

## Behavioral Choice Treatment Promotes Continuing Weight Loss: Preliminary Results of a Cognitive–Behavioral Decision-Based Treatment for Obesity

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Twenty-four obese women were randomly assigned to 1 of 2 group treatments: behavioral choice treatment (BCT) or traditional behavioral treatment (TBT). BCT uses decision theory to promote moderate behavior change that can be comfortably, and therefore permanently, maintained. Groups completed a moderate-intensity walking program and obtained feedback from computerized eating dairies. The TBT group evidenced greater weight loss at posttreatment. However, the TBT group also evidenced a trend to regain weight, whereas the BCT group continued a slow weight loss during follow-up. Exercise followed a similar pattern. Both groups decreased in restraint and increased in self-esteem.

Obesity remains one of the most serious public health problems in the United States, affecting one third of adult Americans (Kuczmarski, Flegal, Campbell, & Johnson, 1994). Behavioral programs have been the principal treatment for obesity, but such programs have been under attack because of high rates of relapse and questions regarding the health effects of both dieting and mild to moderate obesity (Brownell & Rodin, 1994; Garner & Wooley, 1991; Glenny, O'Meara, Melville, Sheldon, & Wilson, 1997). There have been a number of modifications to the basic behavioral program, including very-low-calorie diets (e.g., Wadden, Sternberg, Letizia, Stunkard, & Foster, 1989) and multicomponent treatments emphasizing exercise (e.g., Perri, Lauer, McAdoo, McAllister, & Yancey, 1986), weight-loss drugs (e.g., Atkinson & Hubbard, 1994), and stimulus control (e.g., Jeffery et al., 1993). However, even with modifications, the behavioral approach still promotes the "diet mentality" (Brownell & Rodin, 1994), which relies on moderate calorie restriction and avoidance of certain foods to lose weight.

New conceptual approaches have only recently begun to emerge. Nondieting or undieting programs address weight preoccupation and deemphasize weight loss (Ciliska, 1990; Omichinski

& Harrison, 1995; Polivy & Herman, 1983), with the idea that discontinuing dieting may be psychologically beneficial and may, ultimately, result in weight loss. Unfortunately, there are only two controlled evaluations of such programs that showed improvements in eating pathology despite the fact that weight did not appear to decrease (Ciliska, 1990; Goodrick, Poston, Kimball, Reeves, & Foreyt, 1998). Similar results exist from uncontrolled evaluations of nondieting treatments (Polivy & Herman, 1992; Roughan, Seddon, & Vernon-Roberts, 1990). Recently, in an uncontrolled investigation, Mellin, Croughan-Minihane, and Dickey (1997) reported continuing weight loss over 2 years with a program designed to teach individuals skills to regulate behavior and lifestyle patterns to promote sustained improvements in health, including weight loss. Although the study did not have a control group, the continuation of weight loss is a unique and important finding.

The present study compared behavioral choice treatment (BCT), a cognitive–behavioral intervention based on a decision-making model of women's food choice, with a traditional behavioral weight-management program that incorporated moderate calorie restriction to promote weight loss. This decision-making model of women's eating behavior relates situation-specific eating behavior to outcomes and goals using decision theory (Sbrocco & Schlundt, 1998). The outcomes and goals governing food choice extend beyond food-related factors (e.g., hunger) to include self-esteem and social acceptance. An initial study found that obese women were generally unaware of the positive consequences of their maladaptive eating behavior and did not see how positive consequences might maintain their problem behavior (Sbrocco, Hodges, Gallant, & Lewis, 1995). They also tended to make global, negative self-attributions to explain why they persisted with maladaptive behaviors despite their desire to lose weight. In two other studies (Sbrocco, Nedegaard, Stone, & Lewis, 1998; Sbrocco & Schlundt, 1998), the decision-making patterns of restrained eaters and obese women suggested they lacked the ability to eat in moderation and tended to either diet or overeat, whereas normal-weight women generally ate in moderation. These studies also

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pointed to a tie between eating behavior and self-evaluation among women.

These findings suggest obese women may benefit from being taught to eat in moderation and from understanding how they make decisions about what to eat. It was hypothesized that a treatment focusing on (a) learning to eat and exercise in moderation and (b) disconnecting eating behavior and self-evaluation would be effective in regulating eating behavior, promoting exercise, and producing more permanent weight loss. Participants in a traditional behavior therapy (TBT) were expected to lose more weight over an acute treatment period but then regain weight during follow-up. The BCT group was expected to lose weight more slowly during the acute treatment because of their higher caloric intake. However, BCT was expected to promote continued weight loss after cessation of the acute treatment because of the development of a pattern of moderation in eating and exercise. This pattern was expected to be associated with more realistic choices that could be maintained over a longer course. BCT was also expected to decrease dietary restraint and increase self-esteem compared with TBT. Given that BCT is based on the decision-making patterns of women and that there is reason to suspect men's food choice may be governed by different rules, only women were included in the present study.

## Method

### Participants

Newspaper advertisements were used to recruit women 18 to 55 years of age who were 30% to 60% above ideal body weight, as assessed by the Metropolitan Height Weight charts (Metropolitan Life Insurance Company, 1983) for a medium frame. The participants were nonsmokers in good health, had not lost more than 10 lb (4.54 kg) in the past month or 20 lb (9.09 kg) in the past 6 months, and had a physician's approval for participation. All but 3 individuals paid \$150 to participate, which was returned on completion of the program. Three participants paid a reduced fee because of financial hardship. Similar to other studies (Hill et al., 1989; Schlundt et al., 1992), participation in the subsequent weight-management program was contingent on completion of 2 weeks of pretreatment diaries, the results of which are described elsewhere (Sbrocco, Stone, et al., 1998). Twenty-four of the 29 women who met these criteria completed a 2-week pretreatment assessment period and were randomized to treatment.

### Measures

*Anthropomorphic measures.* Weight in pounds was measured on a balance beam scale at pretreatment, weekly sessions, posttreatment, and 3-, 6-, and 12-month follow-up sessions, with the participant in indoor clothing without shoes. Height, to the nearest half inch, was calculated at pretreatment. Body mass index (BMI) was calculated from the weight and height measurements.

*Behavioral adherence.* Session attendance and number of days of self-monitoring records were used as an index of adherence to the treatment program (Streit, Stevens, Stevens, & Rossner, 1991). Adherence to the exercise prescription was assessed by evaluating participants' daily exercise logs, which included time and date, activity completed, and duration.

*Eating patterns.* Participants kept computerized self-monitoring diaries during pretreatment and the first 10 weeks of treatment using the Psion 3.0A palmtop computer (Psion PLC, London, England). This methodology has demonstrated preliminary accuracy (Sbrocco, Stone, et al., 1998). We recorded dietary intake using the Comcard Compute-A-Diet

Nutrient Balance System (1993) software program, which contains almost 4,000 foods from the United States Department of Agriculture database. Participants weighed all foods in grams or ounces using portable scales and recorded situational parameters associated with eating using the WEIGHT program, a software program developed by Tracy Sbrocco. This program provides six question prompts that ask participants the date and time, where they were (e.g., home or restaurant), who they were with (e.g., family), how hungry they were on a scale ranging from 1 to 7, and how stressed they were on a scale ranging from 1 to 7. Data from these logs were used to set goals, to provide immediate and weekly feedback to the participants, and to track caloric and macronutrient intakes. We evaluated adherence to caloric prescriptions by examining the reported mean daily caloric intake by week.

*Psychosocial measures.* Participants completed self-report measures at pretreatment, midtreatment, posttreatment, and 3- and 6-month follow-up. Measures were not completed at 12-month follow-up. The Restraint subscale of the Eating Inventory (Stunkard & Messick, 1988) was used to examine changes in dietary restraint. This measure has been shown to be useful with obese individuals and has good validity and reliability in a variety of populations (Gorman & Allison, 1995). Participants completed the Eating Disorders Inventory-2 (EDI-2; Garner, 1991), a 64-item scale designed to assess behavioral and attitudinal characteristics clinically observed in eating disorders. Three subscales were used to examine various aspects of eating-related pathology: Drive for Thinness, Bulimia, and Body Dissatisfaction. Participants completed the State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991), a 20-item measure designed to measure clinical change in self-esteem. Given the high correlations among the three subscales (social, appearance, and performance self-esteem) and the total score (.54 to .83), the SSES total score was used. The Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), a 21-item inventory designed to measure depressive symptomatology, was used as a screen at pretreatment and to examine changes in depressive symptoms over time. No participants evidenced depressive symptomatology significant enough to rule out weight management.

### Procedure

Participants were recruited in two cohorts. An orientation was held to introduce the program. Women were told that they would be randomly assigned to one of two programs, a traditional behavioral weight-loss program or a new weight-management program. At orientation, participants received an hour of instruction in the use of the Psion palmtop computers and began 2 weeks of self-monitoring. Contingent on completion of the self-monitoring, participants within each cohort were then randomly assigned either to BCT ( $n = 12$ ) or to TBT ( $n = 12$ ) and attended 13 weekly 1.5-hr group treatment sessions, with 5 to 7 members per group. Treatment was conducted by a clinical psychologist or a clinical social worker (also a psychology graduate student), who had extensive experience in the behavior treatment of obesity, and two inexperienced psychology graduate student coleaders. Group leaders were crossed by treatment type over the two cohorts. Follow-up group meetings were conducted at 3 and 6 months posttreatment. Follow-up weights were obtained at 3, 6, and 12 months posttreatment.

### Dieting Conditions

All participants received 2-week meal plans and recipe booklets that differed only in the amount of food. Both plans were low fat, with macronutrient composition as follows: 60% carbohydrate, 25% fat, and 15% protein. TBT participants were prescribed a 1,200 kcal/day (5,023 kJ) diet. BCT participants were prescribed approximately 1,800 kcal/day (7,534 kJ). All participants were encouraged to adhere to these plans during the first 2 weeks to model new behavior. Diaries were downloaded onto an IBM-compatible PC during each weekly group meeting during which

participants were provided with immediate feedback, including graphs of daily calorie and daily fat intake and a list of their highest fat foods with lower fat alternatives. All participants were encouraged to eat at a constant calorie level to avoid the common pattern of overrestriction followed by overeating. Self-monitoring was phased out before the acute treatment ended to address behavior change and concerns that arise from discontinuing self-monitoring. The groups were matched on session topic, session length, therapist contact time, homework assignments, self-monitoring of eating behavior, and exercise prescription. Participants were encouraged to complete a walking program (30 min/day, 3 days/week) in a single bout. Formal exercise groups were not held, and participants kept daily exercise logs.

**TBT.** The TBT protocol was adapted from Schlundt's (1987) 12-week treatment protocol, which has been used in several clinical trials to produce short-term weight loss of approximately 12 lb (5.45 kg; Hill et al., 1989; Schlundt et al., 1992). Participants were told that the purpose of the program was to promote a substantial weight loss and to help them develop habits and strategies that would enable them to maintain their weight loss. Standard behavioral weight-management techniques were taught (e.g., self-monitoring, stimulus control, and behavioral substitution). Participants were encouraged to avoid eating and purchasing high-caloric or high-fat foods and to lose weight so they could then maintain these changes. Through feedback, participants were encouraged to keep their calorie intake at 1,200 kcal (5,023 kJ), not below or above. Participants were also taught to understand their reasons for eating, besides nutrition, and to engage in problem solving to determine other methods to respond to stress.

**BCT.** Participants were told that they were going to be taught to stop dieting and to view eating as a choice and that they could expect much slower weight losses than they had experienced in the past but that this approach was designed to produce permanent change. Health behavior, including food choice, avoiding exercise, and eating behavior were discussed as choices designed to achieve certain outcomes (e.g., alleviate hunger, lose weight, feel better, and rest). Individuals were taught to identify their choices and the outcomes that controlled these choices. Certain outcomes were identified as less adaptive (e.g., feeling bad because of foods consumed). On the basis of an understanding of the economics of their choices, participants restructured their thinking or behavior to enable them to achieve positive outcomes. For example, if they identified feeling bad as the result of eating certain "forbidden" foods, cognitive restructuring and behavioral modeling were used to promote eating a reasonable amount of this food and to develop the belief that it is important to know how to eat such foods in moderation. Eating in moderation and eating reasonable amounts of high-fat or forbidden foods were identified as skill deficits that required practice, and these skills were promoted through extensive behavioral modeling in the group and through homework assignments. In addition, individuals were taught to do away with the word *dieting* and the inherent caloric restriction, avoid rigid rules about forbidden foods, engage in pleasurable activities besides eating, engage in regular exercise, and accept themselves regardless of their eating behavior and body weight. Participants were taught to focus on learning to eat in a manner consistent with a reasonable end-goal weight that occurs "down the line" rather than an approach that is focused on how quickly weight can be lost.

## Results

### Demographic Information

Participants in the two conditions (TBT vs. BCT) did not differ significantly on pretreatment measures of age ( $M = 43.1$ ,  $SD = 10.3$  vs.  $M = 39.6$ ,  $SD = 10.7$ ),  $t(22) = 0.81$ , *ns*; weight ( $M = 89.54$  kg,  $SD = 11.61$  kg vs.  $M = 89.56$  kg,  $SD = 8.63$  kg),  $t(22) = 0.04$ , *ns*; BMI ( $\text{kg}/\text{m}^2$ ;  $M = 32.45$ ,  $SD = 3.62$  vs.  $M = 32.82$ ,  $SD = 3.20$ ),  $t(22) = -0.81$ , *ns*; or caloric intake ( $M = 9,964$  kJ,  $SD = 2,215$  kJ vs.  $M = 10,654$  kJ,  $SD = 2,328$  kJ),  $t(22) = 0.47$ , *ns*.

### Primary Analyses

Repeated measures analyses of variance or analyses of covariance (ANCOVAs) were used to evaluate the effects of treatment at midtreatment, posttreatment, and follow-ups (3, 6, and 12 months). Modified Bonferroni corrections were used in comparing group means for significant effects (see Holland & Copenhagen, 1988).

**Weight change.** Figure 1 presents weight change (in kilograms) during treatment and follow-up periods. A repeated measures ANCOVA, with pretreatment weight as the covariate, showed a significant interaction between treatment group and time,  $F(4, 14) = 15.66$ ,  $p < .01$ . Simple main effects testing indicated that the TBT,  $F(4, 14) = 4.44$ ,  $p < .05$ , and BCT,  $F(4, 14) = 29.92$ ,  $p < .01$ , groups' weights differed over time. Follow-up between-groups comparisons revealed that participants in the TBT condition achieved greater weight losses at midtreatment ( $M = -3.50$  kg,  $SD = 1.69$  kg vs.  $M = -0.83$  kg,  $SD = 1.51$  kg),  $t(22) = -3.67$ ,  $p < .01$ , and posttreatment ( $M = -5.56$  kg,  $SD = 3.20$  kg vs.  $M = -2.47$  kg,  $SD = 1.67$  kg),  $t(21) = -2.86$ ,  $p < .01$ . Groups did not differ at the 3-month follow-up,  $t(21) = -1.25$ , *ns*. During extended follow-up, the BCT group achieved greater net weight losses than those in the TBT condition at both 6-month follow-up ( $M = -7.01$  kg,  $SD = 1.96$  kg vs.  $M = -4.50$  kg,  $SD = 2.63$  kg),  $t(20) = 2.57$ ,  $p < .05$ , and 12-month follow-up ( $M = -10.06$  kg,  $SD = 3.42$  kg vs.  $M = -4.29$  kg,  $SD = 2.46$  kg),  $t(20) = 4.46$ ,  $p < .01$ .

**Behavioral adherence.** Treatment completion was defined as attendance at 10 of the 13 treatment sessions, including 2 of the last 3. Only 1 participant did not complete treatment, dropping from the BCT condition at Session 5, citing the 1.5-hr commute time as her reason for withdrawing. She was not available for follow-up assessments. In addition, 2 participants (1 from each group) were not available at 6- and 12-month follow-ups. Attendance rates during the 13 acute treatment sessions were high and did not differ across the TBT ( $M = 12.33$ ,  $SD = 0.78$ ) and BCT ( $M = 11.08$ ,  $SD = 2.15$ ) groups,  $t(22) = 1.89$ , *ns*. Completion of self-monitoring of daily food intake did not differ by treatment group, with the TBT and BCT groups turning in an average of 6.75 ( $SD = 0.36$ ) and 6.53 ( $SD = 1.20$ ) days of records per week, respectively,  $t(22) = 0.59$ , *ns*.

We assessed treatment integrity by examining self-reported adherence to diet and exercise prescriptions. Calorie intake across treatment differed between the groups,  $t(22) = -2.43$ ,  $p < .05$ . The TBT group reported consuming  $1,363.45 \pm 273.00$  kcal ( $5,707 \pm 1,142.77$  kJ), whereas the BCT group reported consuming  $1,674.07 \pm 308.53$  kcal ( $7,007 \pm 1,291.50$  kJ). Reported intake was greater than the prescribed 1,200 kcal for the TBT group and less than the prescribed 1,800 kcal for the BCT group.

Table 1 presents the duration and the number of exercise sessions per week over time. At pretreatment, 7 participants reported exercising (4 in the TBT group). There was a significant Group  $\times$  Time interaction,  $F(1, 21) = 9.94$ ,  $p < .01$ . Both groups significantly increased the frequency of their exercise during the acute treatment, with the TBT increasing the frequency more. This increase was maintained throughout follow-up. Simple main effects indicated that exercise frequency from midtreatment through Month 12 did not significantly change for the BCT group,  $F(4, 18) = 1.04$ , *ns*, or for the TBT group,  $F(4, 18) = 2.32$ . However, there was a trend for the TBT participants to decrease their frequency of

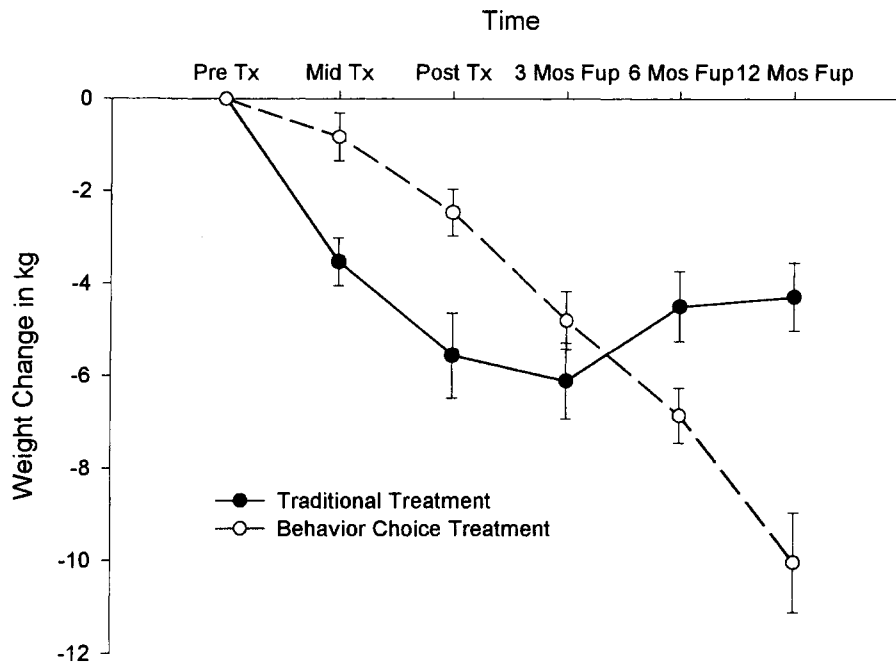


Figure 1. Mean net weight changes (in kilograms) from pretreatment to midtreatment, posttreatment, 3-, 6-, and 12-month follow-ups by group. Vertical lines depict standard errors of the means. Pre Tx = pretreatment; Mid Tx = midtreatment; Post Tx = posttreatment; Mos = months; Fup = follow-up.

exercise from posttreatment to Month 12,  $t(20) = 2.61, p = .06$ . Despite between-groups differences at mid- and posttreatment, there were no differences between groups in exercise frequency at 3-, 6-, or 12-month follow-up. There were no overall between-groups differences,  $F(1, 21) = 0.03, ns$ , or Group  $\times$  Time interactions,  $F(4, 18) = 0.69, ns$ , for the mean duration of exercise sessions. Exercise duration differed over time for the TBT group,  $F(4, 18) = 3.95, p < .05$ , but not for the BCT group,  $F(4, 18) = 0.93, ns$ . For the TBT group, there appeared to be a decrease in duration from posttreatment to 12-month follow-up.

Means for the self-report measures are presented in Table 2. For dietary restraint, the Group  $\times$  Time interaction was not significant,  $F(4, 15) = 0.70, ns$ . The groups did not differ overall,  $F(1, 18) = 1.82, ns$ , on restraint, although they did differ at posttreatment,

$F(1, 18) = 2.53, p < .05$ . Simple main effects testing revealed a significant decrease in restraint for the BCT group over time,  $F(4, 15) = 6.17, p < .01$ . There was a similar trend for the TBT group that did not survive more rigorous testing,  $F(4, 15) = 3.18, ns$ . The groups did not differ overall on the Drive for Thinness subscale of the EDI-2,  $F(1, 18) = 1.09, ns$ , nor was there a significant Group  $\times$  Time interaction,  $F(4, 15) = 0.60, ns$ . Drive for thinness changed for both groups over time,  $F(4, 15) = 6.15, p < .01$ , increasing during treatment and then decreasing from posttreatment to 6-month follow-up for the BCT group,  $F(1, 19) = 4.51, p < .05$ , but not for the TBT group,  $F(1, 19) = 1.34, ns$ . Initially, both groups were elevated on the Body Dissatisfaction subscale of the EDI-2. There were no overall group differences,  $F(1, 17) = 0.11, ns$ . There was a main effect for time  $F(2.44, 14) = 4.93,$

Table 1  
Average Frequency and Duration of Exercise Session Across Treatment and Follow-Up

| Group                                | Pretreatment |       | Midtreatment |       | Posttreatment |       | 3-month follow-up |       | 6-month follow-up |       | 12-month follow-up |       |
|--------------------------------------|--------------|-------|--------------|-------|---------------|-------|-------------------|-------|-------------------|-------|--------------------|-------|
|                                      | M            | SD    | M            | SD    | M             | SD    | M                 | SD    | M                 | SD    | M                  | SD    |
| Frequency: Days per week exercised   |              |       |              |       |               |       |                   |       |                   |       |                    |       |
| TBT                                  | 1.41         | 1.83  | 5.20         | 1.87  | 5.33          | 1.72  | 4.16              | 2.25  | 3.40              | 2.15  | 3.41               | 1.88  |
| BCT                                  | 0.75         | 1.42  | 3.29         | 1.13  | 3.54          | 0.94  | 2.82              | 1.53  | 3.45              | 1.50  | 3.45               | 1.50  |
| Duration: Minutes per week exercised |              |       |              |       |               |       |                   |       |                   |       |                    |       |
| TBT                                  | 36.00        | 8.21  | 43.33        | 11.14 | 49.58         | 11.17 | 47.50             | 11.96 | 45.45             | 13.50 | 35.90              | 21.77 |
| BCT                                  | 50.00        | 22.91 | 38.91        | 16.22 | 44.09         | 16.25 | 44.09             | 16.25 | 45.10             | 18.88 | 42.00              | 17.02 |

Note. TBT = traditional behavior treatment; BCT = behavior choice treatment.

Table 2  
Self-Report Measures by Group Over Time

| Group                                | Pretreatment |           | Midtreatment |           | Posttreatment |           | 3-month follow-up |           | 6-month follow-up |           |
|--------------------------------------|--------------|-----------|--------------|-----------|---------------|-----------|-------------------|-----------|-------------------|-----------|
|                                      | <i>M</i>     | <i>SD</i> | <i>M</i>     | <i>SD</i> | <i>M</i>      | <i>SD</i> | <i>M</i>          | <i>SD</i> | <i>M</i>          | <i>SD</i> |
| Eating Inventory: Restraint subscale |              |           |              |           |               |           |                   |           |                   |           |
| TBT                                  | 10.58        | 4.68      | 9.16         | 4.66      | 9.25          | 2.80      | 7.50              | 2.84      | 8.09              | 2.80      |
| BCT                                  | 11.08        | 5.82      | 8.00         | 5.56      | 6.63          | 2.06      | 5.45              | 1.91      | 5.55              | 1.94      |
| EDI-2: Drive for Thinness subscale   |              |           |              |           |               |           |                   |           |                   |           |
| TBT                                  | 0.84         | 0.47      | 6.83         | 5.96      | 6.25          | 4.69      | 5.45              | 5.61      | 5.00              | 5.71      |
| BCT                                  | 0.88         | 0.70      | 5.18         | 3.57      | 4.36          | 4.73      | 2.60              | 2.67      | 2.00              | 1.70      |
| EDI-2: Body Dissatisfaction subscale |              |           |              |           |               |           |                   |           |                   |           |
| TBT                                  | 20.83        | 4.07      | 18.00        | 6.53      | 15.41         | 7.64      | 18.90             | 7.79      | 16.81             | 9.98      |
| BCT                                  | 20.33        | 6.35      | 17.63        | 7.03      | 16.36         | 8.41      | 15.30             | 8.05      | 12.70             | 8.65      |
| EDI-2: Bulimia subscale              |              |           |              |           |               |           |                   |           |                   |           |
| TBT                                  | 3.00         | 2.13      | 1.91         | 1.73      | 1.66          | 1.92      | 1.72              | 2.19      | 2.00              | 2.28      |
| BCT                                  | 1.83         | 1.69      | 1.00         | 1.34      | 1.18          | 2.48      | 0.90              | 2.02      | 0.22              | 0.63      |
| State Self-Esteem Scale              |              |           |              |           |               |           |                   |           |                   |           |
| TBT                                  | 66.80        | 11.07     | 67.25        | 8.20      | 69.72         | 8.32      | 70.00             | 7.64      | 71.40             | 7.90      |
| BCT                                  | 73.50        | 11.35     | 70.18        | 13.43     | 72.63         | 12.76     | 76.27             | 9.97      | 80.90             | 9.10      |
| Beck Depression Inventory            |              |           |              |           |               |           |                   |           |                   |           |
| TBT                                  | 8.33         | 6.25      | 7.41         | 5.99      | 4.50          | 3.72      | 6.18              | 4.55      | 7.88              | 6.17      |
| BCT                                  | 6.75         | 6.56      | 6.81         | 6.80      | 5.27          | 3.16      | 3.09              | 2.62      | 3.09              | 2.62      |

Note. TBT = traditional behavior treatment; BCT = behavior choice treatment; EDI-2 = Eating Disorders Inventory-2.

$p < .01$ , and a trend for a Group  $\times$  Time interaction,  $F(2.44, 14) = 2.72$ ,  $p = .06$ , in which the BCT group's dissatisfaction decreased and the TBT group's dissatisfaction increased over follow-up. However, even the improved scores on the Body Dissatisfaction subscale were indicative of significant body dissatisfaction. Groups did not differ at pretreatment on the Bulimia subscale of the EDI-2,  $t(22) = 1.48$ ,  $p = .152$ , and neither group evidenced clinical scores on this subscale. There was no Group  $\times$  Time interaction,  $F(4, 15) = 1.56$ ,  $p = .23$ . There was an overall main effect for group,  $F(1, 18) = 5.50$ ,  $p < .05$ , with the TBT group scoring higher on the Bulimia subscale across all assessment points. There also was a trend for the TBT group to decrease over time on the Bulimia subscale,  $F(4, 15) = 0.24$ ,  $p = .07$ . The low initial subscale scores limited the amount of decrease that could be observed.

The groups' SSES scores did not differ at pretreatment,  $t(22) = -1.46$ , *ns*, and the results suggest participants had good self-esteem (Heatherton & Polivy, 1991). The Group  $\times$  Time interaction was not significant,  $F(4, 15) = 1.53$ , *ns*, and there was no main effect for group,  $F(1, 18) = 2.33$ , *ns*. There was a trend for both groups' self-esteem to increase over time,  $F(4, 15) = 3.01$ ,  $p = .052$ . Overall, the groups did not present with significant depressive symptoms. There were no significant differences between the groups over time,  $F(1, 21) = 0.02$ , *ns*, and both groups improved over treatment,  $F(1, 21) = 5.60$ ,  $p < .05$ . Examination of group BDI means over follow-up suggests that the BCT group continued to decrease, whereas the TBT group returned to base-

line. There was a trend for the BCT group to score lower on the BDI at 3 months,  $F(1, 20) = 3.80$ ,  $p < .06$ , and at 6 months,  $F(1, 18) = 7.36$ ,  $p < .05$ ; however, both groups' scores represented nonclinical levels of depressive symptomatology.

## Discussion

The continuation of weight loss up to 12 months after the cessation of BCT is a noteworthy, preliminary finding because behavioral treatment interventions are commonly associated with a pattern of weight regain after treatment ends (e.g., Glenny et al., 1997). The exercise data followed a similar pattern in which the TBT participants initially engaged in a more ambitious exercise program that was not maintained, whereas the more moderate program adopted by the BCT participants was maintained. These results confirm Perri, Martin, Notelovitz, Leermakers, and Sears's (1997) findings that a home walking program is an effective method of promoting exercise for obese women.

Several empirical steps must be undertaken to evaluate the efficacy of BCT, including an increased focus on underlying cognitive change, comparison of eating styles (e.g., moderation vs. dieting), examination and identification of the active treatment components, replication with a larger sample, and extension of the follow-up period beyond 1 year. Some of these limitations are addressed below. The effectiveness or clinical utility of this program also needs to be considered and examined in future research.

On the basis of the National Heart, Lung and Blood Institute's (NHLBI; 1998) guidelines, the typical BCT participant went from being obese (BMI = 32.82) to being overweight (BMI = 29.13) after 15 months. This represents a weight loss of 11% of initial weight, which is in line with the NHLBI-recommended initial weight loss of 10% from baseline. For overweight individuals, defined as individuals who have BMIs between 27 and 29.9, continued weight loss is recommended if individuals have two or more risk factors or a high waist circumference (NHLBI, 1998). Consequently, although individuals in the BCT group were still overweight, this improvement clearly represents a clinically significant impact on health. In fact, because these individuals were otherwise healthy, further weight loss may not be recommended. Future investigations need to examine the effectiveness of this program in populations with more risk factors that need to achieve greater weight losses. Participants and clinicians also need to adjust their expectations to fit with what would traditionally be considered a very slow rate of change. Related to this, future investigations should incorporate measures of participants and practitioner expectations and acceptance and measures of treatment integrity.

A limitation of this study is the reliance on self-report data to assess exercise and food intake. Although there is evidence that quantifying exercise through the use of exercise logs is valid (King, Haskell, Taylor, Kraemer, & DeBusk, 1991), there is also evidence that obese individuals may overreport activity levels (Lichtman et al., 1992). Direct physiological testing of fitness levels would be preferable. Although it is possible that the exercise frequency and duration reported here were overestimated, this possibility probably does not take away from the overall findings that the TBT group exercised more often than the BCT group during the acute treatment. Similarly, a growing body of evidence has suggested that overweight women underestimate food intake (Lichtman et al., 1992). In this study, palmtop computers were used to assess food intake and estimates were not validated by direct methods of energy intake. Even though we did not use more direct measures of energy estimation to validate food intake because the groups did not differ in reported intake at pretreatment and because of the differences in weight loss, we feel it is reasonable to conclude that the TBT participants were eating less than the BCT participants. Obviously, however, a direct estimate of energy expenditure would have been ideal.

There are a number of other methodologic issues that limit the findings of this study. The sample size was smaller than what is generally used in treatment efficacy studies. In addition, the standard deviations for weight change were smaller than those commonly reported in the literature, suggesting our sample may be different in some way. We can only speculate as to why this may be the case. Our program description, used as part of the screening procedure, and the fact that participation was contingent on 2 weeks of self-monitoring likely dissuaded all but the most committed individuals. The adherence measures suggest participants were very adherent. There are a number of other factors that promoted good adherence, including the participation fee, the monetary incentive for study completion, the use of computerized diaries that provided immediate feedback, the small group size, and the low member-to-leader ratio. Our variance also could have been restricted because we instructed individuals to closely adhere to their caloric prescriptions, tracked their progress with the com-

puterized diaries, and often urged participants in both groups to increase their caloric intake. Because of this, we did not have the larger weight losses sometimes seen when a few individuals eat less than what is prescribed. Lastly, we did lose several participants during baseline, and it is quite possible that these individuals were less successful, a phenomenon that would further restrict our range on the dependent variables.

Another methodologic limitation is the generalizability of our TBT group. The use of computerized diaries represents a big departure from a traditional program. It could also be argued that because of the short length of the TBT treatment and the discontinuation of self-monitoring, the traditional program was not representative of state-of-the-art behavioral programs, which are generally 20-plus weeks long and use self-monitoring throughout. These points are clearly important. It is also worth noting, however, that the efficacy of shorter programs have been examined in detail, and, in fact, program length has increased in an attempt to remedy recidivism. The weight loss demonstrated in the TBT group was comparable with that achieved in other clinical trials implementing similar-length programs and with clinical trials implementing this program along with the discontinuation of self-monitoring (e.g., Hill et al., 1989; Schlundt et al., 1993). In addition, there are still many 8- to 16-week public programs in existence. Thus, although not representing the best behavior therapy program, our TBT program shared many features of typical routine behavior therapy treatments. Had the programs been longer (20-plus weeks), our expectations would have been that individuals in the TBT group would have lost more weight, would have exercised more because of the extended acute treatment phase, and would have improved on weight maintenance. However, we still do not think weight loss would have continued for the TBT group as it did for the BCT group.

Another methodologic issue is the choice of appropriate comparison groups to evaluate BCT. BCT uses mild caloric restriction to model realistic eating and teaches individuals to avoid dieting. We chose a TBT with a 1,200-kcal plan as a comparison because this level of restriction is common, whereas a 1,800-kcal plan would have been atypical. Although the present design seems appropriate for an initial study, it does raise questions regarding the role the caloric prescriptions played in the results. Future evaluations could cross the two dietary intake prescriptions (e.g., 1,200 kcal and 1,800 kcal) by treatment type to address this issue. However, to do this would require modification of some of the basic premises of BCT and may be confusing to participants. For example, are individuals likely to be confused by instructions not to diet and to eat 1,200 kcal? These questions are certainly worthy of future investigation and would be best addressed by using a dismantling approach to identify the active features of BCT and, as noted earlier, by examining patient and therapist expectations and satisfaction.

This study is also limited by the population studied, namely, moderately obese women. The decision-making model on which BCT was based was developed with normal-weight and moderately obese women. The utility of this model and the treatment with other populations (e.g., men or morbidly obese women) is unknown. Given that men and women differ on many parameters with regard to their attitudes about eating and body image, it would seem prudent to first understand how men make decisions about eating and exercise. If the decision-making process appears simi-

lar, then it would make sense to take the next step and apply BCT. In summary, many questions remain unanswered, particularly regarding mechanisms of action, yet the continuing weight loss observed does offer promise for improving obesity treatment. Given the widespread problem of obesity and the difficulty in maintaining weight loss, these preliminary findings are clearly worthy of further investigation.

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