

## Effects of Four Maintenance Programs on the Long-Term Management of Obesity

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This study evaluated the effectiveness of four posttreatment programs designed to enhance the long-term maintenance of weight loss. Mildly and moderately obese adults ( $N = 123$ ) were randomly assigned to one of the following five conditions: (a) behavior therapy only; (b) behavior therapy plus a posttreatment therapist-contact maintenance program; (c) behavior therapy plus posttreatment therapist contact plus a social influence maintenance program; (d) behavior therapy plus posttreatment therapist contact plus an aerobic exercise maintenance program; or (e) behavior therapy plus posttreatment therapist contact plus both the aerobic exercise and social influence maintenance programs. All posttreatment programs were conducted in 26 biweekly sessions during the year following behavioral treatment for obesity. At an 18-month follow-up evaluation, all four conditions that combined behavior therapy with a posttreatment maintenance program yielded significantly greater long-term weight losses than behavior therapy alone.

The tendency for obese people to regain the weight they have lost in treatment represents an important clinical and research problem. After treatment, obese clients frequently abandon weight loss techniques, experience relapses, and regain weight (Bennett, 1986; Foreyt, 1987; Perri, 1987). In a review of recent behavioral programs for obesity, Brownell and Wadden (1986) calculated that, during the year following treatment, participants on average regained 36% of the weight they had lost initially. These findings have led reviewers of the obesity treatment literature such as Jeffery (1987) to conclude that "the most pressing continuing challenge is maintaining weight loss . . . obesity should be viewed as a chronic condition requiring long-term supportive care" (p. 20).

Booster sessions, monetary contracts, ongoing support groups, and mail and telephone follow-ups have been evaluated as potential remedies to the maintenance problem. Empirical support for the effectiveness of these procedures has been equivocal (e.g., Kramer, Jeffery, Snell, & Forster, 1986; Perri et al., 1987). More promising findings have been obtained with multifaceted maintenance programs that have included frequent therapist contacts coupled with training targeted to the specific

problems of the posttreatment period (Perri, McAdoo, McAllister, Lauer, & Yancey, 1986; Perri, McAdoo, Spevak, & Newlin, 1984; Perri, Shapiro, Ludwig, Twentyman, & McAdoo, 1984). The first objective of the present study was to conduct a multifaceted, therapist-led, problem-solving program over the course of an entire year following treatment and to test its effectiveness as a weight-loss maintenance strategy.

Poor maintenance of treatment effects may be due in part to a decrease in motivation (or incentives) to sustain the behaviors necessary to continue weight loss (cf. Bandura & Simon, 1977; Brehm & McAllister, 1980; Jeffery, 1985). After several months of restricted caloric intake, many obese clients experience a plateau in weight loss despite maintenance of low caloric intake (Bjorntorp et al., 1975). As they become aware of this exceedingly high cost-benefit ratio, clients may conclude that further progress is beyond their personal control. Consequently, they may experience a loss of motivation to sustain the weight-loss endeavor, and they may resume a higher caloric intake precisely at a time when a slowed metabolic rate (due to prolonged dieting) predisposes them to a rapid regaining of weight (Garrow, 1986; Polivy & Herman, 1985). To enhance motivation during follow-up, social influence strategies, such as instructing peers to reinforce short-term progress, using a contract system that includes financial incentives for maintaining habit changes and weight loss, and having participants publicly model appropriate weight-loss techniques, may provide clients with positive incentives for controlling eating and exercise behaviors (cf. Stuart, 1980). The second objective of the present investigation, therefore, was to determine whether the programmatic addition of

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This research was supported in part by a Veterans Administration Merit Review Research Award to the first author. The authors are grateful to Donna Yancey, James Rebeta, Mimi Brittingham, and Kathy Stevens-Sutton for their assistance in the completion of this study.

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social influence strategies would improve clients' posttreatment progress.

A third goal of this study was to determine whether the inclusion of a high-frequency exercise program during the posttreatment period would enhance long-term weight loss. Exercise increases energy expenditure, counteracts the slowing of metabolism that accompanies dieting, and preserves the loss of lean tissue during weight reduction (cf. Stern & Lowney, 1986; Thompson, Jarvie, Lahey, & Cureton, 1982). Exercise may also serve as a specific cue to maintain moderate caloric intake (Brownell & Foreyt, 1985). Four experiments (Dahlkoetter, Callahan, & Linton, 1979; Harris & Hallbauer, 1973; Perri et al., 1986; Stalonas, Johnson, & Christ, 1978) have demonstrated the benefits of incorporating exercise during behavioral treatment for obesity. Furthermore, recent findings from an animal model of obesity suggested that the long-term effects of exercise may include a lowering of the set point for body weight (Keese, 1986). The effectiveness of posttreatment exercise on long-term weight loss merits investigation. To date, no experiment has investigated the impact of an aerobic exercise program implemented during the posttreatment period.

In the present study, we tested the effectiveness of four year-long maintenance programs for the management of obesity. The maintenance programs were compared with a control condition that provided behavior therapy with no posttreatment contact. Each posttreatment program included 26 biweekly therapist-led problem-solving sessions. The five conditions of the experiment were behavior therapy only (B); behavior therapy plus posttreatment therapist contact (BC); behavior therapy plus posttreatment contact plus a social influence maintenance program (BCS); behavior therapy plus posttreatment contact plus an aerobic exercise maintenance program (BCA); and behavior therapy plus posttreatment contact plus both the aerobic exercise and social influence maintenance programs (BCAS).

## Method

### Subjects

One hundred and twenty-three subjects, 26 men and 97 women from 22 to 59 years of age, were selected from among 182 respondents to advertisements announcing a weight-control program. An initial questionnaire served to screen for applicants who were (a) between 20%–100% over ideal body weight based on the Metropolitan Life Insurance Company (1959) norms; (b) not currently involved in other weight-loss programs; (c) not suffering from any significant health disorders; (d) not taking any medication that would affect weight loss; (e) willing to commit themselves to involvement in the study over a 24-month period; and (f) not pregnant or planning to become pregnant during the course of the study. All subjects who were accepted into the program were required to obtain written approval for participation from a physician and to pay a \$125 refundable deposit (\$40 was returned contingent on attendance and completion of self-monitoring records during treatment, and \$85 was returned for attendance at follow-up or maintenance group meetings scheduled during the 18 months after treatment).

### Therapists

Treatment was conducted in groups by five teams of therapists. Each team consisted of a clinical psychologist paired with either a physician or a nurse practitioner. All therapists had prior experience conducting behavior therapy for obesity. Therapists were provided with manuals

detailing session-by-session treatment procedures. In addition, all therapists participated in weekly training sessions to help ensure uniformity of treatment procedures across therapists.

### Experimental Design

In this study, we utilized a constructive treatment research design wherein extra components are added sequentially to a basic treatment program to determine if the additions enhance the efficacy of the basic treatment (cf. Wilson, 1978). Subjects were randomly assigned by blocks stratified by percentage over ideal weight to one of the following five conditions: B (4 men, 17 women;  $M = 89.03$  kg); BC (7 men, 18 women;  $M = 97.37$  kg); BCS (4 men, 21 women;  $M = 96.94$  kg); BCA (5 men, 21 women;  $M = 95.21$  kg); or BCAS (6 men, 20 women;  $M = 97.40$  kg). Each cell was divided into two treatment groups (with 10–13 clients apiece), and therapists were counterbalanced so that no pair conducted two groups within the same condition.

### Conditions

*Behavior therapy (B).* Treatment consisted of 20 weekly group sessions, each 2 hr in duration. Clients were taught the various self-control procedures typically used in behavioral programs for weight reduction (Johnson & Stalonas, 1981). The techniques included self-monitoring, stimulus control strategies, self-reinforcement, cognitive restructuring, and procedures to slow the pace of eating. Clients were also provided with a regimen of aerobic exercise (Perri et al., 1986). Aerobic training included written instructions, therapist-led demonstrations, and actual practice of the exercise during each treatment session. The two types of physical activity used for conditioning were brisk walking and stationary cycling. The target amount of aerobic exercise was 80 min per week (20 min per day, 4 days per week). After 20 weeks of treatment, clients in this condition had no additional contacts with their therapists except for follow-up assessments scheduled for 6-, 12-, and 18-months post-treatment.

*Behavior therapy plus posttreatment contact (BC).* Clients in this condition received the behavior therapy program plus a posttreatment maintenance program consisting of 26 biweekly therapist contacts. Maintenance program sessions included weigh-ins, reviews of self-monitoring data, and therapist-led problem solving of difficulties in maintaining habit changes in eating and exercise behavior. The problem-solving procedure was adapted from D'Zurilla and Nezu (1982) and included the following four steps: (a) problem identification (i.e., stating the problem in concrete and specific terms); (b) generation of alternatives (i.e., "brainstorming" to develop a comprehensive list of potential solutions); (c) decision making (i.e., anticipating the short- and long-term consequences of possible solutions and selecting a course of action); and (d) solution implementation and verification (i.e., implementing a course of action and evaluating its effectiveness). Clients in this condition were asked to maintain their aerobic exercise levels at 80 min per week throughout the posttreatment period.

*Behavior therapy plus posttreatment contact plus social influence maintenance program (BCS).* Clients in this condition received the initial behavioral treatment and the posttreatment therapist contact programs. In addition, they received a multifaceted program of social influence strategies designed to enhance motivation and to provide incentives for continued weight-loss progress. The social influence program included monetary group contingencies for program adherence and continued weight loss, active client participation in preparing and delivering lectures on maintaining weight loss, and instructions on how to provide peer support for weight loss through ongoing telephone contacts and peer group meetings during the posttreatment period (for details see Perri, McAdoo et al., 1984).

The following example illustrates one way in which group contingencies were administered to encourage adherence and weight loss. During the 2-week period between posttreatment sessions, each client

could earn up to 10 bonus points based on adherence and weight-loss progress. One point was earned for each of the following five activities: (a) attendance at the posttreatment session; (b) completion of self-monitoring records; (c) maintenance of daily calorie limits; (d) completion of required exercise; and (e) completion of one social influence network phone call. In addition, biweekly weight-loss goals were set for each participant, ranging from 0 to 2.0 lb per 2 weeks (depending on the client's amount over ideal weight). Up to 5 additional bonus points could be earned for weight-loss progress (i.e., 100% attainment of weight-loss goal = 5 points; 75% of goal = 4 points; 50% of goal = 3 points; 25% of goal = 2 points; no weight gain = 1 point; any weight gain = 0 points). At each posttreatment session, a lottery was conducted for which the prize was determined by the number of group members who attended the session (\$1 for each client present; funds were derived from previously forfeited deposits). The number of tickets the client received for the lottery was equal to the number of bonus points that he or she had earned during the 2-week interval.

*Behavior therapy plus posttreatment contact plus aerobic exercise maintenance program (BCA).* Clients in this condition received the initial behavioral treatment and the posttreatment therapist contact programs. In addition, they received an aerobic exercise maintenance program consisting of a new set of exercise goals for the posttreatment period and therapist-led exercise bouts during the biweekly posttreatment sessions. During the first 6 months of the maintenance program, the prescribed frequency and duration of aerobic exercise were increased gradually from 20 min per day, 4 days per week, to 30 min per day, 6 days per week (i.e., from 80 to 180 min per week).

*Behavior therapy plus posttreatment contact plus both the aerobic exercise and social influence maintenance programs (BCAS).* Clients in this condition received the initial behavioral treatment and the posttreatment therapist contact programs. In addition, these participants also received both the aerobic exercise and social influence maintenance programs previously described.

### Dependent Measures

*Weight.* Four weight-related measures were used in the data analyses: body weight, body weight lost, body-mass index (BMI; weight/height<sup>2</sup>), and percentage over ideal body weight. Changes in weight were assessed at posttreatment and at 6-, 12-, and 18-month follow-up sessions.

*Adherence.* At posttreatment and at each follow-up session, clients completed questionnaires rating the degree to which they had adhered to each program strategy on a 7-point Likert-type scale (i.e., 1 = *nonadherence*, 7 = *full adherence*).

## Results

### Preliminary Analyses and Attrition Rates

Overall multivariate analyses of variance (MANOVAS) and subsequent one-way analyses of variance (ANOVAS) indicated that there were no significant pretreatment group differences in body weight, percentage over ideal weight, or BMI. Of the 123 subjects who began the program, 29 dropped out during the initial treatment phase, representing an attrition rate of 23.6%. Rates of attrition did not differ significantly among groups (B = 19.0%; BC = 24.0%; BCS = 26.9%; BCA = 24.0%; and BCAS = 23.1%). Subjects who dropped out did not differ significantly at pretreatment from subjects who completed the program in body weight, percentage overweight, or BMI. During the follow-up phase, 3 subjects withdrew from the study (1 was pregnant, 1 was hospitalized for a problem unrelated to obesity, and 1 moved to a different region of the country). In addition, 2 subjects declined to participate in the maintenance programs but

agreed to attend the follow-up weigh-ins. Thus, 91 (74.0%) of the 123 clients who began treatment completed participation through the 18-month follow-up evaluation.

### Analyses of Weight-Related Measures

Table 1 presents means and standard deviations for body weight lost for each condition at posttreatment and at 6-, 12-, and 18-month follow-ups. A repeated-measures MANOVA was used to examine the effects of condition over time. This analysis indicated (a) a significant main effect for condition, MANOVA  $F(4, 86) = 2.54, p < .05$ ; (b) a significant main effect for time, MANOVA  $F(3, 84) = 109.58, p < .0001$ ; and (c) a significant interaction effect for Condition  $\times$  Time, MANOVA  $F(12, 222) = 1.89, p < .05$ . The analyses of body weight, percentage overweight, and BMI using repeated-measures MANOVAS showed the same pattern of significant effects.

Significant MANOVA effects were subjected to further evaluation using Newman-Keuls post hoc comparisons. From pretreatment to posttreatment, subjects in all five conditions lost significant amounts of weight ( $M = 12.45$  kg or 27.39 lb), and there were no significant differences between conditions. At the 6-month follow-up, the four conditions with posttreatment maintenance programs demonstrated significantly better weight-loss progress than the behavior-therapy-only condition, and the BCAS condition demonstrated a significant additional weight loss of 4.08 kg or 8.98 lb (all  $ps < .01$ ). At the 12-month follow-up, all four experimental conditions demonstrated significantly better maintenance of weight loss than the behavior-therapy-only condition, which showed a significant relapse from posttreatment with a weight gain of 5.13 kg or 11.29 lb. The superiority of the four maintenance conditions over the behavior-therapy-only group was maintained at the 18-month follow-up assessment. Moreover, the four experimental conditions on average maintained 82.7% of their mean posttreatment losses, whereas the behavior-therapy-alone condition maintained only 33.3% of its original weight loss. Significant differences between the four experimental conditions were not evident at the follow-up evaluations.

Additional analyses were conducted to examine the influence of dropouts, therapists, and clients' sex on weight-related dependent variables. A repeated-measures MANOVA was used to analyze the weight data for all subjects who began the study. The conservative approach of assuming that each client who dropped out of the treatment program had relapsed to pretreatment weight was used to complete missing data. This analysis showed the same pattern of significant effects as the analyses that excluded the subjects who dropped out of the study. The effect of therapist pairs on body weight lost was also evaluated and was found to be nonsignificant. Finally, the weight data were analyzed for female subjects only. This analysis also showed the same pattern of results as those completed on the entire sample.

### Analyses of Adherence Measures

Subjects' self-reports of adherence to the treatment and maintenance program strategies were examined by means of descriptive statistics and by inferential testing using a repeated-

Table 1  
Means and Standard Deviations for Weight Loss (kg)  
by Condition Across Assessments

Assessment	Condition				
	BCAS (n = 19)	BCA (n = 18)	BCS (n = 19)	BC (n = 19)	B (n = 16)
Posttreatment					
<i>M</i>	13.67 <sub>x,x</sub>	13.05 <sub>x,x</sub>	11.34 <sub>x,x</sub>	13.17 <sub>x,x</sub>	10.80 <sub>x,x</sub>
<i>SD</i>	5.85	4.83	3.07	5.35	7.60
6-month follow-up					
<i>M</i>	17.75 <sub>x,y</sub>	15.19 <sub>x,x</sub>	13.54 <sub>x,x</sub>	15.79 <sub>x,x</sub>	8.94 <sub>y,x,y</sub>
<i>SD</i>	11.66	6.21	6.17	11.77	8.76
12-month follow-up					
<i>M</i>	15.70 <sub>x,x</sub>	12.97 <sub>x,x</sub>	13.35 <sub>x,x</sub>	12.88 <sub>x,x</sub>	5.67 <sub>y,y</sub>
<i>SD</i>	14.29	7.63	7.37	12.44	6.90
18-month follow-up					
<i>M</i>	13.54 <sub>x,x</sub>	9.14 <sub>x,x</sub>	8.43 <sub>x,x</sub>	11.41 <sub>x,x</sub>	3.60 <sub>y,z</sub>
<i>SD</i>	15.16	6.41	7.47	12.13	6.18

Note. B = behavior therapy; C = posttreatment therapist contact; A = aerobic exercise maintenance program; S = social influence maintenance program. Dissimilar lower case subscripts indicate significant differences between conditions within a time period, and dissimilar upper case subscripts indicate significant differences within a condition across time periods ( $ps < .01$ ).

measures MANOVA. Significant effects were subjected to post hoc analyses using Newman-Keuls comparisons.

Table 2 presents means and standard deviations for self-ratings of adherence to nine weight-control strategies at posttreatment and at each follow-up. The repeated-measures MANOVA on these data showed (a) a significant main effect for condition, MANOVA  $F(4, 70) = 3.73, p < .01$ ; (b) a significant main effect for time, MANOVA  $F(3, 86) = 140.80, p < .0001$ ; and (c) a significant interaction effect for Condition  $\times$  Time, MANOVA  $F(12, 180) = 4.91, p < .0001$ . Post hoc testing indicated that there were no significant differences between groups at posttreatment. At the 6-month follow-up, the four conditions with posttreatment maintenance programs demonstrated significantly better adherence than the behavior-therapy-only condition (all  $ps < .01$ ), and the BCS condition showed significantly greater adherence than two of the other three maintenance conditions (BCA and BC;  $ps < .01$ ). At the 12-month follow-up, all four maintenance conditions showed significant decreases in adherence from their 6-month follow-up levels; however, the BCS condition maintained a significantly higher level of adherence than any of the other conditions ( $ps < .02$ ). At the 18-month follow-up, the BCS condition reported a significant decrease in adherence ( $p < .01$ ), and there were no significant between-groups differences between any of the conditions.

A correlational analysis (corrected for familywise error rates) was calculated to determine the relation between self-reported adherence and weight gain during the follow-up period. A significant negative relation between subjects' ratings of adherence to self-management strategies and weight gain at each follow-up session was observed ( $rs$  ranging from  $-.27$  to  $-.48$ , all  $ps < .05$ ).

Attendance at the maintenance program sessions was moderately high. On average, clients attended 66.8% of the 26 scheduled sessions ( $M = 17.38, SD = 6.84$ ). Clients in the BCS condi-

tion attended a significantly greater number of maintenance program sessions than subjects in the BCA condition ( $Ms = 21.05$  and  $14.83$ , respectively;  $p < .05$ ). There were no other significant differences in attendance rates between the maintenance program conditions.

Self-reported adherence to the aerobic exercise prescriptions was generally high during both the treatment and maintenance phases of the study. A repeated-measures MANOVA on self-reported exercise showed a significant interaction effect for Condition  $\times$  Time,  $F(12, 222) = 4.51, p < .001$ . At posttreatment, there were no significant differences between conditions, and participants reported a mean of 97.58 min per week of aerobic exercise. At the 6-month follow-up assessment, however, significant between-groups differences were observed. Significantly greater amounts of aerobic exercise were reported by participants in conditions with high-frequency exercise ( $Ms = 149.50$  and  $142.11$  min per week for BCA and BCAS, respectively) than by those without it ( $Ms = 83.16, 61.58$ , and  $80.44$  for BCS, BC, and B, respectively;  $ps < .05$ ). At both the 12- and 18-month follow-ups, there were no significant differences between conditions in self-reported exercise. A correlational analysis (corrected for familywise error rates) was calculated to determine the relation between self-reported exercise and weight loss at each assessment. A small, marginally significant, positive relation was observed between weight loss and subjects' self-reports of minutes per week of exercise ( $rs$  ranging from  $.19$  to  $.28$ , all  $ps < .10$ ).

## Discussion

The major objective of this study was to examine the effects of four posttreatment maintenance programs on long-term weight loss. The results indicated that all four conditions that combined behavior therapy with a posttreatment maintenance pro-

Table 2  
Means and Standard Deviations for Adherence  
by Condition Across Assessments

Assessment	Condition				
	BCAS (n = 19)	BCA (n = 18)	BCS (n = 19)	BC (n = 19)	B (n = 16)
Posttreatment					
<i>M</i>	55.22 <sub>x,x</sub>	56.83 <sub>x,x</sub>	56.21 <sub>x,x</sub>	53.79 <sub>x,x</sub>	56.38 <sub>x,x</sub>
<i>SD</i>	5.22	6.66	4.81	4.64	4.73
6-month follow-up					
<i>M</i>	52.61 <sub>x,y,x</sub>	46.19 <sub>y,y</sub>	58.74 <sub>x,x</sub>	49.00 <sub>y,y</sub>	34.94 <sub>x,y</sub>
<i>SD</i>	12.67	17.57	3.49	14.51	9.45
12-month follow-up					
<i>M</i>	33.77 <sub>x,y</sub>	38.38 <sub>x,z</sub>	48.33 <sub>y,y</sub>	33.00 <sub>x,z</sub>	33.56 <sub>x,y</sub>
<i>SD</i>	12.42	14.95	8.45	15.78	11.33
18-month follow-up					
<i>M</i>	29.00 <sub>x,z</sub>	26.83 <sub>x,w</sub>	33.38 <sub>x,z</sub>	31.25 <sub>x,z</sub>	29.50 <sub>x,z</sub>
<i>SD</i>	11.83	8.27	8.72	11.48	7.72

Note. B = behavior therapy; C = posttreatment therapist contact; A = aerobic exercise maintenance program; S = social influence maintenance program. Dissimilar lower case subscripts indicate significant differences between conditions within a time period, and dissimilar upper case subscripts indicate significant differences within a condition across time periods ( $ps < .01$ ).

gram sustained significantly greater long-term weight losses than a behavior-therapy-only condition. From posttreatment to the 18-month follow-up, participants in the four posttreatment programs on average maintained 82.7% of their mean posttreatment weight loss. During the same period, clients in the condition that did not receive a maintenance program experienced significant relapses and on average sustained only 33.3% of their mean posttreatment weight loss. Moreover, the magnitude of long-term weight losses sustained by maintenance program participants ( $M = 10.65$  kg or 23.43 lb) compares favorably with results reported in the obesity treatment literature (cf. Brownell & Wadden, 1986). These findings indicate that an intensive, therapist-led program directed toward teaching clients how to deal with the specific problems of the posttreatment period can indeed enhance the long-term maintenance of weight loss.

The effectiveness of the therapist-contact maintenance programs may be attributed in part to greater participant adherence to weight-loss strategies during the 6 months following the initial behavior therapy period. The problem-solving strategies used in maintenance sessions may have assisted clients in overcoming obstacles to maintaining the habit changes acquired in the initial treatment period (cf. Black, 1987). In addition, participants in the maintenance programs may have been subject to the continuing influence of therapist demand. The longer clients continue in contact with their therapists, the longer they seem to adhere to the behaviors recommended by their therapists as necessary for weight loss (cf. Bennett, 1986).

The results of this study are consonant with the social learning conceptualization of relapse in addictive behaviors. Theorists such as Brownell, Marlatt, Lichtenstein, and Wilson (1986) have contended that, following treatment for addictive disorders, clients often encounter circumstances in which they are ill-equipped to cope effectively. Slips or lapses in such situations frequently produce a decrease in self-efficacy that eventually results in the abandonment of the entire self-management effort (cf. Marlatt & Gordon, 1985). Brownell et al. (1986) argued that the prevention of relapse requires the development of posttreatment strategies that enhance clients' long-term coping skills. Our findings are consistent with this social learning model of relapse prevention. Compared with subjects who received initial treatment only, clients who received posttreatment training in cognitive and behavioral coping strategies (i.e., problem solving) exhibited better overall adherence to self-control procedures and demonstrated significantly greater long-term maintenance of weight loss.

The second objective of this study was to determine whether the programmatic addition of social influence strategies to the therapist contact program would produce incremental improvements in clients' posttreatment progress. The results showed that the addition of the social influence program (i.e., BCS) improved participant adherence during the year following treatment compared with the BC and BCA conditions. However, the higher levels of adherence in the social influence conditions were not accompanied by significantly better weight-loss progress. Moreover, as the various incentives and social supports for continued adherence were withdrawn, the degree of adherence decreased significantly (cf. Brehm & McAllister, 1980; Kramer et al., 1986).

The third goal in this study was to determine whether the

addition of high-frequency exercise to the posttreatment therapist contact program would enhance long-term weight loss. At the 6-month follow-up assessment, clients in the high exercise-maintenance conditions reported significantly greater weekly amounts of aerobic exercise compared with subjects in the low exercise-maintenance conditions. However, the higher amounts of self-reported aerobic exercise were not accompanied by significantly greater mean weight losses, and the higher exercise levels were not maintained at the 12- and 18-month follow-ups. The prescribed weekly goal of 180 min per week of brisk walking or stationary cycling may be too difficult for clients to maintain on a regular basis, particularly during periods of seasonally inclement weather. In failing to meet the program's stringent exercise requirements, many clients may have generated negative self-statements about their ability to maintain other self-management strategies as well (cf. Brownell & Foreyt, 1985). Indeed, from 12 to 18 months posttreatment, participants in the BCAS condition reported a significant decrease in overall adherence, whereas clients in the BC condition showed no change in overall adherence during the same period.

The final question addressed in this study was whether the effectiveness of the posttreatment therapist contact program could be enhanced by the addition of both the aerobic exercise and social influence maintenance strategies. From posttreatment to the 6-month follow-up, the BCAS condition was the only condition to demonstrate a significant additional weight loss ( $M = 4.08$  kg or 8.98 lb; net mean weight loss from pretreatment = 17.75 kg or 39.05 lb). At the 18-month follow-up evaluation, the BCAS condition maintained 99.0% of its mean posttreatment weight loss. These findings suggest that the combination of high-frequency exercise coupled with intensive support from peers and therapists holds potential as a multifaceted approach to improving the long-term management of obesity (cf. Perri, 1987).

Effective regimens for the management of obesity may require multiple stages spanning very long periods of time. Many obese clients may need to remain in some form of continuous-care program long after completing an initial period of treatment (cf. Jeffery, 1987). Year-long maintenance programs such as those evaluated in this study may need to be supplemented by tertiary phases of obesity management that provide an opportunity for clients to receive help when problems in maintenance arise (cf. Perri, 1987). The availability of relapse hotlines and client-initiated therapy contacts as well as opportunities for clients to re-enlist in treatment or support groups may be necessary for successful long-term management of obesity.

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Received July 8, 1987

Revision received November 12, 1987

Accepted November 19, 1987 ■