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Relapse Prevention Training and Problem-Solving Therapy in the Long-Term Management of Obesity

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This study compared 2 extended therapy programs for weight management with standard behavioral treatment (BT) without additional therapy contacts. Participants were 80 obese women who completed 20 weekly group sessions of BT and achieved a mean initial weight loss of 8.74 kg. Participants were randomly assigned to a no-further-contact condition (BT only) or to one of two extended interventions consisting of relapse prevention training (RPT) or problem-solving therapy (PST). No significant overall weight-change differences were observed between RPT and BT or between RPT and PST. However, participants who completed the PST intervention had significantly greater long-term weight reductions than BT participants, and a significantly larger percentage of PST participants achieved clinically significant losses of 10% or more in body weight than did BT participants (35% vs. 6%).

Poor maintenance of treatment-induced weight loss remains a major challenge in the management of obesity. Behavioral or "lifestyle" interventions that focus on moderate changes in diet and exercise typically produce body weight reductions of 8%−10% over the course of 20−24 weekly sessions (Perri & Fuller, 1995). However, when behavioral treatment (BT) ends, participants gradually abandon changes in diet and exercise and subsequently regain weight. During the year following BT, obese persons typically regain 30% −50% of their initial losses (Jeffery et al., 2000).

Improved maintenance of lost weight has been observed when BT is continued beyond the typical initial treatment period of 20–24 weeks (Perri, 1998). Studies generally have reported improved maintenance of weight loss for BT extended up to 1 year (e.g., Perri, Nezu, Patti, & McCann, 1989; Wadden, Foster, & Letizia, 1994). However, few such studies have included a randomized control group provided with initial weight-loss treatment but no additional contacts during the year following the initial intervention. Furthermore, little is known about the effectiveness of different types of extended therapy programs, and there are no empirically based guidelines to indicate preferred methods for conducting extended therapy.

In the present study, we tested the effectiveness of two 1-year, extended treatment interventions in comparison with standard BT without extended contact. The extended treatments were based on different approaches to the maintenance problem. The first treatment consisted of relapse prevention training (RPT; Marlatt & Gordon, 1985), a comprehensive skills-based program, wherein participants are taught a variety of specific methods to help them anticipate and cope with the problem of relapse in the maintenance of weight loss. The model assumes that participants can learn a set of skills that will enable them to overcome setbacks and sustain the behavioral changes required for maintenance of weight loss. Two previous studies have suggested the effectiveness of RPT for long-term weight management (Baum, Clark, & Sandler, 1991; Perri, Shapiro, Ludwig, Twentyman, & McAdoo, 1984).

The second approach to extended treatment was derived from a problem-solving model of obesity management (Perri, Nezu, & Viegener, 1992). This model assumes that few obese individuals are able on their own to sustain the changes needed for maintenance of weight loss. The model proposes that active problem-solving efforts by a health care provider can help the obese person to negotiate the myriad of problems that impede successful weight management. Support for this model comes from studies showing the benefits of ongoing professional care in the management of weight loss, with few differences observed based on the specific content of follow-up care (Perri, 1998; Perri et al., 1988).

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Thus, we compared two different extended treatment interventions with standard BT. We hypothesized that 1 year after initial treatment both extended interventions would result in superior maintenance of weight-loss progress compared with standard BT alone. In addition, we were interested in determining whether there was a relative advantage of intensive, didactic training in a comprehensive range of relapse prevention skills compared with continued professional assistance in the form of therapist-led group problem solving.

Method

Newspaper advertisements were used to recruit adults who were 21–60 years of age, had a body mass index (BMI) of 27–40, were in good health, and had a physician's approval to participate in a diet-plus-exercise weight-loss intervention. A total of 103 adults (93 women and 10 men) met these criteria and were assigned randomly to one of three conditions: (a) BT only, (b) BT plus RPT (RPT), or (c) BT plus problem-solving therapy (PST). Participants were randomized at baseline and were informed that in addition to an initial 5-month treatment program they would receive a program of care that would begin either in Month 6 (for the RPT and PST groups) or in Month 18 (for the BT group).

All participants received the same initial cognitive–behavioral weight-loss intervention. Participants attended weekly 2-hr group sessions, with 11–14 members per group, for 20 weeks. There were two groups in the BT condition, three in the RPT condition, and three in the PST condition.

During the initial intervention, standard behavioral weight-management techniques were taught in a didactic fashion (e.g., self-monitoring, goal setting, stimulus control, etc.), and the participants were instructed to follow a low-calorie (i.e., 1,200 kcal per day for women), low-fat diet (i.e., 25% of total kcal per day). Participants were also instructed to complete a home-based walking program consisting of 30 min/day, 5 days/week. Treatment sessions were conducted by pairs of clinical psychology graduate students (counterbalanced by condition) who adhered to a written protocol. All group leaders had prior experience conducting BT of obesity.

During the year following initial treatment, the participants in the BT condition received no additional therapy contacts but were asked to return for follow-up assessments 6 and 12 months later. For the RPT and PST conditions, the groups of participants treated together during the initial phase remained intact for the extended intervention period (i.e., Months 6–17). In both the RPT and PST conditions, the participants were told that the goal of extended treatment was to assist them in maintaining the behavior changes necessary for continued progress in weight management. Participants were allowed to decide whether their goals during extended treatment included further weight loss or the maintenance of lost weight.

Following the initial treatment, RPT participants received a yearlong program of biweekly sessions. The format of the initial treatment program was maintained. At the outset of each session, the group leaders weighed the participants and reviewed their self-monitored eating and exercise diaries. The group leaders then conducted a psychoeducational training session based on 1 of 24 RPT modules designed to teach participants cognitive and behavioral skills for anticipating, avoiding, or coping with lapses in diet and exercise. The lesson plans were adapted from the work of Marlatt and Gordon (1985) and were modified for use in obesity management. Topics included (a) identifying personal high-risk situations for slips and lapses (five sessions); (b) practicing coping with actual high-risk situations, including in vivo practice at restaurants and at a party (three sessions); (c) using problem-solving techniques (six sessions); (d) training in cognitive-coping strategies, including the use of cognitive restructuring to deal with lapses (six sessions); and (e) planning for long-term prevention and a balanced lifestyle (four sessions). All sessions included RPT handouts and written behavioral homework assignments.

Participants in the PST condition also received a yearlong program of biweekly sessions. However, the format of these sessions differed from that of the initial intervention. At the outset of each session, the group leaders weighed the participants and reviewed their self-monitored eating and exercise diaries. Next, the group members were asked to report eating- or exercise-related difficulties experienced during the interval since the previous session. The group leaders, in turn, led the participants in group problem solving with the goal of generating a solution plan for dealing with one of the problem situations described by a group member. The group leaders used the five-stage problem-solving model described by Perri et al. (1992) including (a) orientation (i.e., developing an appropriate coping perspective — "Problems are a normal part of managing your weight, but they can be dealt with effectively."); (b) definition (i.e., specifying the problem and goal behaviors— "What is the particular problem facing you right now? What is your goal in this situation?"); (c) generation of alternatives (i.e., brainstorming potential solutions— "The greater the range of possible solutions you consider, the greater your chances of developing an effective solution."); (d) decision making (i.e., anticipating the probable outcomes of different options— "What are the likely short- and long-term consequences of each of your options?"); and (e) implementation and evaluation (i.e., trying out a plan and evaluating its effectiveness—"What solution plan are you going to try and how will you know if it works?"). During the course of the PST program, the group leaders did not introduce any new lessons or training techniques, and the group members did not receive formal instruction or handouts on the use of problem-solving techniques.

Audiotape recordings were made of two extended treatment sessions (selected arbitrarily) for each of the six therapy groups in the RPT and PST conditions. The tapes were evaluated independently by two assessors (interrater $r = .80$) who used a checklist of 10 key RPT and PST techniques to identify the presence or absence of those used in each session. This manipulation check showed minimal overlap between the PST and RPT conditions. Didactic training in relapse prevention skills was observed in 100% of the RPT sessions and 0% of the PST session. The use of problem-solving techniques was evident in 100% of PST sessions, and their use also occurred to some extent in 33% of the RPT sessions.

The primary outcome measure was change in body weight assessed over the course of 17 months. We assessed adherence to treatment strategies for changing diet and exercise behaviors with a self-report measure in which participants rated their adherence to nine key behavioral weight-management strategies (e.g., self-monitoring, stimulus control, etc.) on 7-point Likert scales, where 1 = *nonadherence* and 7 = *full adherence* (see Perri et al., 1989, for details).

Results

Preliminary analyses of variance (ANOVAs) showed that participants in the three conditions did not differ significantly in baseline measures of age, weight, height, BMI, or years of education. Of the 103 participants who began the behavioral treatment, 88 completed the 5-month program, yielding an initial treatment completion rate of 85%. At the conclusion of initial treatment, the small number of male participants was unevenly distributed across conditions, and the data from these participants ($n = 8$) were excluded from further analysis. Thus, the study sample consisted of 80 women who had mean initial weight loss of 8.74 kg ($SD = 4.79$). The baseline characteristics and initial treatment results for these 80 participants are presented in Table 1.

We considered participants in the extended therapy conditions dropouts if they voluntarily withdrew from the program or if they attended fewer than two sessions during Months 12–17. The rates of attrition in the yearlong extended programs were equivalent (29% and 34% for RPT and PST, respectively) as were the rates of attendance (including dropouts, Ms = 58% and 57%; excluding dropouts, Ms = 76% and 72% for PRT and PST, respectively). At

Table 1
Baseline Characteristics and Initial Treatment Results for Participants Who Completed Initial Behavioral Treatment

	Condition					
	BT (n = 18)		RPT (n = 28)		PST (n = 34)	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Baseline characteristic						
Age (years)	45.23	10.08	49.17	7.21	45.36	9.33
Education (years)	13.13	1.93	14.00	1.63	14.50	2.06
Height (m)	1.62	0.06	1.66	0.06	1.65	0.06
Weight (kg)	94.67	11.35	96.95	13.69	97.96	16.01
Body mass index (kg/m^2)	36.37	4.70	35.00	3.96	36.10	4.93
Initial treatment result						
Weight change (kg)	−8.87	4.77	−9.09	4.97	−8.42	4.70
Body weight change (%)	−9.54	5.06	−9.56	5.51	−8.71	4.88
Session attendance (%)	91.11	9.59	91.67	9.76	89.00	7.73

Note. BT = behavioral treatment; RPT = relapse prevention training; PST = problem-solving therapy.

the final assessment, weights were obtained on 83%, 71% and 66% of the participants in the BT, RPT, and PST conditions, respectively.

We conducted analyses of the weight-change data separately for completers and for the total sample. In the completers analysis, we excluded the 22 people who dropped out or did not complete the final assessment. In the total sample analysis, we included all 80 participants who were available at the conclusion of initial treatment. A comparison of completers versus noncompleters (i.e., those who dropped out or did not complete the final assessment) showed equivalent attendance during initial treatment (*M*s = 86% vs. 93%, p = .502) but poorer attendance by the noncompleters during the extended treatment (*M*s = 33% vs. 73%, p = .0001). In addition, the noncompleters had higher initial body weights (*M*s = 103.2 kg vs. 94.4 kg, p = .012) and nonsignificantly smaller reductions in percentage of body weight during initial treatment (*M*s = 8% vs. 10%, p = .163) than did the completers.

Table 2 presents weight-change data for the completers. The data set was subjected to a 3 (conditions) × 3 (time periods) general linear model repeated measures multivariate analysis of variance (MANOVA). The results indicated a significant Condition × Time interaction effect, Wilks's λ = .678, $F(4, 108) = 5.77$, p = .001. Subsequent univariate ANOVAs and post hoc analyses (linear contrasts with Bonferroni corrections for three between-groups comparisons with alpha set at .05; *SPSS for Windows*, 1999) indicated that the PST condition showed better maintenance of lost weight compared with the BT group from Months 5–11 (p = .004) and compared with the RPT group from Months 11–17 (p = .013). Moreover, the PST condition demonstrated a significantly greater total net loss from baseline to Month 17 compared with the BT group (p = .019).

In examining weight changes for the total sample, we categorized participants in each condition according to percentage change in body weight (from baseline) at the final assessment (see Table 3). We used the conservative approach of assuming no change from baseline for participants who dropped out of treatment or failed to complete the final assessment. Because a 10% reduction in body weight is recognized as a clinically significant change (National Heart, Lung, and Blood Institute, 1998), we examined whether a higher percentage of participants in either of the extended treatments achieved clinically significant losses compared with the BT condition (see Kendall, 1999). The results showed that a larger percentage of PST participants achieved clinically significant losses than did BT participants, 35% vs. 6%, χ^2 (1, N = 52)= 5.56, p = .025, but the differences between the RPT and BT groups (21% vs. 6%) and between the PST and RPT

Table 2
Mean Net Weight Changes (in Kilograms) by Conditions Over Time for Completers

	Condition					
	BT (n = 15)		RPT (n = 20)		PST (n = 23)	
Time period	*M*	*SD*	*M*	*SD*	*M*	*SD*
Baseline–Month 5	−9.54	4.94	−8.41	4.55	−9.28	5.21
Month 5–Month 11	2.92_a	4.76	−0.97	3.89	-2.05_b	3.75
Month 11–Month 17	2.47_a	3.91	3.53_a	2.96	0.54_b	3.14
Baseline–Month 17	-4.14_a	4.86	−5.85	6.39	-10.82_b	8.65

Note. Means with different subscripts indicate significant between-groups differences (ps < .05 with Bonferroni corrections). BT = behavioral treatment; RPT = relapse prevention training; PST = problem-solving therapy.

groups (35% vs. 21%) were not statistically significant ($ps > .10$).[1]

The adherence data from the completers were subjected to a repeated measures MANOVA. The results showed a significant Condition × Time interaction effect, Wilks's $\lambda = .702$, $F(4, 108) = 5.23$, $p = .001$ (see Table 4). Subsequent univariate tests and post hoc comparisons with Bonferroni corrections indicated that the PST group demonstrated significantly better adherence to behavioral weight management strategies than the BT group did from Months 5–11 ($p = .043$) and from Months 11–17 ($p = .041$).

Last, we examined whether the effect of treatment conditions on long-term weight loss (i.e., Month 17) was mediated by adherence (i.e., sum of adherence scores at Months 5, 11, and 17) by testing a general linear model ANOVA with and without adherence entered as a covariate. In the analysis without the entry of adherence as a covariate, the effect of treatment conditions on weight loss was significant ($p = .01$). In the analysis with adherence entered first, the results showed a significant effect for adherence ($p = .045$) but only a marginally significant effect for conditions ($p = .059$). Although the amount of variance accounted for by adherence was modest ($\eta^2 = .072$), these findings indicate that the effect of treatment conditions on weight loss was partially mediated by adherence to behavioral strategies.

Discussion

An extended treatment intervention based on a problem-solving model of obesity management demonstrated significantly better long-term maintenance of lost weight than standard BT. One year after completion of the initial weight-loss treatment, on average, participants who completed PST maintained their entire initial loss, whereas participants in the BT group without extended care regained more than half of their initial reductions. Furthermore, a significantly larger percentage of PST participants (35%) obtained clinically significant weight reductions than did BT participants (6%).

The results also showed that the overall difference in long-term outcome between the PST and RPT conditions was not significant. However, although the PST group demonstrated a statistically and clinically significant better outcome than the BT group, there was no detectable benefit for RPT compared with BT. In contrast to some of our earlier findings (e.g., Perri et al., 1988), this latter result suggests that extended professional contact alone may not be sufficient to improve long-term weight management.

Because only one of the extended programs demonstrated better outcome than standard treatment, it is worth considering the similarities and differences between extended interventions. Both included equivalent amounts of professional contact, both addressed the problem of how to maintain long-term success in weight management, and both included some variation of problem solving. Moreover, participants responded to the two extended treatments in a similar manner in terms of attendance and attrition. Nonetheless, the interventions also differed in several important ways. RPT included didactic presentations aimed at training participants in a wide range of specific cognitive and behavioral skills. In contrast, PST included no didactic presentations but rather focused solely on therapist-led efforts to help participants as a group generate solutions to weight-related problems experienced by individual group members.

With exposure to a wide range of techniques, RPT participants may not have had sufficient opportunity to develop mastery of particular skills. In contrast, PST participants (who did not receive training in new skills) showed better long-term adherence to the behavioral strategies taught in initial treatment than did the BT participants. This finding is noteworthy in light of the results showing that long-term success was partially mediated by adherence to the BT strategies.

The delivery of RPT as a standardized didactic program with biweekly learning modules may have also diminished its potential effectiveness. RPT may have a greater impact when applied as an individualized therapy based on a contemporaneous assessment of specific problem circumstances, the client's level of skill, and the likelihood that the client will apply the skill in the problem situation (Marlatt & George, 1998). In the present study, there was a greater opportunity for such an assessment to occur in the therapist-led PST condition than in the RPT condition. The format of PST represented a change from the didactic approach of initial

Table 3
Classification of Participants According to Categories of Change in Body Weight From Baseline to Final Follow-Up

	Condition					
	BT		RPT		PST	
Category of change	*n*	%	*n*	%	*n*	%
Lost 10.0% or greater	1	5.6	6	21.4	12	35.3
Lost 5.0%–9.9%	6	33.3	6	21.4	6	17.6
Lost 0.0%–4.9%	9	50.0	12	42.9	13	38.2
Gained weight	2	11.1	4	14.3	3	8.8

Note. BT = behavioral treatment; RPT = relapse prevention training; PST = problem-solving therapy.

Table 4
Mean Adherence Scores for Completers by Condition at Months 5, 11, and 17

	Condition					
	BT ($n = 15$)		RPT ($n = 20$)		PST ($n = 23$)	
Assessment point	*M*	*SD*	*M*	*SD*	*M*	*SD*
Month 5	53.80	7.61	48.70	4.81	52.48	8.01
Month 11	36.20_a	13.91	42.25	11.41	45.78_b	9.53
Month 17	29.07_a	10.14	34.00	13.39	38.74_b	10.35

Note. Means with different subscripts indicate significant between-groups differences ($ps < .05$ with Bonferroni corrections). BT = behavioral treatment; RPT = relapse prevention training; PST = problem-solving therapy.

[1] We also completed an "intent-to-treat" analysis for net weight loss at final assessment, assuming no change from baseline for the noncompleters. This analysis showed a pattern of between-groups results similar to that shown by the analysis of weight changes for the completers, $F(2, 76) = 4.39$, $p = .016$.

treatment, and it provided a group therapy context that allowed for extensive attention to a participant's immediate concern. These changes, which may have enhanced the salience of PST sessions, also fostered more opportunities for peers to provide emotional support and practical solutions to relevant problems. Wing and Jeffery (1999) recently demonstrated the benefits of involving peers and increasing social support for weight management efforts.

Several limitations of the present study should be noted. First, the long-term findings are based for the most part on data collected from 69% of the participants who began the extended therapy programs. Noncompleters may have had less favorable outcomes than did the completers. Thus, the findings based on the completers' data may represent an overly positive picture of long-term outcome. This concern is mitigated to some extent by the analysis that included the total sample and showed that compared with BT, a greater percentage of PST participants achieved clinically significant weight reductions of 10% or more (see Table 3).

Second, the absence of process measures and behavioral tests of relapse-prevention or problem-solving skills represents a further limitation. Although independent raters were able to discriminate between the PST and RPT conditions, without detailed process measures, we do not know which elements of the PST intervention contributed to its greater success versus the standard BT condition (e.g., whether greater group support rather than the use of problem solving was responsible for the improved outcome in PST participants). Similarly, it remains unclear whether the groups differed in either their acquisition of or their application of skills presumed essential to the maintenance of behavior change and whether these factors were related to outcome.

Third, the absence of follow-up data beyond the yearlong extended treatment phase entails an additional limitation. During the year following initial treatment, deterioration in adherence and in maintenance of lost weight was observed in the standard BT condition. In contrast, from Months 5 to 11, the two extended interventions showed a slower rate of deterioration in adherence and no weight gain. However, from Months 11 to 17, the beneficial impact of the extended treatments diminished. Similar to the results in other studies (Perri et al., 1988; Wing, Vendetti, Jakicic, Polley, & Lang, 1998), adherence deteriorated and a regaining of weight began during this period. Thus, an additional follow up would likely show a pattern of weight regain consistent with the findings in the literature (Kramer, Jeffery, Forster, & Snell, 1989).

Finally, it should be noted that the results in this study were based on data from a sample of overweight women. We do not know whether overweight men would respond to the PST and RPT interventions in a similar manner.

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