Research and Professional Briefs

Comparison of Techniques for Self-Monitoring Eating and Exercise Behaviors on Weight Loss in a Correspondence-Based Intervention

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ABSTRACT

This study examined whether different methods of self-monitoring eating and exercise behaviors affect the process of self-monitoring and change in body weight in overweight adults. Forty-two subjects participated in a 16-week correspondence-based weight-loss intervention using a pretest–posttest randomized design. Dietary intake was prescribed at 1,200 to 1,500 kcal/day and <30% dietary fat. Physical activity was progressed to 200 minutes/week. Participants were randomly assigned to self-monitoring eating and physical activity behaviors using a traditional detailed method or transitioning to an abbreviated method. Transitioning to an abbreviated method returned significantly more diaries than using a traditional detailed method ($P=0.04$). Participants completing the study showed no significant difference in weight loss between the traditional detailed method (-7.5 ± 5.3 kg) and the abbreviated method (-7.6 ± 5.5 kg), with similar results for intention-to-treat analysis (detailed method -3.9 ± 5.3 kg vs abbreviated method -4.3 ± 5.8 kg). Weight loss was significantly associated with number of self-monitoring diaries completed ($r=0.53$, $P<0.05$). Findings suggest the self-monitoring process, rather than the detail of self-monitoring, is important for facilitating weight loss and change in eating and physical activity behaviors. Transitioning to a simplified approach to self-monitoring does not negatively affect short-term weight loss in overweight adults. These results may have implications for improving self-monitoring in overweight adults during periods of weight loss.

J Am Diet Assoc. 2007;107:1807-1810.

It is estimated that 65.2% of adults in the United States are overweight, which is defined as a body mass index (BMI; calculated as kg/m^2) ≥25.0 (1). Obesity is associated with chronic disease (2-5), mortality (6-8), and psychosocial consequences (9-11). It is estimated that obesity-related costs exceed $100 billion per year (12), underscoring the public health importance for successful prevention and treatment of obesity.

Self-monitoring is the cornerstone of behavior therapy approaches to weight control that focus on modifying eating and exercise behaviors (13,14). Studies report that participants who self-monitor eating and exercise behaviors at the highest levels of consistency and completeness have the greatest weight loss (15). Clinical weight management programs have traditionally had clients record eating and exercise behavior using a high level of detail (13,16). However, detailed self-monitoring is time-consuming and, consequently, difficult to continue over time (14). Therefore, it may be important to identify alternative methods to simplify this process and to improve the consistency and completeness of self-monitoring.

The purpose of this study was to examine whether different methods of self-monitoring of eating and exercise behaviors affect the process of self-monitoring and change in body weight during participation in a correspondence-based weight-loss intervention.

METHODS

Subjects

Forty-two subjects were recruited to participate in a 16-week correspondence-based behavioral weight-loss program. Eligibility criteria included being age 21 to 45 years with a BMI between 25 and 34.9. Participants were excluded if they had medical conditions that would limit their ability to participate in this study; had a weight loss ≥10 lb within previous 6 to 12 months; were taking medication that would affect body weight, heart rate, and/or other metabolic parameters; had medical conditions that would affect energy metabolism; were pregnant within previous 6 months, currently pregnant, or planned on becoming pregnant in the next 6 months; had hypertension or were taking medication that would affect blood pressure; had a history of heart disease or orthopedic complications that would prevent participation in the

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0002-8223/07/10710-0005$32.00/0

doi: 10.1016/j.jada.2007.07.014

exercise. Written informed consent to participate was obtained from each subject and all procedures were approved by the institutional review board at the University of Pittsburgh.

Correspondence-Based Intervention

Subjects participated in a 16-week correspondence-based behavioral weight-loss program. They initially attended a 60-minute in-person session to receive information about the intervention component of the study, which included dietary and exercise recommendations, general strategies for modifying eating and exercise behaviors, and learning how to use methods of self-monitoring based on their randomized group assignment. During the following 16 weeks, participants were mailed one behavioral lesson per week that described strategies for modifying these behaviors. In addition, participants were instructed to complete a self-monitoring diary each week and mail it to the interventionists in a postage-paid envelope that was provided. Completed diaries were reviewed weekly by the interventionists who provided participants with written feedback related to eating and exercise behaviors. The diary was returned to participants within 1 week via mail along with their next behavioral lesson. The behavioral lesson was mailed on the scheduled day even if a diary was not received. When a diary was not received within 1 week of the due date, the subject received a telephone prompt reminding them to return the completed diary.

Dietary Intervention. Subjects were provided structured meal plans that included daily energy and fat goals and suggested serving sizes of foods. Participants weighing $<$200 lb were placed on a 1,200 kcal/day diet and those weighing $\geq$200 lb were placed on a 1,500 kcal/day diet. The written lessons that were mailed to the subjects provided information regarding how to decrease energy intake and dietary fat intake to the recommended levels.

Exercise Intervention. Subjects were given a home-based exercise prescription that consisted of progressing to at least 200 minutes of aerobic exercise (ie, brisk walking) per week. Moderate-intensity exercise was prescribed on 5 days per week, with the duration progressing from 20 to 40 minutes per day by the ninth week of the intervention period.

Randomized Groups Based on Self-Monitoring Technique

Subjects were instructed to self-monitor eating and exercise behaviors using a weekly paper diary that was provided as part of the intervention. Subjects were randomized to different intervention groups based on the detail at which they were to perform this self-monitoring, which included either detailed self-monitoring or transitional self-monitoring condition.

Detailed Self-Monitoring Group. Subjects (n=21) were instructed to self-monitor eating and exercise behaviors using a weekly diary that was provided as part of the intervention. This diary allowed subjects to record the types, quantities, kilocalories, and fat grams of the food for each meal and snack that was consumed throughout each day. If a meal was skipped or missed, the subject was instructed to indicate this in the diary. In addition, subjects recorded exercise information (eg, type, minutes, intensity), and if no exercise was performed for a specified day, the subject was instructed to indicate this in the diary.

Transitional Self-Monitoring Group. Subjects (n=21) were instructed to self-monitor eating and exercise behaviors using the detailed approach during weeks 1 through 8 and then transition to an abbreviated eating and exercise diary during weeks 9 through 16. Subjects were provided written instructions noting the differences between the detailed and abbreviated diaries, along with guidelines and examples of how to complete the abbreviated diary. For the abbreviated diary, participants were instructed to place check marks in boxes (ie, small, medium, large, or supersize) to estimate the fat content and size (based on energy content) of their meals and snacks, indicate skipped meals or snacks, and record range of exercise duration (ie, $\leq$15 minutes, 16 to 30 minutes, 31 to 45 minutes, 46 to 60 minutes, or $\geq$60 minutes).

Assessments

Weight and Height. Weight was measured on a calibrated medical balance-beam scale (Health-O-Meter, Bridgeview, IL) to the nearest 0.25 lb with subjects wearing a cloth hospital gown. Height was assessed to the nearest 0.1 cm, using a calibrated stadiometer (Perspective Enterprises, Portage, MI), with subjects not wearing shoes. BMI was calculated as kg/m^2. Assessments were performed at baseline and 16 weeks.

Statistical Analysis

Analyses were performed using SPSS statistical software (version 12.0, 2003, Chicago, IL) with statistical significance set at $P \leq 0.05$. Baseline data were analyzed to evaluate between-group differences (detailed self-monitoring vs transition to abbreviated self-monitoring) using independent t tests. To examine the process measures for self-monitoring across the intervention, independent t tests were performed to compare detailed self-monitoring and transition to abbreviated self-monitoring. To examine data for body weight a repeated measures (group$\times$time) analysis of variance was performed. Significant between-group main effects and interaction effects were further examined using independent t tests with P values adjusted using the Bonferroni procedure. Correlation coefficients were computed to examine the association between completion of diaries and weight loss.

RESULTS

There were no significant baseline differences between randomized groups at baseline for age (38.0$\pm$5.9 years vs 35.0$\pm$6.6 years for detailed self-monitoring group and transition to abbreviated self-monitoring group, respectively), weight (87.0$\pm$7.5 kg vs 90.0$\pm$8.5 kg for detailed self-monitoring group and transition to abbreviated self-monitoring group, respectively), or BMI (32.0$\pm$1.6 vs 32.5$\pm$1.5 for detailed self-monitoring group and transition to abbreviated self-monitoring group, respectively).

Retention Rates

Retention of participants who provided objective data at baseline and following the 16-week correspondence-based

Table. Data obtained from diaries across the 16-week intervention for participants in the detailed and transition to abbreviated self-monitoring conditions

	Intervention Groups		
	Detailed self-monitoring	Transition to abbreviated self-monitoring	*P* value[a]
	← *mean± standard deviation* →		
Completers[b] (n=22)	n=10	n=12	
No. diaries returned	14.0±2.0	15.2±1.4	0.04
No. diary weights recorded	12.7±1.7	13.3±2.7	0.11
No. reminders sent	2.8±3.3	2.0±2.8	0.63
Self-Reporters[c]+Completers (n=27)	n=13	n=14	
No. diaries returned	11.2±5.6	13.0±5.7	0.76
No. diary weights recorded	9.9±5.6	11.4±5.4	0.78
No. reminders sent	5.5±6.0	3.9±5.4	0.53
Intent-to-Treat[d] Analysis (n=42)	n=21	n=21	
No. diaries returned	7.5±6.6	9.6±6.8	0.84
No. diary weights recorded	6.4±6.3	7.9±6.8	0.69
No. reminders sent	5.8±5.9	6.3±5.9	0.96

[a]*P* value represents results of independent *t* tests comparing detailed self-monitoring and transition to abbreviated self-monitoring groups.
[b]Completers=Provided objective data at baseline and 16 weeks.
[c]Self-Reporters=Provided objective data at baseline but reported weight by telephone at 16 weeks.
[d]Intent-to-Treat=Baseline weight carried forward for missing post-evaluation data.

intervention (referred to as Completers) was 52% (n=22). Retention increased to 64% (n=27) when five subjects who did not attend post-evaluation, but reported their weight by telephone at end of study, were included in the sample (referred to as Self-Reporters+Completers). Data were also analyzed using intent-to-treat (ITT) analysis, where baseline weight was carried forward for missing postevaluation data (n=42). Analyses to compare completers vs self-reporters+completers vs ITT showed no significant differences between these individuals for baseline variables of age, weight, height, BMI, or percent of individuals based on sex or education level (data not shown).

Self-Monitoring Data

Self-monitoring data are presented in the Table. Results revealed a significant difference ($P=0.04$) in the number of diaries returned by detailed self-monitoring group participants (14.0±2.0) and transition to abbreviated self-monitoring group participants (15.2±1.4) when data for Completers were analyzed. Self-Reporters+Completers and ITT analyses revealed no significant differences between the groups. The number of weeks a subject recorded a weekly weight in their returned diary did not differ significantly between the groups for analysis of Completers, Self-Reporters+Completers, and ITT. The number of weekly diary reminders sent to participants when they failed to return a diary did not differ significantly between the groups for analysis of Completers, Self-Reporters+Completers, and ITT. There was no difference between the detailed self-monitoring group participants and the transition to abbreviated self-monitoring group participants for the number of meals and snacks or exercise recorded in the self-monitoring diaries (data not shown).

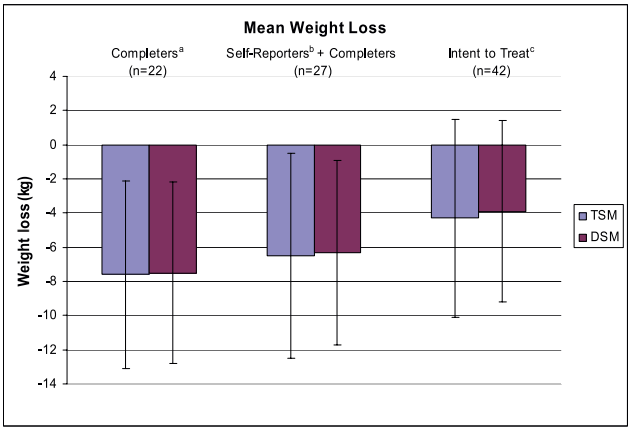

Figure. Weight loss from 0 to 16 weeks in participants completing a detailed self-monitoring instrument (DSM) (n=21) and those who transitioned to completing an abbreviated self-monitoring instrument (TSM) (n=21). There were no significant differences based on independent *t* tests comparing detailed self-monitoring and transition to abbreviated self-monitoring groups for Completers[a], Self-Reporters[b]+Completers, or intent-to-treat analyses[c]. [a]Subject provided objective data at baseline and 16 weeks. [b]Subject provided objective data at baseline but reported weight by telephone at 16 weeks. [c]Baseline weight carried forward for missing postevaluation data.

Change in Body Weight

Body weight data are provided in the Figure. There was a significant decrease in body weight from 0 to 16 weeks for Completers in the detailed self-monitoring group (−7.5±5.3 kg) and the transition to abbreviated self-monitoring group (−7.6±5.5 kg) ($P=<0.001$), with no significant difference between the groups ($P=0.91$). Analysis of Self-Reporters+Completers revealed no signifi-

cant difference between the detailed self-monitoring group (−6.3±5.4 kg) and the transition to abbreviated self-monitoring group (−6.5±6.0 kg) (P=0.51), with a similar pattern shown for ITT analysis (detailed self-monitoring group −3.9±5.3 kg vs transition to abbreviated self-monitoring group −4.3±5.8 kg; P=0.30).

Analysis of Completers data revealed significant correlation coefficients between change in body weight and number of diaries returned (r=0.53) (P=≤0.03). The correlation coefficient remained statistically significant for analysis of Self-Reporters+Completers (r=0.54) (P=≤0.004) and for ITT analysis (r=0.71) (P=<0.001).

DISCUSSION

This study examined the benefits of a transition approach to self-monitoring over the more traditional approach. Although there is evidence to support the link between frequency of self-monitoring and weight loss (14-18), there is limited evidence that the detailed level of self-monitoring that is traditionally encouraged is necessary to maximize weight loss.

Sperduto and colleagues (18) reported that obese individuals who were taught self-monitoring techniques were more likely to complete the entire treatment intervention and have greater weight loss than obese individuals who did not self-monitor. Baker and Kirschenbaum (16) found that weight loss over a holiday period was associated with consistency of self-monitoring. Similar results were obtained by Boutelle and Kirschenbaum (15)—significant weight loss was observed for subjects demonstrating highly consistent self-monitoring, whereas weight gain occurred in those exhibiting minimal amounts of self-monitoring (15). It has also been demonstrated that promoting self-monitoring resulted in significantly greater weight management than a control group (17). McGuire and colleagues (19) found individuals in the National Weight Control Registry who regained weight exhibited a decline in self-monitoring over time.

The significant correlations between weight loss and frequency of self-monitoring in this study support these findings. Moreover, the results suggest that the behavior of self-monitoring, rather than the detail of self-monitoring, may be important for promoting weight loss in overweight adults, with both groups losing similar amounts of weight. Consequently, these findings may provide an option for improving self-monitoring, which in turn may influence weight-loss interventions for overweight adults.

This study was not without limitations. The rate of attrition was 36% to 48%, which did not differ between the groups. Similar levels of attrition have been reported in other minimal-contact intervention studies (20,21). An additional limitation was that our study design did not include a group that used a lower detailed form of self-monitoring throughout the entire intervention period. Because consistency of self-monitoring appears to decrease across time (14), it would be important to examine the usefulness of the transition to an abbreviated self-monitoring approach across a longer intervention period.

CONCLUSIONS

Both a detailed self-monitoring approach and a transition to an abbreviated approach to self-monitoring results in similar short-term weight loss. Consequently, these results indicate that a less effortful method of self-monitoring (ie, an abbreviated self-monitoring approach) may be effective for weight loss when compared to the traditional method of detailed self-monitoring. This may have important application to food and nutrition professionals because traditional weight-loss programs typically have clients record eating and exercise behavior in great detail (13,16), which is a time-consuming process that is difficult to consistently maintain over time (14). If this barrier is reduced by substituting a simplified approach, it may improve adherence to self-monitoring and result in improved weight-loss outcomes, which warrants additional research.

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