Article 13

Changing Health Behavior Via Telecommunications Technology: Using Interactive Television to Treat Obesity

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ABSTRACT. This study compared a 12-week behavioral weight-control treatment program conducted over interactive television (N = 133) to a standard therapist-led (in-person) treatment condition (N = 33). Subjects started treatment with an average Body Mass Index (BMI) of 34.9 and lost 7.7 kg over 12 weeks with no difference between conditions noted for weight loss, calorie (–622 calories per day), or exercise changes (+970 calories expended per day). Ratings of the technology were positive and there was no difference in subjects' expectations for change, nor was there any difference by treatment condition in overall attrition. A cost-effectiveness analysis showed that the per-person cost of the interactive technology was higher.

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Obesity is a serious public health problem in the United States, affecting nearly 1 in 3 adults (Flegal, 1996). Obesity significantly contributes to increased morbidity and mortality from a number of chronic diseases and costs the health care industry up to $70 billion annually (Stipps, 1995).

Improvements in the physiological risk factors associated with obesity-related diseases have been attributed to weight reduction. Weight loss can reduce blood pressure (Chiang, Perlman, & Epstein, 1969), favorably alter the balance in serum lipids (Thompson, Jeffery, Wing, & Wood, 1979), and improve nearly every index of coronary efficiency (Alexander & Peterson, 1972). Moreover, these improvements can be realized with weight losses as small as 2 kg (Kanders & Blackburn, 1992). Currently, the best weight losses to date are achieved with behavioral weight-loss techniques. Behavioral approaches, developed in the late 1960s (Ferster, 1962), govern the treatment of mild to moderate obesity (Brownell & Jeffery, 1987; Kirschenbaum & Fitzgibbon, 1995; Perri, Nezu, Patti, & McCann, 1989). Participation in behavioral weight-control treatments results in lower attrition rates (Volkmar, Stunkard, Woolston, & Bailey, 1981), better maintenance of weight losses achieved during treatment (Bloom, 1988; Brownell & Wadden, 1986), and improvements in a number of psychological parameters (O'Neil & Jarrell, 1992). Thus, behavioral treatments are the weight-loss method of choice for outpatient treatment of mild to moderate obesity (Kirschenbaum & Fitzgibbon, 1995).

Unfortunately, the professional, face-to-face delivery of behavioral weight-loss programs remains an expensive, time-consuming process (Agras, Taylor, Feldman, Losch, & Burnett, 1990; Yates, 1978). Because professionally trained behavioral weight-loss therapists are not widely available and cost is a barrier, high-quality, behavioral weight-control treatment programs are effectively inaccessible to large groups of the population. Low-income individuals and those in rural areas without access to state-of-the-art medical care will be unable to participate in the safest, most reliable method of weight reduction. There is clearly a pressing need to develop cost-effective behavior therapy treatments that are accessible to a larger percentage of the population (Agras et al., 1990; Fitzgibbon, Stolley, & Kirschenbaum, 1993; Jeffery & Gerber, 1982).

Earlier research has demonstrated success with behavioral interventions conducted over television. Frankel and colleagues (Frankel, Birkimer, Brown, & Cunningham, 1983) provided an eating behavior intervention over a local morning television broadcast. The authors reported an average weight loss of 0.68 to 0.90 kg per week, results similar to standard in-person weight-loss programs (Brownell & Wadden, 1986). Meyers, Graves, Whelan, and Barclay (1996) tested the effectiveness of face-to-face, therapist-led behavioral weight loss against an identical program delivered over a cable television channel. There were no significant between-group differences noted, with both groups losing approximately 4.3 kg over an 8-week treatment. Thus, these studies suggest that behavioral weight control via televised media can be effective and acceptable to consumers. However, the ability to duplicate the methodology of the studies previously cited remains problematic. Both studies took advantage of the goodwill of local television stations to broadcast their interventions and both were televised to a primar-

ily urban audience. The cost of ongoing behavioral weight-control sessions offered only via commercial television channels would be prohibitively expensive to sustain long-term. Additionally, local television channels can reach only a local audience, thereby rendering televised programs inaccessible to consumers outside the local viewing area.

One technological solution to this problem is interactive videoconferencing or interactive television. Interactive television involves the translation of transmissions from video and microphones into digital signals, which are then transported via telephone lines. The use of telephone lines is affordable, with hourly costs ranging from $10 to $35 (Attwood & Graham, 1993). The use of videoconferencing to support telemedicine is still fairly novel, although it has been growing in popularity (McGee & Tangalos, 1994). Telecommunications technology has been used as a vehicle to support professional training of health care staff, provide diagnostic and consultative services to practitioners at distant sites, as well as to support the provision of direct services to rural, medically underserved individuals (Hubble, Pahwa, Michalek, Thomas, & Koller, 1993; McGee & Tangalos, 1994). While every indication suggests that this technology holds promise for reaching rural, medically underserved populations (Allen & Hayes, 1994; Troster, Paolo, Glatt, Hubble, & Koller, 1995), many questions remain regarding its effectiveness and acceptability. In a 1994 report on potential contributions of telecommunications technology, McGee and Tangalos cite the important role telecommunications can play in the delivery of health education to underserved populations. However, they argue that "the starting point must be the consumer—what is needed and will be used are more important issues than what is technologically possible" (p. 1133). Currently, there is no report in the literature on the use of televised telecommunications technology to foster behavior change. Therefore, the objectives of this study were to determine if interactive video-conferencing is a feasible, acceptable, effective, and cost-efficient vehicle for delivering a behavioral weight-control intervention.

Method

Subjects

Subjects were recruited with newspaper ads placed in six different locations throughout the state. These sites were chosen to represent a mix of rural and more urban geographic locations, and all were not within a reasonable driving distance of the university. Subjects were required to be over 18 years old, ≥ 20% over ideal body weight based on Metropolitan Life Insurance norms (1983), and free of any major medical problems that would contraindicate participation in a weight-loss program. After subjects were screened by phone, they were invited to attend an orientation session held in each location. The study was explained and informed consent was obtained at this time. Participants at the university site were also informed that they would be randomized to an interactive television (IT) group or a standard therapy (ST) group that met in person with a therapist.

Design

Each group met weekly for 12 consecutive weeks and received an identical behavioral weight-loss treatment program run by a Ph.D.-level, trained behavioral therapist. Only subjects recruited from the university site were randomly assigned to attend treatment sessions at the local interactive television studio or in a campus classroom. Assessments were done at baseline and at Week 12.

Treatment

The treatment program for both groups focused on the modification of eating and exercise habits through the use of behavioral strategies and self-management skills. The program was similar to the LEARN Program for Weight Control (Brownell, 1994). Subjects met weekly for 1 hour and printed lessons were given out to reinforce the weekly discussion. Subjects were instructed to reduce their caloric intake to 1,000 to 2,500 calories per day, depending on their baseline body weight. Calorie goals were determined by multiplying baseline weight by 12 (to get an estimate of current calorie consumption) and subtracting 1,000 calories. This method has been used in previous studies and is known to encourage a weight loss of 1 to 2 pounds per week (Jeffery et al., 1993). The large range in calorie goals was based on the fact that one participant weighed over 300 pounds at baseline. Over 95% of the calorie goals ranged between 1,000 and 1,800 calories per day and the proportion of subjects with 1,000, 1,200, 1,500 and 1,800 calorie goals were evenly distributed between groups.

During treatment, subjects were taught the principles of a healthy diet and generally encouraged to follow a diet that met the Dietary Guidelines (United States Department of Agriculture, 1995). The emphasis, however, was on staying below their calorie goal. Subjects recorded their calorie intake daily throughout the 12-week program. Their diaries were reviewed and advice was given on strategies for lowering caloric intake while maintaining a nutritionally balanced diet. Patients in both groups were taught the benefits of exercise for weight management and other coronary heart disease risk factors. Graded goals for programmed activity (i.e., walking) were used throughout the program, and patients monitored the amount of energy expended on a daily basis. The importance of lifestyle activity (e.g., using the stairs instead of the elevator) was also emphasized, and patients were encouraged to gradually increase lifestyle activity throughout the program. Subjects were also taught the principles of behavior modification to enhance self-management of energy intake and expenditure. Weekly sessions included dis-

cussions of stimulus control, problem solving, social skills training, and relapse prevention training.

Subjects were recruited and treated in two cohorts. Four interactive television sites participated in the first 12-week session; three in the second. The IT group site that was closest to the university was used to broadcast the IT sessions for both cohorts. Thus, there were six different IT sites used, with four participating in the first cohort (the university site and three distant sites) and three in the second cohort (the university site and two other distant sites). The group therapist broadcast treatment sessions out of the interactive television studio closest to the university with a live group participating in that studio and two or three additional groups simultaneously participating via distant interactive television sites. All subjects could see and hear the therapist at all times and each participant could be heard by all others by speaking into their own microphone. The audio system activated the video system; thus, participants were always on camera and visible when they were speaking.

In order to facilitate communication, each distant site had a site facilitator. Local Extension Educators and one local dietitian served in this capacity. The site facilitator weighed participants before each session, reviewed self-monitoring diaries weekly for participants of their site and generally served as the local contacts for their group. Site facilitators were trained in how to weigh participants and review self-monitoring diaries, but they were not trained behavior therapists and did not deliver any of the weight-loss therapy sessions. Generally, site facilitators were trained to give written positive feedback in the self-monitoring diaries to participants regarding their healthy food choices, participation in physical activity, and attempts to successfully meet program goals. The same feedback was given by the therapist for the ST and IT groups run closest to the university.

Measures

Data collection consisted of demographic measures, smoking status, dietary intake, and questionnaire measures of exercise and expectations for change. Subjects were weighed in street clothes on a high-quality floor model scale at baseline and at Week 12. Additionally, IT subjects were asked to rate the interactive television technology.

Diet and exercise. Dietary change was determined by having subjects complete 3-day food records, including 2 weekdays and 1 weekend day. While self-report measures of dietary intake have limitations, 3-day food records are appropriate for measuring changes in group means (Stern, Grivetti, & Castonguay, 1984) while limiting the subject burden associated with monitoring food intake. Subjects were given training in portion size estimation and were encouraged to record all food intake in as much detail as possible. All food diaries were documented for accuracy and completeness. Analyses of the food diaries were done by trained coders at the General Clinical Research Center of the University of Vermont using the Food Intake Analysis System, Version 2.1, 1992 (USDA Human Nutrition Information Service, University of Texas Health Science Center at Houston, TX). All diary analysis was done blinded to subjects' group assignment. Physical activity, as calories expended, was assessed using the Paffenbarger Physical Activity Questionnaire (Paffenbarger, Wing, & Hyde, 1978). The Paffenbarger has shown good test-retest reliability and validity when compared to more objective measures of fitness and energy expenditure (Ainsworth, Leon, Richardson, Jacobs, & Paffenbarger, 1993).

Expectations. Because participants' expectations for change may have been influenced by barriers imposed by the telecommunications technology, expectations for change were assessed both before and after participation in the program. Subjects rated the degree of change expected for 10 mental and physical functioning items on a Likert scale ranging from 1 (*no change expected*) to 10 (*extreme improvement expected*). This scale was based on one used previously by King and colleagues (King, Barr-Taylor, & Haskell, 1993) to examine perceived change both during and after an exercise program and has been shown to have adequate test-retest reliability and concurrent and discriminant validity (King, Barr-Taylor, Haskell, & DeBusk, 1989). The items were related specifically to subject expectations for weight loss, eating behavior, well-being, health, appearance, and fitness changes.

Cost-effectiveness. Costs generated for the IT and ST groups were recorded. Costs consisted of postage, interactive television time, materials for the program, and expenses for the behavior therapist and site facilitators. Site facilitators were paid a set fee per session and for any travel expenses incurred driving to their interactive television site. The therapist time was calculated at an hourly rate based on the base salary of this individual. The total expense for each group was then divided by the number of participants that started treatment in each condition. Additionally, program expenses were divided by the total number of pounds lost in each treatment condition to determine the cost-effectiveness of weight loss produced.

Feasibility and acceptability. In order to assess acceptability of the technology, subjects in the IT groups were asked to complete a 6-item questionnaire during the 3rd week of treatment that assessed their perceptions regarding the interactive television technology. Participants responded to the following five questions on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*): (a) I would prefer being in a non-IT group; (b) I would be more successful if I was not on interactive television; (c) I understand and can follow the class leader over interactive television; (d) Our group would be more successful if we were not on interactive television; and (e) I feel I can communicate effectively over

interactive television. The sixth question asked subjects how satisfied they were with the interactive television system (5 = *very*, 1 = *not at all*). Also examined was attrition from the groups by treatment condition. Finally, to assess feasibility, recruitment numbers were carefully tracked to determine if individuals from rural communities at sites distant from the university were as interested and willing to participate in this type of program as those closer to the university.

Statistical Analysis

Analysis of variance (ANOVA) was used to examine the effect of treatment condition on change in body weight, percent of body weight lost, diet, exercise, and expectations for change. Baseline values were compared with *t* tests. Chi-squared analysis was used to assess differences in the categorical variables.

Results

Subject Characteristics

Characteristics of study participants at baseline are shown in Table 1 by treatment group. Subjects were on average about 45 years old, relatively well educated, almost exclusively white, and approximately three-fourths female. The only significant difference at baseline was in the percent of subjects that were married, with significantly more subjects in the IT groups being married. A majority of subjects had also participated previously in some organized weight-reduction program. Group sizes ranged from 11 in one of the smaller IT sites to 25 in one of the larger. IT group sizes were dictated by the number of seats available in each studio. ST groups (n = 18 and n = 15 for cohort one and two, respectively) were recruited to be approximately equivalent to the IT group sizes. Preliminary analysis was done comparing the IT groups with a live therapist (n = 41) to the distant IT sites (n = 92) and also comparing all IT sites (n = 17, 22, 23, 19, 11, 25, 16) to each other. There were no differences between groups for any dependent variables; thus, all IT groups were combined into one (N = 133) for all subsequent analyses.

Table 1
Baseline Characteristics of Study Participants by Condition

	IT	ST	*p*
N	133	33	
Age (years)[1]	45.8 ± 8.0	44.4 ± 6.6	.38
Non-college graduate (%)	53	39	.38
White (%)	97	100	.68
Married (%)	73	58	.03
Previous weight programs (%)	70	81	.12
Weight (kg)	97.7 ± 18.4	102.1 ± 18.7	.22
BMI (kg/m^2)	34.5 ± 5.4	35.4 ± 5.7	.40
Gender (% female)	81	75	.33
Smoker (%)	7.5	9	.88

Note. *P* values are derived from analysis of variance of continuous values and chi-squared analysis for categorical variables.
[1] ± *SD*

Feasibility and Acceptability

Subject recruitment for the interactive television groups was limited by the number of seats available in each IT studio. The total number of seats available for IT groups was 168. Five hundred and fifty-eight individuals responded to recruitment ads, and 25% of those were from the geographic area closest to the university. Three hundred and forty-eight individuals were invited to orientation meetings (approximately twice the number of seats available), and, of those attending, 96% signed informed consent. Because the number of eligible, interested participants far exceeded the number we could treat, subjects were randomly chosen from the consented list for each site until the maximum number of IT participants was obtained. Only 79% of subjects (N = 133) selected to participate actually began treatment. There was no difference between the percent of selected subjects who began treatment in the IT (78%) versus the ST group (80%). A total of 133 individuals began treatment in an IT group. After treatment began, overall IT group attrition was 22%; this did not differ significantly from attrition in the ST group (18%, p = .73).

Subjects' rating of the interactive television technology is presented in Table 2. Overall, subjects' perceptions of the technology were positive, with the majority of participants reporting they would not necessarily prefer to be in a non-IT group (nor did they feel that they or their group would be any more successful if in a non-IT group). Subjects also reported agreeing with the statement, "I can understand and follow the class leader" (84.4%), although they were less likely to report agreeing with the statement, "I feel I can communicate effectively over IT" (47.8%). Finally, 85% of participants reported being very satisfied with the IT system.

Body Weight, Diet, and Exercise

Change in body weight was determined by assessing total weight loss in kilograms as well as percent of initial body weight lost after treatment. Subjects in both conditions lost a significant amount of weight during treatment (p < .0001); however, there were no significant differences between treatment conditions in either number of kilograms lost or percent of body weight lost (Table 3). Both ST and IT groups lost an average of 7.8 ± 5.1 and 8.0 ± 4.8% (p = .85) of baseline body weight. Similarly, subjects in both conditions experienced significant positive changes in eating and exercise behaviors, with calories decreasing by an average of 622 during treatment, percentage of calories from fat decreasing from 32.3 to 29.5, and calories expended in exercise increasing over the 12 weeks from 970 calories to 1,424 calories. There were no differences between conditions for either the nutrient intake or exer-

Table 2
Subject Rating of Interactive Television (N = 133)

	Strongly Disagree %	Disagree %	Undecided %	Agree %	Strongly Agree %
I would prefer being in a non-IT group.	22.5	35.2	22.5	16.9	2.8
I would be more successful if I were not on IT.	39.4	47.8	12.6	0	0
I can understand and follow the class leader over IT.	4.2	2.8	8.4	46.4	38.0
Our group would be more successful if we were not on IT.	25.3	32.3	32.3	7.0	2.8
I feel I can communicate effectively over IT.	11.2	21.1	19.7	29.5	18.3

cise values.

Expectations

Subjects' reported expectations for change are presented in Table 4. There were no significant differences between groups at baseline in any of the 10 expectations reported, nor were there differences by group in how those expectations changed during treatment.

Table 3
Change in Weight, Diet, and Exercise by Treatment Condition

	IT (n = 103)	ST (n = 27)	p value
Body weight (kg)			
Baseline[1]	97.7 ± 18.4	102.1 ± 18.7	
Week 12	89.9 ± 17.5	92.5 ± 17.9	
Change	−7.6 ± 4.1	−7.9 ± 5.4	.80
Calorie intake			
Baseline	1,959 ± 692	2,176 ± 794	
Week 12	1,386 ± 471	1,497 ± 417	
Change	−607 ± 632	−638 ± 521	.81
Fat intake (% of calories)			
Baseline	32.2 ± 6.3	32.3 ± 6.8	
Week 12	28.3 ± 7.3	29.1 ± 5.6	
Change	−3.4 ± 7.9	−2.1 ± 6.6	.42
Exercise (calories expended)			
Baseline	857 ± 1,174	1,083 ± 1,202	
Week 12	1,519 ± 1,301	1,358 ± 1,289	
Change	664.3 ± 1,346	244.5 ± 943	.13
% Baseline body weight lost	8.0 ± 4.8	7.8 ± 5.1	.85

[1] ± *SD*

Cost-effectiveness

Total program costs for IT and ST groups were calculated. The total cost for each group was then divided by the number of subjects who began treatment in that condition. The per-patient cost of running the IT groups ($34.71 per subject) was substantially higher than the ST groups ($24.65 per subject). The average price per pound of weight loss for the ST groups was $2.00. The average price per pound of weight loss for the IT groups was $2.56.

Table 4
Responses to "To What Extent Do You Believe You Will..." by Treatment Condition

	IT (n = 103)	ST (n = 27)
...lose weight?		
Baseline[1]	7.6 ± 1.8	7.7 ± 1.7
Week 12	.33 ± 2.1	.51 ± 2.9
...improve your appearance?		
Baseline	7.1 ± 2.1	7.6 ± 1.6
Week 12	.28 ± 2.4	.03 ± 2.3
...be less hungry?		
Baseline	6.1 ± 2.4	5.6 ± 2.5
Week 12	.76 ± 3.0	.37 ± 3.3
...be less tense or stressed?		
Baseline	6.1 ± 2.5	5.7 ± 2.6
Week 12	.42 ± 2.6	.85 ± 3.0
...be less anxious?		
Baseline	5.6 ± 2.5	5.7 ± 2.7
Week 12	.64 ± 2.6	.25 ± 2.6
...have more energy?		
Baseline	7.9 ± 1.6	8.1 ± 1.5
Week 12	.25 ± 2.0	.00 ± 1.9
...be happier?		
Baseline	7.1 ± 2.5	7.5 ± 2.2
Week 12	.34 ± 2.5	.03 ± 2.8
...be more physically fit?		
Baseline	8.0 ± 1.9	8.3 ± 1.5
Week 12	.08 ± 2.0	.11 ± 2.0
...be able to eat less?		
Baseline	7.3 ± 2.2	7.2 ± 2.0
Week 12	.01 ± 2.6	.66 ± 3.2
...be healthier?		
Baseline	8.3 ± 1.8	8.6 ± 1.2
Week 12	.15 ± 2.0	.04 ± 2.1

[1] ± *SD*

Discussion

This study found that a behavioral weight-control program conducted over interactive television technology was as effective for inducing weight loss as a standard behavior therapy intervention. Subjects in both conditions lost significant and comparable amounts of weight and both groups made significant and comparable positive changes in eating and exercise behaviors.

Additional objectives of this study were to determine if conducting a behavioral intervention via interactive television technology would be feasible and acceptable to participants. Based on recruitment statistics and subject ratings of the technology, we have every indication that the program was not only highly acceptable but highly desired as well. Simple recruitment efforts in different geographic locations throughout the state consistently yielded two to three times the number of eligible participants we could accommodate. Once they were introduced to the program by attending an orientation session, nearly all signed informed consent—an indication of their willingness to experience the interactive television technology. What is surprising is that nearly 21% of the subjects selected to participate in both IT and ST groups never attended even the first group meeting. The majority of these participants reported having work- or family-related commitments that took priority—even though they had been told at orientation meetings when the group meetings would be held. Perhaps the lack of intensive pre-assessment data and the message that not all subjects would be selected for participation led some individuals to consent to participate without being totally committed to following through.

After the program began, ratings of the interactive television technology were better than acceptable, with the majority of participants being very satisfied with the technology. This is most notable for the subjects who attended the IT group close to the university. Theirs was the only group that was randomly assigned to IT or ST conditions. In other words, even knowing they had had a chance at having a therapist to themselves did not change their perceptions of the interactive television technology.

Although the majority of subjects were satisfied with the technology, over 50% were not sure about, or were not satisfied with, their ability to communicate over interactive television. This did prove to be the most difficult feature of the technology. Subjects had to "wait their turn" to speak, speak into a microphone, and speak loudly enough to be heard above someone else who might simultaneously be trying to speak. Because the technology rating was completed during Week 3 of the intervention, it is possible that participants eventually "learned" how to communicate and became more comfortable with this aspect of the technology. Nevertheless, attrition after treatment began was similar between the two groups and was comparable to other behavioral weight-control programs (Wing, 1992), again suggesting that participants were not disproportionately unhappy with their treatment group.

One final indication that the technology was acceptable to participants was the assessment of expectations for change. Subjects had fairly high expectations for both physical and mental health changes at baseline, and these ratings did not differ by condition. This suggests that participants in the IT groups did not start treatment with any negative perceptions regarding their ability to succeed based on the technology. Additionally, for each of the 10 items, subjects in both conditions reported increasing their expectations for improvement after treatment. The degree of this change was not different for the IT versus ST groups. Both groups remained equally confident in their ability to see improvements in physical and mental-health parameters.

Weight losses during treatment were also similar to those reported in the literature for a 12-week behavioral intervention. Subjects lost on average .65 kg per week, consistent with current recommendations of .45–.90 kg per week (Dwyer, 1995) and similar to weight losses experienced in other behavioral interventions (Wadden, 1993; Wing, 1992). While the weight loss differences between the groups were very small, a post-hoc power analysis revealed that we may not have had a large enough sample size to detect significant differences, given the large variability in weight change. One additional study limitation was the lack of follow-up. There is, however, little reason to suspect that weight loss maintenance would be different for the two conditions. Despite these limitations, subjects in both groups lost a clinically significant amount of weight with no apparent differences between treatment conditions.

Although subjects appeared to be equally successful in both treatment groups, the cost-effectiveness analysis was somewhat disappointing. Presumably, an intensive behavioral intervention to so many more individuals via telecommunications technology would be less expensive than a standard intervention with one therapist and a group of 20 to 25 participants. This, however, was not the case. While there are a number of ways to calculate a cost-benefit analysis, the two ways chosen in this study—a per-subject cost and a per-pound cost—yielded the same results: The IT condition was more expensive. The per-subject cost of conducting the IT groups was $7 higher and the per-pound cost was approximately 50 cents more. The difference in cost between the two conditions is explained by the interactive television charge ($50 per hour—$35 per hour for one site and $50 per hour for multiple sites) and the salary and travel paid to the site facilitators. In fact, if the expense of the site facilitators is subtracted from the IT group costs, the two conditions would be comparable in cost: $23.45 per subject for the IT condition versus $24.65 per subject for the ST condition. Site facilitators added a human element to the distant IT sites. They weighed subjects each week, reviewed

self-monitoring diaries, and served as the local contact person for IT group participants. While it is certainly theoretically possible to conduct a similar program without site facilitators, it would likely result in a much less supportive environment for group participants and might compromise their continued participation. However, similar research done with a television intervention (Meyers et al., 1996) suggests that subjects can do well on their own with little direct therapist support. While future research in this area should carefully consider efforts to try to improve the cost-effectiveness of the technology, it's important to consider what may have been the greatest benefit of all—the improved access to high-quality treatment for residents living in remote areas of the state. Travel costs and time savings were not calculated for the participants. However, for those who were within driving distance of the university and may have chosen to drive there for treatment, the availability of an IT group in their community was a huge benefit.

In summary, the results of this project have demonstrated that telecommunications technology can be used successfully to induce behavior change. Moreover, while the focus of this project was on determining the feasibility, acceptability, and effectiveness of using this medium for weight loss, there is every reason to believe it would be just as effective for facilitating weight maintenance as a standard intervention. Previous research has shown that continued support is predictive of better weight maintenance (Perri, Shapiro, Ludwig, Twentyman, & McAdoo, 1984). Thus, IT and other telecommunications technology could play an exciting role in the preservation of the client-therapist relationship. Therefore, our results have significant implications for a medium that has previously been used primarily to support clinical teaching, consultation, and teleconferencing. Over one-third of the U.S. population is overweight. While we have developed high-quality, medically appropriate, behaviorally focused obesity treatment interventions, they are not accessible or affordable for large segments of the population. The advent of telecommunications technology provides one possible solution. Future research should continue to focus on innovative applications of this technology to the problems of obesity treatment and prevention.

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