7-1-1984

Adherence to Weight Control Techniques and Weight Loss: A Case Study

Anthony F. Rotatori

Tom Erekson

Robert A. Fox
Marquette University, robert.fox@marquette.edu

Jaime Costellano

Published version. *Journal of Obesity and Weight Regulation*, Vol. 3, No. 2 (Summer 1984): 107-114.

Journal of Obesity and Weight Regulation
Vol. 3, No. 2, Summer 1984

Adherence to Weight Control Techniques and Weight Loss: A Case Study

ANTHONY F. ROTATORI, Ph.D., TOM EREKSON, Ed.D., ROBERT FOX, Ph.D., and JAIME COSTELLANO, M.A.

ABSTRACT: A multiple baseline design across four behaviors was used to assess the effectiveness of a self-monitoring behavioral weight reduction program. The four behaviors were (1) the number of arm lifts used to direct food and liquid, other than water, into the mouth, (2) the number of minutes the subject engaged in daily exercise, (3a) the number of meals eaten per day, and (3b) the number of balanced meals eaten per day. The subject involved in this study was a 22-year-old male graduate student who was approximately 25 pounds overweight. At the completion of the study the subject lost a total of 19 pounds, at a rate of 1.73 pounds per week, over an eleven-week period. The results indicated that a self-monitoring behavioral weight reduction program was effective in reducing the weight in a 22-year-old male graduate student. A follow-up check six months later revealed an additional nine-pound weight loss. The study emphasized the need for reliability checkers in the natural environment to increase the dieter's adherence to weight control techniques.

Traditional approaches of effecting lasting weight loss in overweight people have generally achieved minimal success (Abramson, 1977). Although a large number of medical treatments have been tried, ranging from psychotherapy (Burch, 1957) to (Penick, 1970) to fasting (Drenick, 1969) to a wide assortment of varied drugs, the long-term results of such programs have, few exceptions, ranged from disappointing to dismal (Feinstein, 1960). Since it is universally accepted even by such proponents of exercise as Mayer (1968) that the reduction of caloric value of food eaten is both necessary and sufficient for weight loss to occur, it would appear that the control of obesity could be most effectively dealt with in terms of the control of eating behavior. In recent years psychologists have finally become interested in the question of obesity and weight control, and a number of studies utilizing behavior modification techniques to control overeating have been undertaken. Several

Dr. Rotatori is with the University of New Orleans, Dr. Erekson and Mr. Costellano are with Northern Illinois University, and Dr. Fox is with Marquette University. Address reprints to: Anthony F. Rotatori, Ph.D., Associate Professor, University of New Orleans, Department of Special Education, New Orleans, LA 70458.

of these studies have involved aversive counterconditioning of smell, taste, and thought of food, either using electric shock (Meyer & Crisp, 1964), nauseous odors (Foreyt & Kennedy, 1971), or cognitively produced nausea (Cauleta, 1966) as aversive stimuli. Although the reports of these studies have been encouraging, possibly due to the very small number of subjects involved, the fact that all but Cautela's technique involved the use of equipment in a laboratory limits their practical value.

A second type of behavior modification approach to weight reduction and the approach used in this study has been that of contingency management, generally involving self-monitoring and self-control procedures (Ferster, Nurnberger, & Levitt, 1962; Stuart, 1967; Harris, 1969). Because such programs have actually taught the subject how to use behavior modification techniques such as positive reinforcement for refraining from eating and stimuli control procedures, such an approach might be expected to have more lasting success than procedures that do not focus on producing permanent changes in the overweight person's knowledge and behavior (Rotatori & Fox, 1981).

The recording of one's weight while participating in a weight reduction program can result in weight loss due to its reactivity effect (LeBow, Rotatori & Fox, 1981). When discussing the issue of reactivity, investigators must be cautious in their interpretations because of the accuracy of the data reported (Bellack, Rosensky, & Schwartz, 1974). A number of studies (Charney, Goodman, McBride, Lyon, & Pratt, 1976; Pirie, Jacobs, Jeffrey, & Hannan, 1981; Schlichting, Hoiland-Carlsen, & Quaade, 1981; Stunkard & Albaum, 1981; Wing, Epstein, Ossip, & LaPorte, 1979) have investigated the accuracy of self-reported body weights. The studies demonstrated that most subjects are quite accurate although some subjects make large errors.

Another concern in self-monitoring and self-control appoaches is the individual's adherence to techniques taught. Generally the individual records the degree to which he/she adhered to the techniques. Theoretically, adherence to the techniques should result in behavioral changes that produce weight loss (Coates & Thoresen, 1981). However, the literature has revealed weak relationships between behavior changes and weight loss among adult normal individuals (Brownel & Stunkard, 1978; Jeffery & Coates, 1978). In contrast, a number of investigations have not demonstrated significant relationships between behavior and weight changes (Bellack, Rozensky, & Schwartz, 1974; Brownell, Heckerman, Westlake, Hayes, & Monti, 1978; Jeffery, Wing & Stunkard, 1978; Stalonos, Johnson, & Christ, 1978). The assessment data gathered from the above studies relies on the individuals'own records, and one must examine the reliability of such self-report records (Hall, 1972) to be meaningful. Thus the purpose of this study was to determine the effect of a self-control self-monitoring system in a behavioral weight

reduction program as well as to assess the reliability and accuracy of a subject's recordings.

METHOD

Subject

The subject involved in this study was a 22-year-old male graduate student who at the initiation of the study weighted 190 pounds. The subject was 25 pounds overweight according to the Metropolitan Life Insurance Company height and weight tables, which are based on data from the Build and Blood Pressure Study (1959), Society of Actuaries.

Setting

The study took place in three settings: the subject's home, where food preparation and data recording took place, the subject's job site, where the prepared food was eaten and some data recording took place, and the local gymnasium, where the exercise component of the study took place.

Procedure

Baseline 1. Baseline was taken for eating behavior by using a golf counter to record the number of armlifts used to direct food and liquid, other than water, into the mouth. Following each armlift, the subject was required to press the gold counter that recorded that armlift. After any meal or snack the total number of armlifts used would appear on the counter, which could then be recorded on the appropriate chart.

TABLE 1
Reliability Checks for Armlifts, Minutes of Exercising and Meals Eaten for All Experimental Phases

	Behavior	Baseline			Treatment			Follow-up	
1.	Armlifts	91%	88%	92%	100%	93%	100%	95%	95%
	Dates	2-15-81	2-16-81	2-18-81	3-15-81	3-18-81	3-25-81	9-15-81	9-20-81
2.	Exercise	100%	100%	87%	84%	83%	86%	92%	
	Dates	2-24-81	3-4-81	3-16-81	3-23-81	4-8-81	4-20-81	9-22-81	
3a.	Meals	100%	100%	100%	100%	100%	100%	100%	
	Dates	3-20-81	3-30-81	3-31-81	4-10-81	4-15-81	4-17-81	9-15-81	
3b.	Balanced Meals	100%		100%	100%	100%	100%	100%	
	Dates	3-20-81	3-20-81	3-31-81	4-10-81	4-15-81	4-17-81	9-15-81	

Treatment 1. For this behavior, treatment consisted of restricting the subject maximum to a number of armlifts to be used when engaging in eating behavior (Ratcliff, 1974). More specifically, for breakfast the subject could use only a maximum of 20 armlifts. If any food or liquad was left following the twenty armlifts, it was either put away or discarded. For lunch and dinner the maximum number of armlifts that could be used was fifty. Any leftover food was dealt with in the same manner as was indicated for breakfast. For snacks the maximum was 10. For alcohol consumption the subject could use a maximum of 50 armlifts if he visited the local bars or attended parties or 20 armlifts if friends would come over for a social drink(s).

The subject also followed a series of suggestions by Rotatori and Fox (1981) that would make his eating behavior more distinct. These included eating meals as much as possible in one place, using a complete place setting for eating a meal or snack, chewing food fully and swallowing before taking another bite, and putting utensils down after each bite.

Baseline 2. A clock that hung from the wall of the gymnasium was used during baseline to record the number of minutes the subject engaged in physical activities, i.e., playing basketball, running, doing calisthenics. Before the subject began exercising for the day, he would record the time shown on the clock. At the termination of the exercise period, he would again record the time shown on the clock to determine the number of minutes he engaged in exercise for that day. The data were than recorded on the appropriate chart.

Treatment 2. An additional ten minutes of exercising was added to the daily exercise period, which varied from day to day. The additional time was either spent playing basketball, running, doing calisthenics, or in the sauna. The choice was decided on a daily basis. Daily and weekly charts were also included in this part of the study. The charts were kept to monitor the amount of weight loss and because it was intrinsically rewarding for the subject to chart and see the lost weight on paper.

Baseline 3a and b. Counted was the number of "meals" and "balanced meals" the subject had each day. A meal was recorded as such if it consisted of at least one serving of at least three of the four food groups, which include; the meat group, the bread/cereal group, the milk group, and the fruit/vegetable group. A balanced meal was counted if it consisted of the proper servings of food from the four food groups as recommended by Rotatori & Fox (1981).

Treatment 3a & b. The goal for this combination of behaviors was to ultimately have the subject eat three balanced meals a day, according to the definition of balanced meal. By doing this, the subject would have eaten three meals a day, all of which have been balanced, therefore meeting the criterion for both behaviors.

Reliability

A total of 31 reliability checks were conducted in which two independent observers collected data for the behaviors during the three experimental phases (see Table 1). Reliability was determined by using a simple division procedure (the small frequency divided by the larger frequency obtained by each other) for each behavior. Average reliability for behavior one was 90.33 for baseline, 97.66 for treatment, and 95.00 for follow-up. Average reliability for behavior two was 88.33 for baseline, 84.33 for treatment, and 92.00 for follow-up. In behaviors 3a and b, agreement was 100 percent across all checks.

Reliability for weigh-ins was conducted by using two different scales: a Fairbanks-Morse 1/2 pound graduation scale and a Fairbanks-Morse standard scale. The average reliability for the six weight checks was 99.8 percent.

RESULTS

Armlifts

For the baseline, the range in the number of armlifts used to direct food and liquid, other than water, into the mouth during a meal varied from 5 to 130 with a mean of 38.45. The weekly total for armlifts varied from 472 to 617 with a mean of 528.25. When the subject used one intervention procedure criteria for maximum armlifts, the range for a meal varied from 10 to 60 with a weekly total of 20.13, whereas the weekly total for armlifts ranged from 393 to 572 with a mean of 490.28 (see Figure 1). Follow-up revealed a maintenance of the behavior learned.

Exercise

During baseline, the range for the number of minutes in exercise varied on a daily basis from 0 to 70 with a mean of 43.28. The weekly exercise total varied from 172 to 290 with a mean of 242.40. During treatment, the range for the number of minutes in exercise varied on a daily basis from 0 to 70 with a mean of 40.64. The weekly exercise total varied from 202 to 370 with a mean of 284.50. The follow-up data revealed a substantial decrease in minutes of exercise.

Meals Eaten

During baseline the daily range for the number of meals eaten varied from 0 to 2 with a mean of 1.3. The weekly total varied from 5 to 12 with a mean of 9.13. During treatment the range for daily meals eaten varied from 1 to 3 with a mean of 1.85. The weekly total varied from 10 to 15 with a mean of 13. The follow-up check revealed a maintenance of the behavior learned

Balanced Meals Eaten

During baseline, the daily range for the number of balanced meals eaten varied from 0 to 2 with a mean of .54. The weekly total varied from 2 to 9 with a mean of 3.75. During treatment, the range for daily balanced meals eaten varied from 0 to 2 with a mean of .80. The weekly total varied from 5 to 7 with a mean of 5.66. The follow-up data are similar to the treatment results.

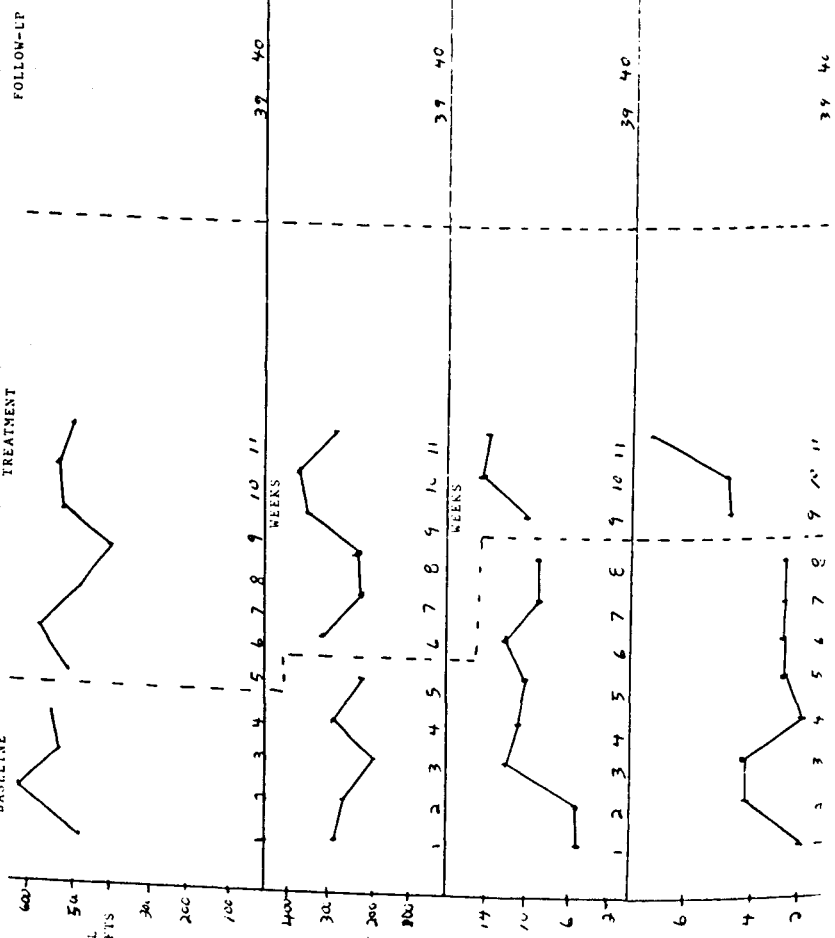
BASELINE
TREATMENT
FOLLOW-UP
TOTAL ARM LIFTS
TOTAL MINUTES IN EXERCISE
TOTAL MEALS EATEN
TOTAL BALANCED MEALS EATEN
WEEKS

FIGURE 1

DISCUSSION

The results indicated that a self-monitoring behavioral weight reduction program was effective in reducing the weight of a 22-year-od overweight male as the subject lost nineteen pounds during an 11-week period. Additionally, a 4-month follow-up revealed the subject lost an additional nine pounds. The study demonstrated that when a subject adheres to weight reduction techniques, weight loss occurs. Also, a subject can reliability record their weight with few errors.

The above study necessitated the inclusion of reliability observers to check the subject's adherence to the techniques and the accuracy of the daily weighing. The use of spouses, parents, relatives, or friends as reliability checkers would be a natural and practical way to assist the dieter in their weight loss program. This is especially relevant, since a number of successful weight losses studies have programmed spouses to administer reinforcement and provide verbal feedback on how well the dieter is using the weight control techniques (LeBow, 1981; Matson, 1977). For treatment that takes place in a mental health facility, observers can be trained to use the Eating Analysis and Treatment Schedule (EATS) developed by Coates and Thoresen (1978), which is an observational survey for use by nonparticipant observers at mealtimes to collect data on the eating behaviors of individual dieters.

REFERENCES

Abramson EE: Behavioral approaches to weight control: An updated review. *Behavior Research and Therapy, 15:* 355-63, 1977.

Bellack AS: A comparison of self-reinforcement and self-monitoring in a weight reduction program. *Behavior Therapy 7:* 68-75, 1975.

Bellack AS, Rosensky R, & Schwartz J: A comparison of two forms of self-monitoring in a behavioral weight reduction program. *Behavior Therapy 5,* 523-30, 1974.

Brownell KD, Heckerman CL, Westlake RJ, Hayes SC, & Monti PM: The effect of couples training and partner cooperativeness in the behavioral treatment of obesity. *Behaviour Research and Therapy 16:* 323-33, 1978.

Brownell KD & Stunkard AJ: Behavioral treatment of obesity in children. *American Journal of Disease of Children 132:* 403-12, 1978.

Bruch, H: *The Importance of Overweight.* W.W. Norton, New York, 1957.

Cautela JR: Treatment of compulsive behavior by covert sensitization. *Psychological Records 16:* 33-41, 1966.

Charney M, Goodman HC, McBride M, Lynon B, & Pratt R: Childhood antecedents of adult obesity: Do chubby infants become obese adults? *New England Journal of Medicine 295:* 6-9, 1976.

Coates TJ & Thoresen, CE: Treating obesity in children and adolescents: A review. *American Journal of Public Health 68:* 143-51, 1978.

Coates TJ & Thoresen CE: Behavior and weight changes in three obese adolescents. *Behavior Therapy 12:* 383-99, 1981.

Drenick EJ: *Starvation in the management of obesity,* in Wilson, Nancy (ed.): *Obesity,* F. A. Davis, Philadelphia, 1969.

Feinstein AR: The treatment of obesity: An analysis of methods, results, and factors which influence success. *Journal of Chronic Disease 11:* 349-93, 1960.

Ferster CB, Nurnberger JI, & Levitt EB: The control of eating. *Journal of Mathematics 1:* 87-109, 1962.

Foreyt JP & Kennedy WA: Treatment of overweight by aversive therapy. *Behavior Research and Therapy 9:* 29-34, 1971.

Hall SM: Self-control and therapist control in the behavioral treatment of overweight women. *Behavior Research and Therapy 10:* 59-68, 1972.

Harris MB: Self-directed program for weight control: A pilot study. *Journal of Abnormal Psychology, 74:* 263-70, 1969.

Jeffery RW & Coates TJ: Why aren't they losing weight? *Behavior Therapy 9:* 856-60, 1978.

Jeffery RW, Wing RR, & Stunkard AJ: Behavioral treatment of obesity: The state of the art in 1975. *Behavior Therapy 6:* 189-99, 1979.

LeBow MD: *Weight control: The behavioral strategies.* New York: John Wiley and Sons, 1981. Metropolitan Life Insurance Company. Build and Blood Pressure Study, Society of Actuaries, Chicago, 1959.

Matson JL: Social Reinforcement by the spouse in weight control: A case study. *Journal of Behavior Therapy and Experimental Psychiatry 8:* 327-28, 1977.

Mayer, J: *Overweight: Causes, Costs, and Control.* Englewood Cliffs, NJ: 1968.

Meyer V. & Crisp AH: Aversion therapy in two cases of obesity. *Behavior Research and Therapy 2:* 143-47, 1964.

Penick SB: The use of amphetamines in obesity. Psychiatric Opinion 1: 27-30, 1970.

Pirie P, Jacobs D, Jeffery R, & Hannan P: Distortion in self-reported height and weight data. *Journal of the American Dietetic Association 78:* 601-6, 1981.

Ratcliff RW: *The Bite Book.* Newton IA: The Helpers, 1974.

Rotatori AF & Fox R: *Behavioral Weight Reduction Program for Multiply Handicapped Persons: A Self-control Approach.* Baltimore, MD: University Park Press, 1981.

Schlichting P, Hoilund-Carlsen PF, & Quaade F: Comparison of self-reported height and weight with controlled height and weight in women and men. *International Journal of Obesity 5:* 67-76, 1981.

Stalonas PM, Johnson WG, & Christ M: Behavior modification for obesity: The evaluation of exercise, contingency management and program adherence. *Journal of Consulting and Clinical Psychology 46:* 463-69, 1978.

Stuart RB: Behavioral control of eating. *Behavior Research and Therapy 5:* 357-65, 1967.

Stunkard AJ, & Albaum JM: The accuracy of self-reported weights. *American Journal of Clinical Nutrition 34:* 1593-99, 1981.

Wing RR, Epstein LH, Ossip DJ, & LaPorte, RE: Reliability and validity of self-report and observers' estimates of relative weight. *Addictive Behaviors 4:* 133-40, 1979.