This is to certify that the

thesis entitled

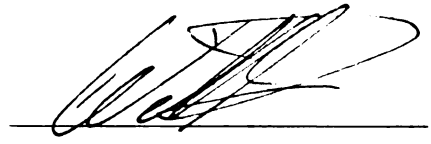
BEHAVIOR CHANGE VERSUS WEIGHT LOSS AS CONTINGENCY FOR MONETARY REWARD AND BEHAVIORAL CONTRACTING

presented by

TERESA A. MONAGHAN

has been accepted towards fulfillment
of the requirements for

M.A. degree in Psychology



Major professor

William S. Davidson

Date March 31, 1993

BEHAVIOR CHANGE VERSUS WEIGHT LOSS AS CONTINGENCY FOR MONETARY REWARD AND BEHAVIORAL CONTRACTING

By

Teresa Ann Monaghan

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Psychology

1993

ABSTRACT

BEHAVIOR CHANGE VERSUS WEIGHT LOSS AS CONTINGENCY FOR MONETARY REWARD AND BEHAVIORAL CONTRACTING

By

Teresa Ann Monaghan

Research on weight control has revealed that only 5% of successful weight loss clients maintain their losses. Most programs measure success in terms of amount of weight lost, although studies have suggested a negative correlation between weight lost during a program and future maintenance. The present study compared the efficacy of two contracting methods utilized in a weight control program. Randomly assigned participants contracted to lose a specified amount of weight each week, or to change specific behaviors related to weight loss, as contingency for monetary reward. Results revealed significant differences between groups in rate of meeting weekly goals and adherence to program techniques. There was no significant difference in amount of weight lost between groups. There appeared to be relationships between self-efficacy at both pretest and posttest, and amount of weight lost. Limitations of the present study and issues surrounding the experimental study of weight loss are discussed.

ACKNOWLEDGEMENTS

It is difficult to include all of the people who have influenced me, and thus this thesis, in such a short space. It is even more difficult to decide who should receive top billing. However, someone must be first. So I would like to thank my parents, John and Mary Ann Monaghan, for the obvious chore of giving me life and a solid and loving upbringing. Throughout the years I have made choices that they may or may not have agreed with, but they always allowed me the freedom to make those choices. Knowing that they would be there to cushion my fall made it easier for me to take chances. The support from my entire family must also be acknowledged. Sometimes I just needed to be asked "How's it going?" so thanks for coming through for me.

Secretarial staff often do not receive the glory and recognition that they so greatly deserve. Two amazing people have helped me at times of desperation: Pat Bayer and Suzy Pavick. I honestly don't know how I would have made my way through the maze of University administration without their knowledge and talent.

Next I thank my committee chair, Dr. William Davidson, for his continuous support and encouragement through the seemingly never ending process of revisions. I also thank my other committee members, Dr. Brian Mavis and Dr. Bertram Stoffelmayr, for their willing and capable assistance towards this work.

Thanks also are extended to my classmates and Pitchers and Nachos group, Kurt Ribisl and Kim Eby. The beginning stages were often difficult, but combining work with fun was just what was needed. Their friendship throughout the years has been invaluable to me. A special thanks to Barb Schillo, for cheerfully listening to me complain and gripe about everything, and for remaining calm while helping to decipher SPSS-X. Thanks also to the Masters Thesis Fairy, a.k.a. Kerry Vachta for supplying me with the necessary sustenance in the final stages. To the rest of my friends who have given me encouragement along the way, thank you very much.

Although he'll never read this, I must say thanks to Adonis, my faithful companion throughout my entire MSU career. Sometimes it seemed that he could understand more than anyone, or at least he didn't talk back.

Last, but certainly not least, thanks to Martin, who helped me to see that taking things too seriously won't do me any good. Words cannot convey how much your support and advice have meant to me.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Obesity is pervasive in the United States, affecting between 20% and 41% of men and between 18% and 60% of women (Margolis, Sparrow, & Swanson, 1988). The wide variation is due to different rates across age groups and by race. Since 1960 through to the present time, there have consistently been approximately 25% of the population classified as overweight or obese in the United States (National Center for Health Statistics, 1992). It has been estimated that about one-third of the American population is obese to the extent of decreasing life expectancy (U. S. Senate Select Committee on Nutrition and Human Needs, 1977). Most estimates define obesity as more than 20% over ideal weight or percentage body fat for height and age. It has been suggested that obesity is defined arbitrarily by the particular time frame and cultural standards that are selected for use as the "norm" (Van Itallie, 1979), and that the current epidemic of obesity is the result of a lowering of ideal height/weight standards (Rittenbaugh, 1982). While the implication of such statements may be that societal norms are the problem rather than obesity itself, Van Itallie points out that obesity is common in the United States, regardless of the measurement standard used.

In this paper, issues associated with obesity and overweight will be discussed. Correlations of obesity with both physical and psychological difficulties will be presented. Because obesity is a result of a complex array of causal factors, few programs are successful in assisting clients to lose and maintain substantial weight losses. Simply put, obesity results from energy intake exceeding energy output, so any restrictive diet or exercise-increasing program can produce a weight loss. However, additional factors, such as environmental cues, the social environment, and lifestyle habits, affect the ability of individuals to maintain a weight loss. This paper will then turn to a review of past literature on weight management programs and their effective components. The review will provide a justification for the present study focusing on individualized weight control programs, utilizing individual problem solving, behavioral contracting, monetary deposit, team competition, and an educational component. A full explanation of the present study will then be given.

Physical Correlates

Obesity has been highly correlated with numerous disabilities, including both physiological and psychological problems. In a 26 year follow-up of the original participants of the Framingham Heart Study, obesity was found to be a significant independent predictor of cardiovascular disease (Hubert, Feinleib, McNamara, & Castelli, 1983). Significant associations between obesity and many cardiovascular disease risk factors were found in a study of 250 pairs of White, male, monozygotic twins. The risk factors included systolic and diastolic blood pressures, one hour post-load glucose, cholesterol (total, low density lipoprotein, and high density lipoprotein), and triglycerides, and the associations were found entirely in the absence of genetic

twins. The risk factors included systolic and diastolic blood pressures, one hour post-load glucose, cholesterol (total, low density lipoprotein, and high density lipoprotein), and triglycerides, and the associations were found entirely in the absence of genetic influences (Newman, Selby, Quesenberry, King, Friedman, & Fabsitz, 1990). The relationship between obesity and diabetes mellitus has long been recognized (Van Itallie, 1979). Over 70% of adult-onset diabetic patients are overweight, and the accumulation of excess weight between the ages of 25 and 44 increases the incidence of diabetes several times (United States Department of Health, Education, and Welfare, 1975). Correlations have also been found between obesity and hypertension, gallbladder disease, stroke, and digestive disorders (U. S. Select Committee on Nutrition and Human Needs, 1977).

Obesity is related to physical performance decrements as well. In a study of school children in grades 3, 7, and 11, obesity had a negative effect on boys and girls equally on such physical measures as the standing long jump and wall pass (to evaluate the fundamental skills of jumping and catching, respectively), the flexed arm hang, sit-ups, and side slide (to evaluate motor fitness), and the timed run (to evaluate cardiovascular fitness); these relationships held constant across grades (Smoll & Schultz, 1990). The effects of obesity on physical performance continues into adulthood. Significant negative correlations, ranging from -.63 to -.71 ($p<.05$), were found between measures of aerobic capacity and body composition in a group of morbidly obese women. Mean aerobic capacity was comparable to that of Class III cardiac patients, who have symptoms with less than normal physical activity.

Furthermore, the extreme body weight of the participants limited the duration of exercise possible (DeLozier, Israel, O'Brien, Shaw, & Pories, 1986).

Psychosocial Correlates

The negative psychosocial factors associated with obesity include social stigmas (DeJong, 1980; Maddox, Black, & Liederman, 1968), prejudices (Crandall and Biernat, 1990; Clayson & Klassen, 1989; Pauley, 1988), and some emotional or psychological manifestations, such as body image distortions (Cullari & Trubilla, 1989; Gardner, Morrell, Urrutia, & Espinoza, 1989). Gardner, et al. (1989) used video methodology to estimate body image accuracy. They found a high incidence of body-image distortion, although participants who had recently lost weight had more accurate body image than normal weight participants. Participants who had recently lost an average of 38% of their body weight and were currently 37% overweight pictured their ideal body weight to be 47% less than their current weight. In other words, even after a substantial weight loss, these participants felt that their ideal weight was lower than the standard for their height. Faubel (1988), however, found evidence for a subpopulation of obese women who were neither depressed nor dissatisfied with their bodies. Three groups of women were compared: women of normal weight, women with early onset obesity (i.e., before age 13), and women with adult onset obesity (i.e., after age 17). Measures assessed body image and depression. Results showed that the two obese groups rated their bodies as less fit than the normal weight group, but there were no significant differences between obese and normal weight participants on the level of depression or body image disturbance. Despite these contradictory studies, American culture does value

thinness and devalue obesity (Crandall & Biernat, 1990), placing a pressure on people, particularly women, to conform to the physical standard of attractiveness.

Due in part to the negativism associated with obesity in this country, over $10 billion is spent each year on weight loss programs, books, fitness clubs, and other methods of losing weight. Approximately one-half of American adults attempt to control their weight, and each week about one million people participate in group weight loss programs (Hodgson, 1984). In a 1989 cross sectional survey of 39 states and the District of Columbia, 25% of the men and 39% of the women reported that they were currently trying to lose weight, and 29% of men and 28% of women were trying to maintain their weight (Williamson, Serdula, Anda, Levy, & Byers, 1992). While many individuals succeed in losing substantial amounts of weight, only about 5% maintain their loss for any significant length of time. Thus, much research time and money is spent on devising the most effective weight loss program. In order to develop safe and effective weight loss treatment programs, an understanding of the causes of obesity is important.

Causal Factors

There has been an ongoing debate among researchers of obesity concerning potential causal factors. Theories vary widely, from strict genetic causes to behavioral factors. Since the time of Hippocrates and Galen the scientific and medical communities have debated the issue. Popular opinion has shifted between a moralistic judgement on the obese person's self-control, and a view that obesity is hereditary and not controllable by the individual (Bray, 1990). A recent article by Costanzo and Schiffman (1989) challenged the theory that obesity has a genetic

component. Analysis of data from the Danish Adoption Register revealed that lean body mass of biologic parents might have a small protective factor against the onset of obesity in children, but body fat does not seem to be a significant genetic risk factor in the development of obesity. In contrast, Stunkard, Sorensen, Harris, Teasdale, Chakraborty, Schull, and Schlusinger (1986) examined the contributions of genetics and family environment to human fatness in adoptees. They found a strong relationship between weight class of adoptees and body mass index of biologic parents, but no such relationship between adoptees and their adoptive parents. The relationship between adoptees and their biologic parents was present across the entire range of body fatness.

Since the relative contributions of the various causal factors are still unknown, most researchers acknowledge that obesity is probably influenced by both hereditary and behavioral factors (Van Itallie, 1979). Schlundt, Hill, Sbrocco, Pope-Cordle, and Kasser (1990) stated that a complete understanding of obesity requires an integrated biobehavioral approach, attending to environmental, cognitive and affective variables that may contribute to the development of obesity. Regardless of which variables cause or contribute to obesity, the fact remains that weight gain results from energy intake exceeding energy output. This positive energy balance can be due to an excess of energy intake or too little energy output (Garrow, 1979). The reasons for such a positive energy balance are varied among individuals. Although many researchers have attempted to develop an effective weight loss program, none have succeeded in helping large numbers of individuals to lose weight and maintain their loss. It has been estimated that, of those who begin

weight loss treatment programs, between 20% and 80% complete them (Brownell & Jeffery, 1987). In a detailed review of weight loss treatments, Brownell and Jeffery (1987) noted a consistent trend towards regain over five year follow-ups in even the most successful treatment programs. The challenge to weight control programs then is not only to assist individuals in losing weight, but also to increase the number of successful clients who maintain their weight loss. A review of past literature on the subject of weight management programs and their effective components will help to clarify this problem.

CHAPTER II

REVIEW OF THE LITERATURE

Despite a wealth of research, questions still remain as to which strategies are most effective for weight loss in the short term and, more importantly, for the rest of one's life (Blair, Lewis, & Booth, 1989). Many researchers have attempted to determine variables that differentiate between obese and non-obese individuals, and variables which might predict successful weight loss. Some have focused on individual differences in personality variables, while others have examined behavior changes related to successful weight loss.

Differences Between the Obese and Non-obese

Obese eating style. Many researchers have attempted to determine an obese eating style, thus differentiating obese from non-obese. Schlundt, et al. (1990) investigated the eating behavior of obese women based on two weeks of food diaries. Data from this study suggested that eating behavior was often controlled by environmental, cognitive, and affective variables. Overeating and impulsive eating were affected by the physical setting of the eating episode, the person's mood, the time of day, the particular meal, the presence of tempting or forbidden foods, and self-perceptions of being tired or craving sweets. Hunger was associated with lower probabilities of overeating and impulsive eating. Since eating behavior was not

compared to that of non-obese women, it cannot be concluded from this study that obese women differ in this realm.

Eating restraint. Eating restraint is one style of eating which has been hypothesized to differ among people of different body weights. Specifically, it has been hypothesized that restrained eaters (i.e., dieters) hold irrational beliefs related to weight loss, such as the feeling that "If I eat something I'm not supposed to, I've blown my diet", which in turn leads to overeating. Ruderman (1985) tested this hypothesis, and found that restrained eaters did endorse rigid, perfectionistic beliefs related to eating and dieting. This study did not examine this relationship in terms of obese versus normal weight. In a study of college females, however, normal weight and obese participants were virtually identical on a measure of restraint, with both groups showing sizable individual differences (Herman & Mack, 1975). In other words, it seems that not all obese individuals are externally motivated to eat, and not all normal weight individuals are internally motivated.

Predictor Variables

Predictors of weight loss. Researchers have attempted to determine predictor variables for successful weight loss. Jacobs and Wagner (1984) compared groups of individuals who were obese, previously obese now average, and always average. They found significant differences in behavioral and personality characteristics. For example, currently obese individuals reported a lower physical self-concept than the other two groups, reflecting their opinions related to body image, state of health, physical appearance, and sexual functioning. There were, however, no significant differences among groups on overall self-concept. Additionally, the obese group

engaged in less physical activity, both vigorous and passive, than the other two groups. The reinforcement value of eating was highest in the currently obese group, although eating was not the most reinforcing activity. Adams, Grady, Wolk, and Mukaida (1986) found the most important predictor of weight loss was percent overweight before treatment, with people who were more overweight before treatment losing more weight. The number of previous programs tried was also negatively related to weight loss.

Predictors of attrition. Researchers have also attempted to predict attrition in weight loss programs. Pekarik, Blodgett, Evans, and Wierzbicki (1984) found significant group differences among early and late dropouts and completers of a behavioral weight loss program on a variety of measures, including anxiety, breadth of interest, energy level, organization, responsibility, and depression. Early dropouts scored lower on all indices except anxiety, indicating a lower level of adjustment.

Weight Maintenance Strategies

Snow and Harris (1985) identified factors associated with maintenance of weight loss. Maintainers were more likely to be male and younger, weighed less as teenagers and adults, had fewer overweight sisters and friends, were better educated, had dieted less often in groups, used fewer other dieting procedures, exercised more, weighed themselves more frequently, and had made permanent changes in lifestyle. Regainers, on the other hand, ate more in response to emotions and indicated more concern about their weight. Grana, Coolidge, and Merwin (1986), however, were unsuccessful in determining variables in the Minnesota Multiphasic Personality

Inventory and the Coolidge Axis Two Inventory which would predict success in weight loss among morbidly obese participants. These and similar studies have not revealed any sort of consistent profile of a successful weight loss client (Brownell, 1985).

Most research studies on weight loss have been done with clients of formal weight loss programs. Kayman, Bruvold, and Stern (1990) conducted a unique study in which they examined weight loss strategies used by women who had lost weight outside of formal treatment programs. Women were grouped as those who had regained weight after successful weight reduction, formerly obese women who had successfully maintained their losses and were now of average weight, and women who had always remained at the same average, non-obese weight (control group). Significant differences were found in weight maintenance strategies used. Most maintainers (90%) and control participants (82%) exercised regularly, were conscious of their behaviors, used available social support, confronted problems directly, and used personally developed strategies to help themselves. In contrast, few relapsers exercised (34%), most ate unconsciously in response to emotions, few used available social support, and few confronted problems directly.

In summary, while many researchers have found variables which might help to predict those who will be successful, no consistent pattern has emerged. Wilson (1985) stated that different factors may predict success or failure at different points in time, and variables that predict success at weight loss may be different than those related to maintenance. Additionally, there may be different prognostic factors for different types of treatment. The most important finding seems to be that treatment

programs should be individualized rather than using a blanket treatment for all (Kayman, et al., 1990). Following is a review of program components which have been used in the past and in the present, with varying degrees of success. In addition, both the positive (i.e., effective) and negative (i.e., ineffective) aspects of each component will be discussed. A description of the programs to be used in the present study will then be provided, along with a complete rationale for each component.

Energy Intake Restriction

A large percentage of the American public does not eat a nutritionally sound diet based on the Recommended Daily Allowances (RDA's) of the United States Department of Agriculture (USDA). Based on the 1976-1980 National Health and Nutrition Examination Survey (NHANES-II), only 27% of the population surveyed had eaten the three or more servings of vegetables and 29% had eaten the two or more servings of fruit recommended by the USDA on the day of recall (Patterson, Block, Rosenberger, Pee, & Kahle, 1990). The average American diet is not conducive to weight loss. Therefore when individuals attempt to lose weight, they will most likely need to examine their diet to determine if changes need to be made in this area. This is often difficult and sometimes problematic.

Most individuals attempting to lose weight, either on their own or in a formal treatment program, devote a majority of their efforts to restricting their intake of food. This might mean deleting certain foods from the diet, restricting total calories, or restricting such dietary components as fat, carbohydrates, or protein. It has been theorized that composition of the diet, rather than total amount of energy, may be

related to obesity. Miller, Lindeman, Wallace, and Niederpreum (1990) determined the body fat percentage, and diet and exercise behaviors of adult men and women. As body fat increased, the percentage of energy derived from fat significantly increased, and the percentage from carbohydrate significantly decreased. When subgroups of lean and obese participants were compared, the lean group derived 29% of their energy from fat and 53% from carbohydrates, while the obese group derived 35% and 46% from fat and carbohydrates, respectively.

Often there are negative physical effects which accompany calorie restrictions. Dale, Saris and Hoor (1990) compared body composition and sleeping metabolic rate (SMR) of male and female participants at 18, 36, or 42 months follow-up for diet only (D) and diet plus exercise (DE) treatments. The D group regained 90% of their initial weight loss, while the DE group regained 60%. At 42 months, SMR of non-exercising participants was lower than that of participants who continued exercising.

Frey-Hewitt, Vranizan, Dreon, and Wood (1990) compared the resting metabolic rates (RMR) of moderately overweight men on energy restriction (D), exercise (E), and no treatment controls. Although both D and E groups lost significantly more weight and fat mass than the control group, the D group had a significant decrease in RMR, while the RMR for the E group did not change. The important implication is that a decrease in metabolic rate means that energy intake requirements are lowered.

Brownell, Greenwood, Stellar, & Shrager (1986) demonstrated the metabolic effects of weight cycling in rats. The rats that were put through two cycles of

calorie restriction and refeeding had a four-fold increase in food efficiency (weight gain/kcal of food intake) compared to obese rats of the same weight that had not been cycled. The cycled animals required more than twice the time to lose the same amount of weight during the second restriction compared to the first, while one-third the time was needed to regain weight in the second refeeding. This suggests that frequent "yo-yo" dieting may make later weight loss more difficult. Extrapolating this to human dieters, food intake must be lowered more with each subsequent diet, making it more difficult to lose weight each time, and difficult to maintain a desirable weight.

Often the dieter feels unable to maintain a low enough energy intake to lose weight, and resorts to the use of diet aids. The most common diet aids contain phenylpropanolamine (PPA). PPA is a stimulant, similar in chemical structure to amphetamine, and causes blood vessels to constrict, airways to dilate, and heart rate to increase. It is not known exactly how PPA suppresses the appetite, although it is believed that it works on the hypothalamus, which is the brain's satiety center (Buchanan, 1988). More than 9 million Americans used PPA containing diet aids in 1981, making it the fifth most used drug in the country (Pentel, 1984). Problems can arise if these drugs are not used properly. When used at higher than recommended doses or in combination with caffeine, PPA can cause clinically significant, though transient, blood pressure increases (Lake, Zaloga, Clymer, Quirk, & Chernow, 1989). PPA interacts with other drugs to either decrease or dangerously increase their effectiveness (Buchanan, 1988). In a survey of male and female diet center clients, 16% reported using PPA containing diet aids. Among this group,

22% reported deliberately using more than the recommended dosage, and 59% regularly consumed caffeine containing beverages (Lake, Rosenberg, & Quirk, 1990). These numbers are typically higher in samples of teenage and college age females. Forty-two percent of high school senior women had used PPA containing diet aids in their lifetime, 30% within the past year (Johnston, Bachman, & O'Malley, 1982). Similarly, 30% of college women surveyed had used over the counter diet aids in the past year (Vener & Krupka, 1985). The Food and Drug Administration (FDA) has approved the use of PPA as a diet aid, but only for a 12 week duration. Therefore PPA is not helpful in long-term weight control (Buchanan, 1988).

Various social and environmental factors make restricting one's food intake difficult. Jeffery, French, and Schmid (1990) compared the effects of four dietary change groups. Participants in the Hypertension Prevention Trial were assigned to one of four diets for a period of three years: sodium restriction (NA), calorie restriction (CAL), sodium plus calorie restriction (NACAL), and sodium restriction plus potassium increase (NAK). The most common complaints of all groups were handling environmental and social situations, lack of willpower, habit strength, and the diet itself. The two groups on the calorie restricted diet (CAL and NACAL) were twice as likely to explain problems in adherence through a characterological defect or an emotional state than the NA and NAK groups, and significantly more likely to consider their problems to be internal rather than external. In discussing these differences, the authors propose possible reasons, including real differences in

difficulty, cultural labeling biases, higher rate of previous failures in the weight loss groups, and differences in situational pressures.

Thus it can be seen that simply restricting one's energy intake does not guarantee weight loss or maintenance. Restricting one's diet is difficult in terms of physiology, social situations, and environmental cues. In addition, the relationship between energy intake and obesity is unclear. In a comparison of hyperplastic (increase in fat cell number) and hypertrophic (increase in fat cell size) obese women, an energy reduced diet resulted in the decrease of fat cell size to normal, but did not decrease the number of fat cells. Therefore the hypertrophic women ended up with a normal body fat, while the hyperplastic women had a pronounced remaining obesity (Bjorntorp, Carlgren, Isaksson, Krotkiewski, Larsson, & Sjostrom, 1975). In a study of the relationships of relative weight to energy intake and physical activity, a weak inverse relationship between relative weight and total energy intake was found. This relationship reduced essentially to null when age and exercise were controlled (Romieu, Willett, Stampfer, Colditz, Sampson, Rosner, Hennekens, & Speizer, 1988). Thus a simple relationship between energy intake and weight loss does not exist. Most programs therefore incorporate one or more additional components into their regimen.

Energy Output Increase

As indicated above, exercise is associated with higher sleeping and resting metabolic rates compared to energy restrictive dieting alone (Dale, et al., 1990; Frey-Hewitt, et al., 1990). Brownell and Jeffery (1987) note that the addition of exercise to behavioral programs has shown relatively little short-term benefit, but

exercise has been correlated with long-term maintenance of weight loss. In the Kayman, et al. (1990) study cited earlier it was found that 90% of maintainers and 82% of control participants reported exercising regularly, whereas only 34% of the regainers reported regular exercise. Additionally, regainers who did exercise reported less frequent and less vigorous activity than maintainers, and maintainers reported engaging in more leisure time and daily work time activities than did regainers. Similarly, Miller, et al. (1990) found no significant differences in total energy intake between lean and obese participants. There was, however, a significant relationship between leanness and exercise, where lean individuals exercised more often.

Exercise has also been examined in relation to other aspects of weight loss. Keim, Barbieri, and Belko (1990) found that daily aerobic activity increased total body weight, but this was predominantly due to an increase in fat free mass. In addition, regular physical exercise has been associated with positive psychological variables, such as higher self-esteem, feelings of control, self-sufficiency, more restful sleep, less anxiety, better handling of stressful encounters, and higher level of imaginativeness (Brown & Siegel, 1988; Brunner, 1967; Killip, 1984; Sachs, 1984).

This review will now turn toward the use of techniques designed to alter behaviors related to weight loss. Common techniques include behavior modification and incentive procedures.

Behavior Modification Therapy

The goal of behavior therapy for weight control is to modify daily habits which contribute to weight gain, such as eating and activity, in order to produce lasting changes (Kalodner & DeLucia, 1990). Behavioral techniques generally include stimulus control, self-monitoring, alteration of eating patterns, development of social support, and increasing exercise (Westover & Lanyon, 1990). This type of treatment for obesity has been used with some degree of success for many years. As early as 1971, behavior therapy produced promising results in weight loss treatment. Penick, Filion, Fox and Stunkard (1971) found that participants in a behavior therapy treatment program lost significantly more weight than those in a matched control group treated with traditional group therapy, and weight loss equalled that of traditional medical techniques. Behavior therapy continues to be used as a component of weight loss programs. Research shows, however, that a major problem facing behavior therapy is how to reduce attrition and how to facilitate long term maintenance of weight loss (Brownell, Heckerman, and Westlake, 1979; Kalodner & DeLucia, 1990).

While it is difficult to lose weight in the first place, it is even more difficult to maintain a weight loss. This is the point at which most people relapse. Although maintenance of weight is the ultimate goal in any weight loss program, few studies provide data on follow-ups of any great length. Those that do give such data are typically not encouraging. Stalonas, Perri, and Kerzner (1984) conducted a five year follow-up of participants in a behavioral weight control program which utilized exercise and contingency management. At termination of the ten week program,

participants had lost an average of 10.7 pounds, and maintained that loss at three month follow-up (M=12.5 pounds). At five years posttreatment, most participants had regained a major portion of their lost weight. Average regain was 11.94 pounds, and participants were an average of 1.49 pounds heavier than they had been at the onset of the program. Adherence to program techniques was low, and negatively correlated with posttreatment gains. Perri, Shapiro, Ludwig, Twentyman, and McAdoo (1984) evaluated two strategies for enhancing maintenance of weight loss (post-treatment client therapist contact or no posttreatment contact) crossed with three treatments (nonbehavioral therapy, behavior therapy, or behavioral therapy plus relapse prevention training). The only group which maintained their mean posttreatment weight loss at 12 month follow-up was that which received behavior therapy and posttreatment contact by mail or phone.

Although behavior therapy can produce impressive weight loss during treatment, an effective means of enhancing maintenance of losses has not been found. Similarly, adherence to the program techniques is typically low after regular treatment ends. Various incentive components have been added to behavioral programs in the hopes of addressing these issues.

Incentives

In order to improve the rate of weight loss and maintenance of weight loss, contingency management techniques have been utilized. Jeffery, Thompson, and Wing (1978) examined the effectiveness of behavioral contracts with monetary deposits. Rewards were contingent on either attendance, calorie restriction, or weight loss. The calorie restriction and weight loss groups lost significantly more

weight than the attendance group and a no contract control group, but did not differ from one another. Although the two groups were successful in losing weight, the authors cite earlier evidence that contracts contingent on habit or behavior changes might promote better maintenance than would a focus on weight loss.

In a study by Mahoney (1974), obese adult volunteers deposited $35 and were compared across four conditions: self-reward for weight loss (SR-weight), self-reward for habit change (SR-habit), self-monitoring, and delayed treatment control. After an 8 week treatment period, the SR-habit group had lost significantly more weight than either the SR-weight or self-monitoring groups. Since this study by Mahoney, however, weight loss programs and the studies examining them have continued to focus primarily on amount of weight lost rather than changes in behaviors or lifestyle habits. The reasons for this continued focus on weight are unclear.

The Jeffery, et al. (1978) study cited above used monetary deposits of $200. While there was strong evidence for the use of monetary contracts, there was a high rate of initial declining to participate, which may have been due in part to the large sum of money required. Other researchers have examined the utility of lower amounts of deposit for contracting.

Jeffery, Bjorn-Benson, Rosenthal, Kurth, and Dunn (1984) compared weight loss and one year maintenance of three contracting conditions: monetary commitment control, in which participants were refunded their entire $150 deposit contingent on attending the initial session; constant refunds contingent on weight loss; and increasing refund contingent on weight loss. Increasing funds produced

Thus a method of increasing the likelihood of continued loss or maintenance of loss after a person leaves a weight loss program is needed. In a review of work on reinforcement of risk reduction and the use of social structures to support maintained reductions, Fisher, Lowe, Levenkron, and Newman (1982) concluded that, while external reinforcement can be effective in altering behaviors, it is important that the individual be aware of naturally occurring consequences to behavior. To expand on this idea, the individual must eventually become internally motivated in order to maintain behaviors that will lead to permanent weight control. Social support has been theorized as one of the missing links in the solution to this problem as a way to increase initial motivation for compliance.

Social Support

Social support can involve spouses, family members, peers, or coworkers, and can vary in the amount of involvement, content, and techniques included (Kalodner & DeLucia, 1990). At present there are contradictory findings on the efficacy of social support in weight loss programs. Kalodner and DeLucia (1990) proposed that factors which may affect efficacy include the choice of significant other as partner and weight of the partner.

A meta-analysis of couples weight control programs revealed that inclusion of significant others produced significantly greater mean weight loss at posttreatment compared to subject-alone programs; a nearly significant statistical superiority was also found at 2- to 3-month followup, but no significant difference existed after 3 months (Black, Gleser, & Kooyers, 1990).

Brownell, Kelman, and Stunkard (1983) found that parental involvement is important in the behavioral treatment of obese children. However, the nature of this involvement was also important. Separate treatment of mother and child was more effective than treating them together or treating only the child. Kayman, et al. (1990) found that 83% of women who had successfully maintained a weight loss and 76% of women who had always been of average weight reported that they did not want professional help in their weight-control efforts, while most relapsers (64%) wished that they had more help for their efforts. In contrast, more maintainers and control participants sought help from family, friends, or professionals for problem situations than did relapsers, and more relapsers reported that they had few people available for such support.

Worksites can be a source of social support as well as a competitive atmosphere. Brownell, Cohen, Stunkard, Felix, and Cooley (1984) described three weight loss competitions in worksite settings. The program lengths ranged from 12 to 15 weeks. Overall attrition rate was 0.5% and mean weight loss was 12.1 pounds. The worksite settings were found to be cost effective, and workers and managers perceived an increase in motivation and social support. In addition, both workers and managers reported improvements in six work-related areas, including morale, energy level, relations with coworkers, work performance, relations with supervisors, and absenteeism.

Researchers have examined the relationship of social support networks and other health related behaviors, such as smoking cessation. Mermelstein, Cohen, Lichtenstein, Baer, and Karmack (1986) found that the presence of smokers in the

Individualized Programs

Most weight control programs deliver the same treatment to all of their patients, which may be detrimental both physically and psychologically for those who fail to lose weight (Brownell & Jeffery, 1987). In recent years, it has been suggested that weight loss programs which match individuals to treatment may be more successful than comprehensive programs for all (Kalodner & DeLucia, 1990). Research is beginning to show support for this theory.

Feuerstein, Papciak, Shapiro, and Tannenbaum (1989) compared the traditional use of a commercial weight loss program, in which all clients received the same treatment, and the same program with the addition of a weight loss profile to identify personal and environmental factors that may impede weight loss success. After identifying relevant factors, the intervention was implemented to address specific problem areas for each individual. This produced significantly more weight loss and significantly higher retention rates than the traditional program alone. Once individual factors impeding weight loss are identified, the specific techniques can be utilized more effectively by concentrating on particular problem areas. Kalodner and DeLucia (1990) stated that part of the individual approach should be cognitive restructuring strategies such as problem solving and restructuring thought and belief patterns about weight and weight loss techniques.

Loro, Fisher, and Levenkron (1979) developed and experimentally tested a self-initiated (SI) training in which participants first learned a general model of self-control, and then developed their own specific approach based on individual needs and circumstances. The SI program was compared to an eating behavior control

Individualized Programs

Most weight control programs deliver the same treatment to all of their patients, which may be detrimental both physically and psychologically for those who fail to lose weight (Brownell & Jeffery, 1987). In recent years, it has been suggested that weight loss programs which match individuals to treatment may be more successful than comprehensive programs for all (Kalodner & DeLucia, 1990). Research is beginning to show support for this theory.

Feuerstein, Papciak, Shapiro, and Tannenbaum (1989) compared the traditional use of a commercial weight loss program, in which all clients received the same treatment, and the same program with the addition of a weight loss profile to identify personal and environmental factors that may impede weight loss success. After identifying relevant factors, the intervention was implemented to address specific problem areas for each individual. This produced significantly more weight loss and significantly higher retention rates than the traditional program alone. Once individual factors impeding weight loss are identified, the specific techniques can be utilized more effectively by concentrating on particular problem areas. Kalodner and DeLucia (1990) stated that part of the individual approach should be cognitive restructuring strategies such as problem solving and restructuring thought and belief patterns about weight and weight loss techniques.

Loro, Fisher, and Levenkron (1979) developed and experimentally tested a self-initiated (SI) training in which participants first learned a general model of self-control, and then developed their own specific approach based on individual needs and circumstances. The SI program was compared to an eating behavior control

(EBC) group and a situational engineering (SE) group in a six week treatment and sixteen week follow-up. All three treatments produced equivalent weight losses at six weeks, but SI was the only group to lose weight throughout the follow-up. In addition, SI was rated higher than both SE and EBC on a client rating of their own change (from "have changed markedly for the worse" to "improved markedly"), and SI participants indicated greater attribution of treatment effects to themselves.

In the Kayman, et al. (1990) study of women who had not entered formal treatment programs for obesity, it was found that although the maintainers used similar strategies to lose weight, each maintainer used these strategies in ways that were specific to her own lifestyle. Maintainers devised personal weight loss plans to fit their lives. In contrast, relapsers deprived themselves of foods which they enjoyed, and viewed their diet foods as special and different from what they and their families really wanted. Their feelings of deprivation led them easily back to their old habits.

In conclusion, there are people who successfully reduce their weight and maintain a desirable body weight. However, most studies are conducted on clients of formal weight loss programs which are applied to all individuals without regard to differences in lifestyle. The low rates of maintenance reported in the literature may be due in large part to the lack of individuality in weight loss programs. The present study thus utilized components that have proven to be effective, but the individual made decisions as to specific strategies to be used. Following is a description of the two programs compared in this study.

CHAPTER III

PRESENT STUDY

Based on the above literature, the present study was undertaken to assess the efficacy of two weight loss programs. Most weight loss programs measure success in terms of how much weight clients lose in the time period of the intervention. As the above review indicates, however, large weight losses do not guarantee maintenance of an ideal weight. Rather, variables which have been found to be indicative of weight control include social support, self-efficacy, and regular attendance at group meetings. Additional variables examined here included consistency in meeting personal goals, satisfaction with the program, and perception that one can continue to adhere to program techniques. Both programs were based on a study which examined the use of monetary incentives and team competition for weight loss (Mavis, 1987) and the resulting approach which has been used throughout the Michigan State University Healthy U worksite wellness programs. The common components were: individual problem solving; behavioral contracting; monetary deposit; team competition; and education. The focus of the present study was the contingencies of the contracts. The experimental group contracted to change specific behaviors, and received a portion of their deposit each week contingent on successful attainment of their behavior goals. The control group contracted to lose

specific amounts of weight each week, with reward contingent on this loss. Each component will now be discussed based on the literature.

Individual Problem Solving

It is important to first identify those areas which are problematic in terms of weight control. As discussed previously, Kayman, et al. (1990) found that women who had successfully maintained a weight loss and women who had always been of average, non-obese weight were more likely to have lost weight on their own than women who had lost weight but regained it. Additionally, maintainers and control participants used a variety of strategies specific to their own lifestyles. Maintainers reported making a decision to lose weight and devising a personal weight loss plan to fit their own lives. Thus weight control programs should take into account individual differences and life circumstances.

Behavior Contracting

In behavior contracting, a contingency system is set up in which a goal and resulting reward are established. These goals are established weekly and monitored, and rewards are dispensed contingent on success in meeting the goals. This process has been used successfully with diverse groups, including adolescents (Davidson, Seidman, Rappaport, Berck, Rapp, Rhodes, & Herring, 1977), smokers (Lando, 1977), athletes (O'Block & Evans, 1984), and weight control clients (Jeffery, et al., 1978; Jeffery, et al., 1984; Mavis, 1987). Incorporating the importance of individual problem solving into the process of behavioral contracting, it must be recognized that the goals should be specific to the desired outcome. Based upon experimentation of the Interval Goal-Setting (IGS) program used with athletes to

improve performance, O'Block and Evans (1984) concluded that realistic short-term process goals enhance the accomplishment of long-term and outcome goals. Additionally, by setting personal and achievable yet challenging goals, it is proposed that commitment and confidence to achieve are increased, the process becomes internalized, and self-directed behaviors are generated.

Monetary Deposit

As a source of reward for behavioral contracting in weight control programs, participants are often required to deposit a sum of money at the beginning, to be dispensed contingent upon successful attainment of weekly goals. This technique has been used with considerable short term success. Jeffery, et al. (1978) found that deposit of $200 produced significantly higher weight loss when reward was contingent on either calorie restriction or weight loss, compared to contingency upon attendance. Jeffery, et al. (1984) compared the repayment schedules in contracting contingencies for weight loss. Deposits of $150 were returned either entirely at the initial session, as constant weekly amounts contingent on weight loss, or as an increasing amount contingent on weekly weight loss. Increasing refund produced the greatest amount of weight loss, followed by constant refund. Maintenance strategies did not prevent regain for any group at one year follow-up. The deposit requirement of $150 to $200 may prohibit some people from participating. Thus a lower amount may be necessary.

In Mavis (1987), $40 deposits were matched equally by the researcher. The current project was part of Michigan State University's worksite wellness program.

The $40 participant deposit is no longer matched by the research project. This amount seems to be low enough to allow many people to participate, but still high enough to create an incentive to attain goals. This study will also utilize team competition in the dispensing of rewards, which is described in the next section.

Team Competition

An additional component which has been used in weight control is competition and team support. Team competition is theorized to increase motivation and social support, and to improve relationships among team members. Brownell et al. (1984) described three competitive weight loss programs utilizing a nonintrusive behavioral treatment program at worksites, ranging from 12 to 15 weeks. Weight loss averaged 12.1 pounds. Since the goal of weight loss is maintenance of a desirable weight, outcomes that may be more important than the amount of weight lost during the program are the attrition rate of 0.5%, and the improvements reported by both workers and management on variables such as morale, energy level, and coworker relations.

Education

Many weight control programs present participants with educational information on such topics as nutrition, exercise, and behavioral techniques. Kalodner and DeLucia (1990) stated that this should consist of more than just presentation of information. Rather education should teach the skills needed to make informed decisions about the nutritional content of foods, and to promote the development and maintenance of positive health behaviors (Johnson & Johnson, 1985). Because behavior contracting and monetary deposits will be used, it is

important to educate participants on the dangers of some commonly used dieting techniques such as semi-starvation or prescription and non-prescription diet aids. Ritt, Jordan, and Levitz (1979) reported that after a behavioral weight loss program with no systematic dietary instruction, average intake of iron, thiamin, and calcium, dropped from the "good" and "excellent" range of the RDAs (i.e., 86% to 98% of the RDAs) to "fair" (i.e., 60% to 62%). There has been no evidence, however, that the use of monetary contracts results in unhealthy eating behaviors (Jeffery, et al., 1978).

The basic components of the weight control programs under study are thus: individual problem solving; behavior contracting, monetary deposit, team competition, and education.

A specific program of weight management was developed as a doctoral dissertation at Michigan State University (Mavis, 1987). The resulting program has been in existence at MSU since 1987. The program uses individual problem solving to pinpoint specific behavioral changes needed to produce weight loss, and individual contracts to implement these changes. Individuals deposit a sum of money at the beginning of the program, and receive or forfeit a portion of it contingent on loss of a specified amount of weight. In addition, the group is separated into teams of 4 to 6 people, in order to facilitate social support and motivation. Based on this program and the above literature, the present study compared two weight management programs. Both utilized problem solving, behavioral contracts, monetary deposits, and team competition to achieve individual goals. The difference was in the focal point of the contracts. The control group

used a traditional focus of amount of weight lost each week. Individuals contracted to lose a specific amount of weight each week, and reinforcement was contingent on achievement of this goal. The experimental group was instructed to focus not on weight per se, but on specific behavior changes. Individuals contracted to alter both eating and exercise behaviors, and, while weight was individually recorded each week, reinforcement was contingent only on the achievement of these behavior goals.

Hypotheses

In the comparison of two weight loss programs, the following hypotheses were tested:

1) There will be a larger increase in social support in the experimental group than in the control group.

This is expected because in the behavior change group, specific attention will be paid to incorporating goals which fit into the individual's circumstances, as well as those of their social network. The weight change group, however, will focus on the feelings of their significant others in terms of their weight loss, but will not specifically work within their own lifestyle habits.

2) There will be a higher perceived self-efficacy in the experimental group than in the control group at posttest.

The rewarding of behavior change rather than weight loss will likely result in more consistent reinforcement; thus the individual will feel that she or he is in control. This in turn will likely increase feelings of self-efficacy in terms of controlling one's weight.

3) There will be more regular attendance in the experimental group than in the control group.

Often the reasons for low attendance at a weight loss program are related to feelings of frustration. In the behavior change group, it will be emphasized continually that long-term weight loss means permanent and slow behavior changes. When weight is lost, individuals will be praised, but monetary reinforcement will depend only on behavior changes and attaining weekly goals. The weight loss group will only be reinforced for specific amounts of weight lost. As discussed earlier, weight loss is not always under an individual's control, and not being rewarded after following a diet steadfastly can lead to frustration.

4) There will be a lower attrition rate in the experimental group than in the control group.

Similar to the hypothesis number three, dropping out of a weight loss program can often be due to frustration from not losing weight quickly enough. Rewarding for behavior change will likely result in higher satisfaction with the program and with oneself.

5) The experimental group will show a higher rate of meeting their weekly goals than will the control group.

Behavior changes are more easily attainable than loss of a specific amount of weight. Therefore the behavior change group will likely achieve their goals more consistently than the weight loss group.

6) The experimental group will be more satisfied with the program than will the control group.

People do not typically enjoy being punished (or not being rewarded). Particularly in terms of weight loss, if an individual has been diligent in their weight loss attempts but does not lose weight due to extraneous reasons, they will likely be less satisfied. In Mavis (1987) several participants said that they would probably perform better if they were rewarded for positive behaviors rather than punished for negative ones. Additionally, the process in the experimental group, of slowly adding changes to build a repertoire of behaviors which will lead to weight loss and maintenance, will likely be more instructional and educational than merely contracting to lose weight.

7a) The experimental group will use the techniques taught in the program more regularly than the control group.

7b) The experimental group will perceive continued adherence to the program and to their goals as easier than will the control group.

Again, by slowly building a repertoire of behaviors into one's life, the chances of continuing with them after the end of the program is higher. Comparatively, in the weight loss group, different methods may be tried and dropped throughout the program, and participants will not be receiving specific reward or praise for behavior changes.

Research Questions

In addition to the above hypotheses, the following questions will be examined:

1) Will either program produce a higher mean weight loss?

Since the focus of the experimental group will not be weight loss per se, it is not expected that there will be a higher loss of weight during the intervention. However the behaviors which individuals will contract for will be related to weight loss, so it is expected that this group will produce a weight loss.

2) Will participants who score high on the initial measure of self-efficacy be more successful in meeting weekly goals or in losing weight? Will this differ between groups?

The literature suggests that those with high initial self-efficacy are more successful in programs that emphasize individual control. Both groups will encourage individual control, but in different ways.

3) Will more frequent goal attainment and/ or large weight losses lead to increased self-efficacy?

Questions 3 examines the relationship among goal attainment, weight loss and self-efficacy at both pretest and posttest. It is unclear from the literature whether individuals high in initial self-efficacy lose more weight than those with low self-efficacy, or whether weight loss itself increases self-efficacy. Additionally, this question examines the relationship between goal attainment and self-efficacy.

CHAPTER IV

METHODS

Participants

Participation was open to any healthy adult who was 20% or more over ideal weight based on weight for height and sex as compared to standard weight chart. Ninety-five per cent of participants were female, 100% were white, mean age was 37.4 years, mean education level was 14.6 years, and 84% were employed. A body mass index (BMI) of 28 or greater indicates obesity. BMI's ranged from 28.1 to 47.5, with an average of 35.4. Relative percentage overweight, defined as (actual weight/ reference weight) x 100, was 149% for the entire sample [reference weights were calculated as the midpoint of the range of weights for height and gender using the 1983 Metropolitan Life Insurance Company data]. Age of onset of obesity varied widely, from a low of 9 years to a high of 55 years, with slightly less than half becoming obese after the age of twenty.

Procedure

An advertisement was placed in the Sunday edition of the Lansing State Journal on September 29, 1991, for an experimental weight loss program utilizing incentives and behavioral techniques. Telephone respondents were given a description of the program. All callers were told about the $80 monetary deposit

and contracting procedure. Descriptions alternated for each call, so that there would be an equal number in the weight loss (control) program and the behavior change (experimental) program. The first time the advertisement ran, there were 73 responses. Based on previous recruitment efforts for similar research, it was assumed that approximately one half of the respondents would come to the first meeting, so a decision was made to run the newspaper advertisement again on October 6, and to advertise in other places. Thus an ad was placed in The Towne Courier (a small community newsletter), notices were put in area grocery stores, and an announcement was put on public access television. These efforts yielded an additional 71 responses.

Of 144 people responding to the advertisement, 42 of the respondents were disqualified for one of the following reasons: they had a medical problem which made it dangerous to undertake a weight loss program without medical supervision (n=9); they were not above 20% overweight (n=10); they could not pay the $80 deposit (n=17); or they had participated in a similar program at an earlier time (n=1). The remainder of the respondents were randomly assigned to the experimental (N=49) or control group (N=53), subject to the following criteria:

1) Members of the same family or friends who desired to join the program were put into the same groups. If they were in different groups, they would likely be sharing information, which would invalidate their data.

2) Individuals who could only attend the sessions of one group due to time conflicts were put into the group that was convenient for them. Otherwise there would be a higher likelihood of attrition or low attendance.

After hearing the description of the program, respondents were told where and when to come for the initial session. These sessions were conducted separately for the two groups in order to talk more specifically about each particular program. For both groups, information about the program was reiterated. It was explained that information for the experimental portion would be collected by two questionnaires, one at this first meeting and again at six months. Participants were assured that all information would be confidential, and the complete research design would be revealed to participants at the end of the program. Participants then completed the informed consent form and the questionnaire, were weighed by the researcher, and deposited $80. At the initial meetings, 16 of the 53 people assigned to the control group were present and completed the initial measures, and 17 of the original 49 were present for the experimental group. Thirteen people in the control group and twelve in the experimental group paid the deposit and participated. After the six month intervention period, all remaining participants again completed the measures. Analyses included only data from participants who completed the entire program. The researcher was present for the administration of all measures, which were in questionnaire format.

Participants were grouped into teams of 3 to 4 people. As discussed earlier, this is theorized to increase both motivation and social support. Those who were acquainted with each other prior to the program were given the option of being on the same team if desired. The members of one of the four teams in the control group, and members of two of the three teams in the experimental group, knew each other prior to the program. The rest of the participants were given the choice of

forming their own teams or having the researcher assign teams. It was decided by each group that teams would be assigned by drawing names out of a hat. Each individual would forfeit their own money when they failed to meet contract goals. However, if all members of a team were successful in a week long time period, they would evenly split the money lost by other participants. Thus there would be incentive to succeed in order to help one's team, but not an overwhelming amount of pressure that one's own failure would cause a loss to team members.

For both groups, the experimenter or an assistant weighed participants as they arrived at each meeting. The participants of the experimental group recorded their own weight. The weigh-in procedure for the control group differed in that the researcher officially recorded each person's weight. The purpose was to make the experimental group feel that amount of weight lost was not of primary importance, while the control group should feel that it was the most important outcome.

A portion of each session of both groups was devoted to education on a variety of topics. Each participant was given a manual containing all information to be introduced, as well as periodic handouts of additional information. The education portion of the program consisted of a lecture, question and answer, and problem solving of individual issues.

The programs themselves proceeded as follows:

Experimental group. At the second meeting the instructor fully explained the food and activity logs to be used in the program. The purpose of keeping the logs was to pinpoint problem areas that may be preventing weight loss. Participants completed a practice log using their most recent meal. Any difficulties that the participants had in completing the logs were discussed at this time. The importance of accurate record keeping and not modifying one's diet or activity level while keeping these preliminary logs was emphasized. Although the recording of one's behaviors often tends to alter those behaviors, the keeping of daily logs is probably the best method for establishing a baseline for each individual. Participants were then requested to complete food and activity logs for the next seven days, in order to accurately pinpoint problem areas while accounting for day-to-day variation.

The third meeting was devoted to individual analysis of food logs. The researcher explained what participants should be looking for: sources of fat in the diet, times of the day when or places where one is more likely to overeat, and other specific problem areas. The researcher assisted individuals in pinpointing behaviors to begin to alter. The changes to be made, however, were determined by each individual. Also in this session, contracts were explained and given out. The purpose was for participants to develop a repertoire of positive health behaviors through weekly goal setting. Throughout the program, each individual determined his or her own specific behavior changes, as well as the appropriate pace of adding new goals. While instructors encouraged the addition of new goals, if goals are added too quickly, the individual may become overwhelmed, frustrated, or angry,

and may drop out. Therefore decisions were left up to the individual, but again instructors were available for advice. Participants were instructed to decide on one behavior to contract for in the next week. This contract was a practice, so did not affect the monetary standings.

In the fourth meeting participants discussed the contracts to be certain that the procedure was fully understood. The process of winning and losing money was explained again as well. The contract to be implemented at this session began the monetary incentive system.

All subsequent meetings were conducted in a similar fashion. The first 15 minutes was devoted to weighing in, a review of team standings, and team discussion about contracts and behaviors. Teams were encouraged to troubleshoot together on specific individual problems that may arise. The remainder of each session was devoted to educational material. Each participant received a manual, and the researcher presented information on a variety of topics related to weight loss. Participants were encouraged to take part in discussions on topics to be covered.

Control group. At the second meeting the program leader presented basic principles of weight loss in a discussion format. Food logs were explained, and, similar to the experimental group, a practice log was completed by all participants.

At the third meeting the contract was explained. Participants were told that they will decide how much weight they would like to lose each week, based on typical guidelines of between one-half to two pounds per week, and will begin

contracting for this amount. The first contract was a practice to be sure the participants understood the concept; thus no money was won or lost at this point.

At the fourth meeting the participants discussed their contracts and clarified any misunderstandings. The monetary system was explained again. The contracts implemented this week began the monetary incentive system.

All subsequent sessions were conducted similarly. The first 15 minutes were spent weighing in and assessing success at meeting the contract goal. The remainder of each session was spent presenting materials related to weight loss. This material came from the same written manual used with the experimental group.

Beginning in the ninth week of the program, group meetings were held every other week. This was done to avoid dependency on group meetings and to prepare the participants to continue controlling their weight after the program ended.

Material

At the initial meeting, all participants were given a written manual containing weight loss information and behavioral techniques. This manual was adapted from one developed by Brownell (1979). Additional supplemental materials, such as newspaper and magazine articles related to weight control, were given to participants concerning various topics covered.

Measures

The questionnaires were a compilation of validated measures as well as simple data collected by the researcher. The pretest and posttest consist of the same questionnaire, with the addition of the satisfaction and perceived ease of adherence scales at the posttest. The posttest was administered at the end of the six month

long intervention. The purpose was to determine differences at time 1 and time 2 on the variables, and differences between groups at time 2. Following is a description of each of the variables to be measured, and the sources of measurement.

Demographic variables. In order to determine if the groups differed at the outset of the intervention, the following variables were measured: age, sex, weight, body mass index, education, ethnic background, age of onset of obesity, and number of prior diets attempted. Those variables which have a potential for change from pretest to posttest (e.g. weight, body mass index) were measured at both times.

Expectancies. There was the possibility that participants would be coming to the initial meeting with preconceived ideas as to what they wanted and/or expected from the program. In order to determine if this had an effect on outcome measures, 11 items were included in the pretest questionnaire. Eight items comprised a scale which asked participants to indicate whether they preferred certain features of weight loss programs. The other three items asked for specific weight loss goals, in terms of number of pounds participants expected to lose, how long it would take, and how long they could maintain a loss. This measure was administered at pretest before any information about the program was given, and again after more detailed information was presented.

Reliability analysis for this scale indicated a low reliability (alpha=.38). Items with low item-total correlation were dropped, and the scale was analyzed again. Revised alpha value, shown in Table 1, increased to .60.

Social support. The importance of social support in making behavior change has been discussed in such diverse areas as smoking cessation (Fisher, Lowe,

Table 1

Scale Reliability: Preferences for Weight Loss Programs

ITEM	CORRECTED ITEM-TOTAL CORRELATION
FOOD PROVIDED	.43
MENU PLAN PROVIDED	.39
REGULAR MEETINGS	.44
FOOD LOGS	.29
MONETARY INCENTIVE	.33
ALPHA=.60	

Levenkron, & Newman, 1982; Mermelstein, et al., 1986), and weight control (Robbins & Slavin, 1988). In the area of weight control, evidence for the manipulation of social support has been cited in treatment of obese children (Brownell, Kelman & Stunkard, 1983), in worksite weight loss competitions (Brownell, et al., 1984), and in individual weight loss efforts (Kayman, et al., 1990).

Social support was measured at both pre- and posttest using the Health Support Index (HSI) (Robbins & Slavin, 1988). This index consists of a supportiveness and a modeling subscale. Cronbach's alpha for the subscales is .76 and .70, respectively, and .80 for the composite index, indicating adequate internal reliability (Robbins & Slavin, 1988). Using the current participant data, Cronbach's alpha, shown in Table 2, was .83 for each of the subscales at pretest, and .60 for the supportive, or active subscale and .75 for the modeling, or social subscale. Two items were dropped from the active scale for posttest analysis, raising the alpha to .67. Predictive validity was demonstrated by Robbins and Slavin (1988) using discriminant function analysis. Concurrent validity of the supportiveness subscale

Table 2

Scale Reliability: Health Support Index

ITEM	CORRECTED ITEM-TOTAL CORRELATIONS			
	ACTIVE-PRETEST	ACTIVE-POSTTEST	SOCIAL-PRETEST	SOCIAL POSTTEST
FAMILY MEMBER 1	.24	.11	-.11	.26
FAMILY MEMBER 2	.59	.37	.29	.40
FAMILY MEMBER 3	.61	.22	.30	.31
CO-WORKER 1	.50	*	.92	.36
CO-WORKER 2	.39	.52	.65	.71
CO-WORKER 3	.79	.61	.68	.64
FRIEND 1	.59	*	.64	.34
FRIEND 2	.68	.35	.65	.32
FRIEND 3	.55	.50	.78	.61
	ALPHA=.83	ALPHA=.67	ALPHA=.83	ALPHA=.75

*Item dropped from scale due to low item-total correlation.

was demonstrated through significant correlations with the Perceived Social Support subscales for family ($r=.37$, $p<.01$) and friends ($r=.29$, $p< .05$).

In the HSI, participants are asked to name specific individuals who are important in their lives, and rate them on two 6 point scales. The first concerns how active each person is in improving their own health. The scale ranges from 1=extremely active to 6=minimally active. The second scale concerns how supported the individual feels by others, and the scale ranges from 1=extremely supported to 6=minimally supported. In addition, respondents are asked to give a global rating for both scales. This variable was measured at both pre- and posttest.

Meeting weekly goals. Weekly goal setting has a dual purpose in this study. First, it serves to establish a repertoire of positive health behaviors in the experimental group which, it is assumed, will be continued after the six month treatment. In this way, it is more likely that the experimental program will enhance the maintenance of weight loss. The second purpose of weekly goal setting was to enhance self-efficacy. By setting goals and meeting them, it was intended that both groups would learn that their weight loss efforts were within their control. It is hypothesized, however, that the experimental program will result in more consistent meeting of goals. Weight loss itself is sometimes not controllable for various reasons, including water retention or variations in metabolic rate. Thus consistent efforts might not result in a consistent rate of loss. Traditionally many practitioners have regarded a failure to lose weight as proof of deviation from the diet (Garrow, 1979). When an individual is persistent in weight loss efforts but does not lose weight, it serves to reinforce the notion that they cannot control their weight. On

the other hand, in the experimental program the contingency is on behavior changes rather than weight loss. Therefore, even if an individual does not lose weight in a given week, if she or he is successful in meeting behavior change goals, reward is still dispensed. This is hypothesized to increase one's sense of control, in much the same way that successful attainment of short-term process goals in the IGS program for improving athletic performance can increase confidence in achieving both short-term and long-term goals (O'Block & Evans, 1984).

Participants began the contracting procedure in week 3 of the intervention. For the experimental group, contracts were written documents which were completed and signed by a verification partner. A new contract was completed for each week of the intervention, and participants calculated their success at meeting goals. Old contracts were given to the researcher weekly, and team success was recorded and money changes calculated from these documents. For the control group, contracts consisted of verbally giving the researcher weight loss goals; these goals were recorded right away while each participant was there.

Self-efficacy. The self-efficacy theory by Bandura (1977) has stimulated a large volume of research in health-related fields. Perceived self-efficacy, or the sense of one's own ability to carry out certain roles or activities under a variety of circumstances (Bandura, 1981), has been shown to play a significant role in many forms of health behavior, including smoking cessation, pain experience, and control of eating and weight (O'Leary, 1985). Although a controversy has surrounded the conceptual clarity of the model, the importance of self-efficacy on behavior is generally recognized (Mavis, 1987). Recent research has produced supporting

evidence for the significance of perceived self-efficacy in weight control. Weinberg, Hughes, Critelli, England, and Jackson (1984) found that participants whose preexisting self-efficacy was high lost more weight than those with low initial self-efficacy. Additionally, participants who were given high efficacy feedback during weight loss treatment were more successful than those receiving low efficacy feedback. Blair, Booth, Lewis, and Wainwright (1989) concluded from their study of a representative convenience sample that, irrespective of weight control strategies used, high perceived self-efficacy was positively correlated with estimated success in attempts to reduce and to maintain weight loss. In a review of the literature, O'Leary (1985) found that percepts of self-efficacy to manage food and body weight were low for patients of the three eating disorders (anorexia, bulimia, and obesity. Westover and Lanyon (1990) reviewed 22 studies utilizing behavior therapy in weight control and concluded that confidence in ability to lose weight and confidence in ability to control eating situations were related to whether or not dieters would use coping strategies once they have been alerted to the onset of relapse.

Many researchers are finding that weight control programs which emphasize self-efficacy may be more effective for participants who score high on the internal locus of control scale (Weinberg, et al, 1984; Chambliss & Murray, 1979). However, research has shown that perceived self-efficacy plays an important role in diverse forms of health behavior, such as smoking cessation relapse, pain experience and management, success of recovery from myocardial infarction, adherence to preventive health programs, as well as control of eating and weight (O'Leary, 1985).

Since self-efficacy seems to be helpful across many groups and health behaviors, emphasis on self-efficacy should not be confined to those with a high internal locus of control.

Self-efficacy was measured using a modified version of the Eating Self-Efficacy Questionnaire developed by Van Koten-Chappell (1982). Respondents were presented with various situations associated with eating, and asked to rate the probability that they could restrain from eating in each situation. Ratings are on an eleven interval scale ranging from 0% to 100%. A rating of 0% indicates the respondents feeling that they could not refrain from eating, while a rating of 100% indicates total confidence that they could refrain from eating in that situation. This variable was measured at both pre- and posttest. Cronbach's alpha, shown in Table 3, was .94 at pretest and .97 at posttest.

Attendance and attrition. Behavioral weight control programs typically require participants to meet weekly or biweekly for educational material and weighing in. A major problem with these programs is the low rate of regular attendance and the high rate of attrition. Estimates of attrition rates range from 20 to 80% (Brownell, Heckerman, & Westlake, 1985). In a comparison of contracting conditions, attendance was seen as a mediating factor for success, either as a

Table 3

Scale Reliability: Self-efficacy

ITEM: WHEN I AM...	CORRECTED ITEM-TOTAL CORRELATION (PRETEST)	CORRECTED ITEM-TOTAL CORRELATION (POSTTEST)
ANXIOUS	.77	.82
NERVOUS	.87	.83
ANNOYED	.73	.78
WORRIED	.77	.61
ANGRY	.49	.71
DEPRESSED	.75	.61
UPSET	.60	.82
FRUSTRATED	.73	.91
ANGRY WITH MYSELF	.81	.84
HAVING A CRISIS	.38	.58
WANT REWARD	.72	.85
WANT TO CHEER UP	.78	.92
WANT TO TAKE BREAK	.31	.77
RESTING	.51	.68
EMBARRASSED	.13	.58
UNCOMFORTABLE	.66	.66
OVERLY EXCITED	.64	.81
TENSE	.76	.85
IMPATIENT	.48	.86
WANTING CIGARETTE	-.24	.30
DRINKING ALCOHOL	.28	.48
DEPRESSED	.81	.69
FINISHING A MEAL	.40	.53
DRINKING COFFEE	-.10	.45
BORED	.78	.82

Table 3 (cont'd)

SEE OTHERS EATING	.76	.75
OFFERED FOOD	.75	.76
AT A SPECIAL OCCASION	.69	.57
FEEL THAT FOOD WOULD AID AN ACTIVITY	.49	.60
	ALPHA=.94	ALPHA=.97

reflection of participation or as an index of exposure to treatment (Jeffery, et al., 1984).

Participants were required to weigh in at each weekly or biweekly meeting. The researcher was thus able to record attendance. If a participant came to be weighted in but did not stay for the rest of the meeting, they were counted as attending that meeting. Attrition is defined as the proportion of participants who paid the deposit, but later quit the program, thus forfeiting the deposit. These measures were calculated at the end of the six month program.

Satisfaction with program. Various factors may contribute to the high rate of attrition typically found in weight loss programs. If a person is not losing enough weight, or if the program is perceived as being too difficult or punitive, attrition may be high. In order to better understand this common problem, participants' satisfaction with the program was measured. Aspects of satisfaction include the philosophy of the program, the use of monetary deposit and behavioral contracting, the educational materials and presentations, group discussions, weighing-in, and the program leader.

Table 4

Scale Reliability: Program Components

ITEM: HOW IMPORTANT WAS EACH COMPONENT OF TEH PROGRAM?	CORRECTED ITEM-TOTAL CORRELATIONS
MEETING OTHERS WITH SAME CONCERNS	.22
THE PROGRAM LEADER AS A PERSON	.34
MATERIALS AND INFORMATION	.30
GROUP DISCUSSION	.22
PHILOSOPHY OF "DON'T DEPRIVE YOURSELF"	.21
PHILOSOPHY OF SLOW WEIGHT LOSS	.43
PERSONAL GOAL SETTING	.31
ALPHA=.55	

TABLE 5

Scale reliability: Program Content

	CORECTED ITEM-TOTAL CORRELATION	
PROGRAM SATISFACTION		
MATERIAL WAS HELPFUL	.87	
MATERIAL WAS INTERESTING	.81	
MATERIAL WAS MOTIVATING	.75	ALPHA=.89
INCENTIVE SATISFACTION		
MONETARY INCENTIVE WAS MOTIVATING	.52	
I LIKED THE MONETARY INCENTIVE	.52	ALPHA=.68
PROGRAM REACTIVITY		
DIETARY SUGGESTIONS WERE RIGID	.14	
GOALS WERE DIFFICULT	.14	
RULES WERE RESTRICTIVE	.23	
MONETARY INCENTIVE WAS UNFAIR	.06	ALPHA=.24
PROGRAM EFFECTIVENESS		
PROGRAM IS HELPING ME LOSE WEIGHT	.50	
PROGRAM WILL HELP OTHERS	.50	ALPHA=.64

This variable was measured with a modified version of 2 scales used by Mavis (1987), based on the work of Coehlo (1983). The first Mavis scale consists of 8 items describing components of the program. Respondents are asked to rate each component on a three point scale: not at all important, somewhat important, very important. Questions were also asked about the specific contracting and incentive procedures. Reliability analysis revealed a Cronbach's alpha of .42. One item was dropped from the scale due to low item-total correlation. Alpha for the revised scale, shown in Table 4, was .55. This variable was measured at posttest only. The second measure was adapted from one used by Mavis (1987) to examine program reactance and acceptance. Fourteen of the original 22 items were used, representing 4 subscales. Thirteen items ask participants to rate aspects of the program on a 5 point scale, from strongly agree to strongly disagree. One item asks what the individual expects in six months after the end of the program concerning weight loss. Reliabilities are presented in Table 5.

Adherence to program techniques. The aim of behavioral weight control programs is to produce losses of weight and to then prevent relapse. The mechanism for this is to permanently alter behaviors that contribute to weight gain (Kalodner & DeLucia, 1990). According to Brownell and Jeffery (1987), relapse typically involves the following sequence of events: precipitating environmental or social event, associated negative psychological states, a cycle of guilt and self-disparagement, and the eventual collapse of self-management behaviors. In a five year followup of participants in an earlier comparison of four variations of a behavioral treatment program, participants reported that numerous situational, social,

and emotional factors impacted their weight control efforts (Stalonas, et al., 1984). It was found that, compared to the potential use of 13 program techniques, utilization was 23.8% of what it could have been. Despite the low level of adherence, the number of techniques used and the months of conscientious technique use showed significant negative correlations with posttreatment weight gains. The average participant in this study regained 11.94 pounds and was 1.49 pounds heavier than at the initiation of treatment.

In order to continue performing positive health behaviors and thus maintain weight loss, the individual must perceive that she or he is able to do so. Time constraints prevent the present study from long-term follow-up of participants to determine success in maintenance. Thus the adherence to program techniques will serve as a preliminary measure of plans to continue utilizing program techniques and changes in behavior. Although this variable is similar to degree of self-efficacy, it will be measured as a distinct variable. While self-efficacy measures the individuals confidence in their ability to succeed, the perception of ease variable measures the individual's adherence to program techniques during the program, and an evaluation of how easy or difficult it will be to adhere to the program techniques after the intervention is over. This was measured with two scales developed by the researcher. The first scale consisted of eight items asking the participants to indicate which program techniques they utilized during the program, and the second scale asked which they are likely to continue to use. Cronbach's alpha for the two scales

TABLE 6

Scale Reliability: Adherence to Program Techniques

ITEM	CORRECTED ITEM-TOTAL CORRELATION: DURING PROGRAM	CORRECTED ITEM-TOTAL CORRELATION: IN FUTURE
MONITORING FOOD INTAKE	.26	.23
LOWERING FAT INTAKE	.17	.17
EXERCISING	.46	.47
USING INCENTIVE	*	.45
USING TEAM SUPPORT	*	.24
REGULARLY WEIGHING IN	.28	*
PROBLEM SOLVING	.14	.33
USING MANUAL FOR REFERENCE	.12	.38
	ALPHA=.58	ALPHA=.60

* Item deleted due to low item-total correlation

were low (.42 and .58, respectively). Two items from the first scale and 1 item from the second scale were dropped. Revised alpha values, presented in Table 6, were .58 and .60, respectively.

Weight loss. Participants were weighed on a standard balance-type scale by the researcher. For those in the control group, the researcher or an assistant immediately recorded each person's weight on a record-keeping sheet. For the experimental group, the researcher told each participant their weight, and they were responsible for recording this on their weekly contracts. Contracts were collected each week, so the researcher had a record of weight losses. Weight loss was calculated in two ways: 1) total weight loss, defined as the difference between weight at end of program and weight at the first session, and 2) relative weight loss, defined as kilograms lost divided by number of kilograms overweight at pretest.

CHAPTER V

RESULTS

The statistical analyses employed included analysis of variance (ANOVA), repeated measures analysis of variance (MANOVA), Pearson r correlation coefficient, and Chi square. Analyses were performed using the Statistical Package for the Social Science (SPSS-X). Significance levels for all analyses were set at $p<.05$.

To ensure that there were no preexisting differences between the experimental and control groups which might affect the outcome of the study, the two groups were tested for equivalency based on pretest demographic measures. Variables considered were age, sex, marital status, education level, age of onset of weight problem, present weight, maximum weight, past dieting history, how often they were typically dieting, maximum weight loss in a one month period, and how much weight they expected to lose in six months. Due to small variances, sex and marital status were not analyzed using ANOVA. Results of one way ANOVAs for demographic and pretest variables, presented in Table 7, revealed no significant differences between the two groups.

An expectancy measure was developed which asked participants what they thought about possible features of this program, as well as expectations about their

TABLE 7

ANOVA: Demographic Variables at Pretest by Group

	MEAN (SD) WEIGHT LOSS GROUP (N=12)	MEAN (SD) BHVR CHANGE GRP (N=10)	F SATISTIC	SIGNIF LEVEL
AGE	37.9 (10.3)	36.8 (7.5)	.098	.758
AGE OF WEIGHT ONSET	20.6 (7.6)	16.4 (6.9)	1.73	.205
EDUCATION (YEARS)	14.3 (2.0)	14.9 (2.2)	.400	.535
EXPECTED LOSS AT 6 MONTHS (TIME1)	39.0 (13.8)	38.3 (17.2)	.011	.917
EXPECTED LOSS AT 6 MONTHS (TIME2)	38.75 (17.1)	39.22 (15.3)	1.22	.283
WEIGHT AT PRETEST	200.67 (29.9)	202.70 (37.9)	.020	.890
MAXIMUM WEIGHT	205.25 (33.3)	209.80 (36.8)	.093	.764
# PAST DIETS*	1.92 (1.3)	2.10 (0.9)	.142	.710
HOW OFTEN DIETING*	2.17 (0.8)	2.20 (1.0)	.007	.934
MAXIMUM WEIGHT LOSS IN 1 MONTH	12.08 (6.7)	16.90 (7.3)	2.59	.123

*Mean values indicate intervals of scale, not specific numbers.

TABLE 8

ANOVA: "Food Provided" by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	.06	.06	.12	.74	.00
RESIDUAL	20	9.40	.47			
TOTAL	21	9.46	.45			

MEANS	
WEIGHT LOSS GROUP	4.50
BEHAVIOR CHANGE GROUP	4.40

TABLE 9

ANOVA: "Menu Plan Provided" by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	.10	.10	.06	.81	.00
RESIDUAL	20	34.27	1.71			
TOTAL	21	34.36	1.64			

MEANS	
WEIGHT LOSS GROUP	2.67
BEHAVIOR CHANGE GROUP	2.80

TABLE 10

ANOVA: "Regular Meetings" by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	.04	.04	.06	.81	.00
RESIDUAL	20	12.92	.65			
TOTAL	21	12.96	.62			

MEANS	
WEIGHT LOSS GROUP	1.92
BEHAVIOR CHANGE GROUP	2.00

TABLE 11

ANOVA: "Keeping Food Logs" by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	.12	.12	.12	.74	.00
RESIDUAL	20	21.15	1.06			
TOTAL	21	21.27	1.01			

MEANS	
WEIGHT LOSS GROUP	3.25
BEHAVIOR CHANGE GROUP	3.10

TABLE 12

ANOVA: "Incentive Procedure" by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	.73	.73	.63	.44	.03
RESIDUAL	20	23.27	1.16			
TOTAL	21	24.00	1.14			

MEANS	
WEIGHT LOSS GROUP	2.17
BEHAVIOR CHANGE GROUP	1.80

own weight loss during the program. Data was collected at the beginning of the initial meeting before any information was given (Time 1), to get an indication of expectancies or preferences participants arrived with. After detailed information was given and participants were given an opportunity to have questions answered, the expectancy measure was again administered to determine if expectancies had significantly changed as a result of hearing about the program (Time 2). Difference score were computed from Time 1 to Time 2 on each item and on a total score. Analysis of Variance (ANOVA) revealed no significant differences between the two groups. Because the scale had a low reliability, items with low corrected item-total correlations were dropped from the scale, resulting in a scale of 5 items. ANOVA

TABLE 13

MANOVA: Health Support Index-Active Scale

SOURCE	df	SS	MS	F	PROB	ETA^2
CONDITION (A)	1	12.10	12.10	2.00	.17	.09
SUBJECT ERROR	20	156.34	7.82			
TIME (B)	1	.97	.97	.13	.72	.00
A x B	1	3.69	3.69	.51	.49	.03
SUBJECT x TIME ERROR	20	146.06	7.30			

MEANS

	TIME1	TIME 2
WEIGHT LOSS GROUP	5.79	6.18
BEHAVIOR CHANGE GROUP	7.42	6.64

TABLE 14

MANOVA: Health Support Index-Social Scale

SOURCE	df	SS	MS	F	PROB	ETA^2
CONDITION (A)	1	6.03	6.03	.77	.39	.04
SUBJECT ERROR	20	156.34	7.82			
TIME (B)	1	9.83	9.83	2.65	.12	.12
A x B	1	3.42	3.42	.92	.35	.04
SUBJECT x TIME ERROR	20	74.21	3.71			

MEANS

	TIME 1	TIME 2
WEIGHT LOSS GROUP	4.64	6.15
BEHAVIOR CHANGE GROUP	4.46	6.64

was also performed for each of the five variables at Time 2. Results, presented in Tables 8 to 12, revealed no significant differences between groups.

Hypothesis 1

The measure used to evaluate social support in this study, the Health Support Index, actually measures two constructs. One is described as the extent to which one's family, friends, and coworkers engage in healthy behaviors; the other is the extent to which one feels supported by their social network in participating in healthy behaviors. This measure was completed by participants at pretest and posttest. Composite scores for each construct were derived by averaging the ratings for each person listed, and adding the global support rating. The range of individual scores for the social support variables were as follows: active support at pretest range = 1.22 to 10.56; active support at posttest = 2.44 to 10.78; perceived support at pretest = 0.0 to 8.56; perceived support at posttest = 1.44 to 11.11. In examining differences between the experimental and control groups, repeated measures ANOVA was utilized. Results of ANOVAs for the active and social scales are presented in Tables 13 and 14, respectively. The differences from pretest to posttest were nonsignificant for both the active and supportive scales for the entire sample, and between the experimental and control groups (interaction effect).

Hypothesis 2

The analysis of the effect of treatment upon self-efficacy, presented in Table 15, revealed no significant difference between groups, nor was there a significant interaction effect.

TABLE 15

MANOVA: Self-efficacy by Condition

SOURCE	df	SS	MS	F	PROB	ETA^2
CONDITION (A)	1	.24	.24	.05	.83	.00
SUBJECT ERROR	20	97.24	4.86			
TIME (B)	1	17.59	17.59	10.88	.004	.35
A x B	1	1.06	1.06	.66	.43	.03
SUBJECT x TIME ERROR	20	32.33	1.62			

MEANS

	TIME 1	TIME 2
WEIGHT LOSS GROUP	4.46	5.41
BEHAVIOR CHANGE GROUP	3.99	5.58

TABLE 16

ANOVA: Attendance by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	.183	.183	.025	.877	.001
RESIDUAL	20	149.32	7.47			
TOTAL	21	149.50	7.12			

MEANS	
WEIGHT LOSS GROUP	12.42
BEHAVIOR CHANGE GROUP	12.60

TABLE 17

ANOVA: Weekly Goal by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	148.44	148.44	23.75	.00	.54
RESIDUAL	20	125.02	6.25			
TOTAL	21	273.46	13.02			

MEANS	
WEIGHT LOSS GROUP	6.08
BEHAVIOR CHANGE GROUP	11.30

Hypothesis 3

One way ANOVA, presented in Table 16, revealed no significant difference in attendance between the two groups.

Hypothesis 4

Attrition or drop out rate was defined as the proportion of those who, after paying their deposit, discontinued their involvement at any point during the program, thus forfeiting the deposit. Chi square analysis revealed no significant difference in attrition rate between groups.

Hypothesis 5

As shown in Table 17, the experimental group showed a significantly higher rate of meeting their weekly contracting goals than the control group ($F=23.75$, $p<.05$, $Eta^2=.54$).

Hypothesis 6

Satisfaction with the program was measured in terms of the program content and the program components. ANOVA results, in Tables 18 and 19, revealed no significant differences between the groups on either satisfaction scale. The mean values for both groups indicated a favorable attitude toward the content and the components.

Hypothesis 7-a

Adherence to the techniques taught during the program was measured at posttest. One-way ANOVA, shown in Table 20, revealed a significant difference between groups ($F=5.70$, $p<.05$, $Eta^2=.23$), with the behavior change group using program techniques more often.

TABLE 18

ANOVA: Satisfaction with Program Content by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	.41	.41	1.19	.29	.06
RESIDUAL	20	6.96	.35			
TOTAL	21	7.38	.35			

MEANS	
WEIGHT LOSS GROUP	3.92
BEHAVIOR CHANGE GROUP	4.20

TABLE 19

ANOVA: Satisfaction with Program Components by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	.12	.12	2.36	.14	.11
RESIDUAL	20	1.01	.05			
TOTAL	21	1.12	.05			

MEANS	
WEIGHT LOSS GROUP	2.83
BEHAVIOR CHANGE GROUP	2.69

TABLE 20

ANOVA: Adherence to Program Techniques During Program by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	54.86	54.86	5.70	.03	.23
RESIDUAL	19	182.95	9.63			
TOTAL	20	237.81	11.89			

MEANS*	
WEIGHT LOSS GROUP	16.64
BEHAVIOR CHANGE GROUP	13.40

*Higher mean score indicates lower use of techniques

TABLE 21

ANOVA: Adherence to Program Techniques in Future by Group

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP	1	139.63	139.63	.571	.46	.03
RESIDUAL	20	4891.16	244.56			
TOTAL	21	5030.79	239.56			

MEANS	
WEIGHT LOSS GROUP	64.71%
BEHAVIOR CHANGE GROUP	68.70%

Hypothesis 7-b

Participants were asked how likely they were to continue to use the techniques taught in the program on their own. Analysis, presented in Table 21, revealed that the difference between groups was not significant.

Research Question 1

Repeated measures ANOVA was used to test for differences in weight loss, and is presented in Table 22. The differences between the two groups in amount of weight lost over six months was not significant.

Research Question 2

The relationship between self efficacy measured at pretest and amount of weight lost in six months was examined first by grouping participants according to pretest scores of self-efficacy. High and low self-efficacy was determined by median split. These groups were compared on pretest and posttest weight using repeated measures ANOVA. Analysis, presented in Table 23, revealed no significant difference in amount of weight lost between those who scored higher on the initial measure of self-efficacy, and those who scored lower.

The relationship was further explored through correlational analysis because using a median split to classify participants as high or low in self-efficacy was not meaningful due to the small sample size. The range of scores was 1.63 to 8.61, and over one half of the participants scored between 3.0 and 5.0. Presented in Table 24, the Pearson r correlation coefficient for self-efficacy at pretest and weight loss was nonsignificant, while the correlation between self-efficacy at posttest and weight loss was significant ($r=-.4328$, $p<.05$). The correlations of self-efficacy at pretest and

TABLE 22

ANOVA: Weight Change by Condition

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
CONDITION (A)	1	.68	.68	.00	.98	.00
SUBJECT ERROR	20	39627.5	1981.37			
TIME (B)	1	906.69	906.69	13.40	.002	.40
A x B	1	56.88	56.88	.84	.37	.04
SUBJECT x TIME ERROR	20	1353.03	67.65			

MEANS

	TIME 1	TIME 2
WEIGHT LOSS GROUP	200.67	193.83
BEHAVIOR CHANGE GROUP	202.70	191.30

TABLE 23

MANOVA: Pretest Self-efficacy by Weight Change

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP (A)	1	3600.09	3600.09	2.00	.17	.09
SUBJECT ERROR	20	36028.09	1801.40			
TIME (B)	1	873.09	873.09	13.15	.00	.40
A x B	1	81.82	81.82	1.23	.28	.06
SUBJECT x TIME ERROR	20	1328.09	66.40			

MEANS

	WEIGH TIME 1	WEGHT TIME 2
HIGH INITIAL SELF-EFFICACY	193.91	182.27
LOW INITIAL SELF-EFFICACY	209.27	203.09

TABLE 24

Pearson r Correlation Coefficients (N=22)

	SELF-EFFICACY	
	PRETEST	POSTTEST
WEIGHT CHANGE	.381 (ns)	-.433*
MEETING GOALS	.011 (ns)	.264 (ns)

*p<.05

posttest with the rate of meeting weekly goals were also calculated. Both correlations were nonsignificant.

Research question 3

Repeated measures ANOVA was used to test whether those who lost more weight had a higher self-efficacy score at pretest and posttest than those who had lost less weight. Participants were classified as either a high or low weight loser based on a median split, irrespective of which condition they were in. The two cases at the midpoint were dropped from the analysis because they had the same weight loss but would have been put into separate groups. Mean weight change for the low group was +1 lb (+.45 kg), and for the high group mean weight change was -18.6 lbs (-8.4 kg). The groups were compared on self-efficacy scores. Results, presented in Table 25, revealed significant differences for the main effects of group ($F=10.09$, $p<.05$, $Eta^2=.36$) and time ($F=8.93$, $p<.05$, $Eta^2=.33$), but no significant interaction effect. Those who had lost more weight had a higher mean score on the self-efficacy measure at both pretest and posttest, indicating higher self-efficacy. Additionally, both groups showed an increase in self-efficacy scores over time.

Further analyses were performed to detect correlations between weight change and the other variables. Significant correlations were found between weight change and the program reactance subscale of satisfaction with program content ($r=-.48$, $p<.05$), and between weight loss and rate of meeting weekly goals ($r=-.51$, $p<.05$)

TABLE 25

MANOVA: Self-efficacy at Pretest and Posttest by Lost Weight

SOURCE	DF	SS	MS	F	SIGNIF	ETA^2
GROUP (A)	1	34.21	34.21	10.09	.005	.36
SUBJECT ERROR	18	61.04	3.37			
TIME (B)	1	15.19	15.19	8.93	.008	.33
A x B	1	.80	.80	.47	.50	.03
SUBJECT x TIME ERROR	18	30.63	1.70			

MEANS

	SELF-EFFICACY TIME 1	SELF-EFFICACY TIME 2
LOW WEIGHT LOSS	3.50	4.45
HIGH WEIGHT LOSS	5.06	6.58

CHAPTER VI

LIMITATIONS OF THE STUDY

The lack of significant findings on most of the analyses must be interpreted in light of limitations inherent in the study as it was carried out. Four such limitations will be discussed: sample size; the recruitment process; failure of the instructional material to be learned or internalized by participants; and the analytical procedure.

Sample Size

The proposed study involved a power analysis indicating that a sample size of 50 (25 in each group) was necessary for a power of .70 to detect an effect size of .35. The sample size in the study was n=22, with 12 participants in the control group, and 10 in the experimental group. The power of the statistical analyses involving differences in weight loss by group had a power of .54. That is, the probability of correctly rejecting a false null hypothesis that there was no difference in weight loss between groups was smaller than is normally acceptable in the behavioral literature. In order to detect differences between the two groups, larger effect sizes would have been necessary. Wing and Jeffery (1984) discussed the relationship between sample size and effect size to determine weight losses of 5, 10, and 15 lbs. They stated that very large differences between groups (i.e., 15 lb.

weight loss or effect size=1.95), or very large sample sizes (n>45) are necessary to detect statistical significance.

Wing and Jeffery (1984) made suggestions for dealing with this problem: increase sample size, reduce group variability, and increase the level of significance to .10. For the present study, an initial attempt was made to increase the sample size by running the advertisement again and in additional venues. Time and budgetary constraints prevented further recruitment efforts. Since the sample size was already small, restricting participation to people of similar demographic characteristics was not feasible. However, analysis of self-efficacy by high and low weight loss in effect did reduce the variability on one variable. By grouping together those high on self-efficacy and low on self-efficacy, variability of self-efficacy was decreased, and the difference in weight loss was significant. Setting the significance level at .10 would have allowed only one additional difference between groups to be considered statistically significant.

Recruitment

The present study utilized recruitment methods commonly used in weight control studies (e.g., Mavis, 1987; Weinberg, et al., 1984; Wing, et al., 1981; Jeffery, et al., 1978; Mahoney, 1975). Although a complete analysis of published studies was beyond the scope of the present research, important trends can be seen by examining only a small number of studies. Newspaper, radio, and television advertisements have tended to result in a large number of responding phone calls (n=60 to 200) (Agras, et al., 1990; Pekarik, et al., 1984; Weinberg, et al., 1984; Wing, et al., 1981; Jeffery, et al, 1978; Mahoney, 1975). The present study yielded

144 responses by phone. In past research, of the people who expressed interest in participating, typically one-half actually attended introductory meetings, and the number who participated dropped further. Of the 144 respondents to the present study, 99 (69%) were eligible and agreed to participate by phone, 33 (23%) came to the initial meeting, and 25 (17%) participated. The studies which have been able to recruit and maintain larger sample sizes have tended to be associated with large scale or long running weight control programs, often through well-known medical facilities (e.g., Romieu, et al., 1988; Jeffery, et al., 1978).

Failure of Program Implementation

Throughout the six month program, group meetings involved an educational component based on the weight control manual developed by Brownell (1979). This component included material on reading food labels, monitoring dietary fat intake, incorporating physical activity into one's life, and increasing social support in one's environment. In addition, the program sought to provide a source of social support through team members, and to increase self-efficacy related to weight control by learning to solve individual problems and circumstances. The guiding principles of the educational material used involved the devising of personal strategies to lose weight and to maintain a weight loss. This has been seen in past research (Kalodner & Delucia, 1990; Kayman, et al., 1990; Feurstein, et al., 1989; Loro, et al., 1979) to be the most effective method. Rather than give everyone the same eating and exercise plan, participants were continually instructed to determine what strategies would work for them. Some participants expressed that they wanted to be given a "diet", and were somewhat disappointed that they would have to

determine their own eating plan, or intimidated at the prospect of doing so. Throughout the program participants were encouraged to determine their own goals, and to add goals as they felt ready. Participants in the behavior change group, however, tended to use the same goals as others, or to stick with the same goals throughout the program. Thus most did not build a repertoire of new behaviors as was expected.

By grouping participants into small teams, and by ensuring that failure to accomplish goals would lose a participant's own money and not her team members' money, it was intended that social support would be enhanced within the group. This did not seem to happen in most groups. The groups which were assigned by the researcher were limited in that group members did not know each other prior to the program, and often lived too far away from each other to easily meet outside of the regular meetings. Although participants could only lose their own money, if one group member was unsuccessful in a week, no one in that group could win money. Instead of encouraging and helping one another to accomplish goals, some group members began to resent others on their team. Another hindrance to increasing group support was the fact that group members often were not present at the same meetings, and could not discuss their successes or failures regularly with their group. They were encouraged to contact each other outside of class, but this did not seem to occur. No measure of group cohesion was included in the analyses. This may have indicated whether the groups provided any support for each other, and whether those groups that did were more successful.

Anectdotally, it was noted that many participants who did not win money very often associated the amount of money they were winning with success, even if they had lost weight. A vital part of long term weight control must be that the behaviors associated with weight control become intrinsically motivating and that the outcomes become incentive enough (O'Block & Evans, 1984; Fisher, et al., 1982). This did not happen for most participants, but is an area that merits further research.

Statistical Analysis

The analytical methods employed in the present study involved a group design. That is, the experimental and control groups were compared to each other. Since the early 1970's, group methods have predominated in the analyses of behavioral weight control studies (Anderson & Gross, 1988; Wilson, 1978). For many reasons, the credibility of single subject or case study designs have decreased. Primary among these reasons have been the desire of researchers to compare the efficacy of different treatment methods, and the desire to generalize treatment effects to large groups of people (Wilson, 1978). However, most analyses of behavioral weight control intervention utilizing group designs have not revealed clinically significant weight reductions or long-term effectiveness (Wilson, 1978). Anderson and Gross (1988) proposed that this may be due to the fact that means for groups do not reveal individual differences. Although most researchers agree there is a need to tailor weight control programs to each individual participant in terms of lifestyle, existing problems, and behavioral histories, analyses of these same programs have relied on group designs, thus potentially obscuring individual successes.

In the present study, there were not enough participants, and therefore power, to obtain statistically significant differences between groups. Based on these findings it cannot be concluded that the weight loss and the behavior change techniques for contracting procedures are equivalent. Some individuals in each group were successful. It is possible that there are one or more variables that would differentiate those who were successful using the weight loss strategy from those who were successful using the behavior change strategy.

Many researchers have attempted to detect relationships among self-efficacy, locus of control, and weight control strategy. Chambliss and Murray (1979) demonstrated that those classified as Internals were more successful in a program designed to increase self-efficacy beliefs than those classified as Externals. Blair, et al. (1989) concluded that those who scored higher on a measure of self-efficacy were significantly more successful in their last attempt to lose weight and to maintain that loss. There was no difference, however, in the strategies used to control weight.

Case Studies

Four particular cases will now be discussed in order to illustrate individual variability in weight change, self-efficacy, social support, attendance, and meeting goals. It was attempted to represent a high and low weight loser from each group. Individual and mean scores are presented in Table 26.

The most critical issue illustrated in Table 26 is the difference in weight change across individuals, and the resulting mean score. As discussed above, in

TABLE 26

Individual Case Studies

	A	B	C	D	MEAN
PRETEST WEIGHT (LBS)	212	193	195	175	193.8
POSTTEST WEIGHT (LBS)	194	200	170	184	187
WEIGHT CHANGE (LBS)	-18	+7	-25	+9	-6.8
PRETEST SEL-EFFICACY	5.62	2.93	4.23	5.12	4.48
POSTTEST SELF-EFFICACY	9.50	3.22	8.34	5.39	6.61
ATTENDANCE *	16	11	15	12	13.5
MEETING GOALS**	10	5	12	10	9.25
PRETEST ACTIVE SUPPORT	4.20	7.56	9.22	3.77	6.19
PRETEST SOCIAL SUPPORT	4.41	4.78	6.78	2.44	4.60
POSTTEST ACTIVE SUPPORT	5.43	9.56	6.44	6.33	6.94
POSTTEST SOCIAL SUPPORT	6.17	2.56	2.67	2.56	3.49

NOTE: Participants A and B were in the weight loss group, Participants B and C were in the behavior change group.
* Number of times attending of 16 possible
** Number of successes of 12 possible

order to detect a statistically significant difference in weight loss between groups, the difference must be greater than 10 lbs for a small sample size. Across individuals there were large differences in amount of weight lost, but when grouped together these differences were no longer detectable. If Participants A and B were considered representative of the weight loss group, and Participants C and D were considered representative of the behavior change group, then the difference between the two groups would be 2.5 lbs. However if Participants A and C were taken to represent those who attended the most meetings, and Participants B and D represented those who attended the least number of meetings, then the difference in weight loss between the two groups would be 29.5 lbs. This difference would be statistically significant.

The four participants presented in Table 26 illustrate the wide variability in each case. Social support scores increased for some and decreased for others by time and by scale. In other words, some participants' scores went up on one scale and down on the other, some increased on both scales, and some decreased on both scales. Self-efficacy scores went up for all four participants, although the high weight losers exhibited a larger increase in score over time than the low weight losers.

Possible reasons for the success in weight loss in Participants A and C can be entertained based on data and anecdotal information. Participant A, in the weight loss group, was unsuccessful in meeting weekly goals only twice, during the winter holidays. Although she gained 6 lbs over the month of December, she didn't attribute it to her own failings. Rather she acknowledged that the holidays were a

time when she would eat more than usual with her family and friends, and that enjoyment was important to her. While she continued to attempt to maintain her activity level during this time, she admitted that even this proved to be difficult. After the holidays she again increased her activity level and decreased her dietary fat intake, and consistently lost 1 to 2 lbs per week for the remainder of the program. On the posttest questionnaire, space was given for comments about the program. This participant indicated that the critical point for her was learning to incorporate the changes she had made in eating and lifestyle into her daily life.

Participant C was successful each week with her behavior change goals, while her weight loss varied each week. Some weeks she would lose 2 lbs, other times she would stay the same or gain a pound or two. An important contributing factor to her success in weight loss over the 6 months may have been the fact that her sister, who she seemed close to, was also in the program. They did aerobic video tapes together throughout the program. They reported that they progressed to the point that they were doing a couple of tapes almost every day, and still wanted to do more. They also both began walking the stairs at work rather than an elevator. The rest of their team members were unsuccessful quite often, and one member quit the program. This frustrated the two sisters, but they were able to keep their motivation up despite not winning very much money. It is possible that, had her sister not been a part of the program, Participant C's frustration may have led her to failure or quitting. In her comments at the end of the program, she stated that she did not like the team approach, but did like to set her own behavioral goals.

CHAPTER VII

DISCUSSION

Social support

The hypothesis that the experimental group would have a higher posttest score on the measure of social support was not supported. Past research has produced contradictory findings on the efficacy of social support in weight control. Kalodner and DeLucia (1990) suggest that choice of people from whom to draw support is important. The best choice is often different for each individual. It may be that not enough emphasis was placed on finding the most beneficial people in one's social network.

Self-efficacy

Analysis revealed a significant difference between pretest and posttest on the measure of self-efficacy for the entire sample, but no differences between the experimental and control groups. The two groups had identical meeting schedules and received the same informational material throughout the program. The only difference was the individual goals of the contracting procedure. Based on the observed finding, it can be postulated that neither contracting for weight loss nor for changing behaviors is more effective in increasing self-efficacy related to weight loss.

Attendance and Attrition

The hypotheses that the experimental group would have a higher rate of attendance and lower attrition rate than the control group were not supported. It was expected that the experimental group would be more satisfied with the program overall, thus decreasing the attrition rate and increasing regular attendance. This relationship did not occur. Regular attendance was a problem for participants in both groups. There are many possible reasons for this. First, group meetings were held on Michigan State University campus in the evenings next to the main library and close to the basketball stadium. Parking is difficult on this part of campus, but particularly on nights of basketball games. Second, many of the participants lived in surrounding towns, which made it more difficult to get to campus when the weather was poor. The program ran from October to March, and included much inclement weather. Third, the weight loss group received reward contingent on their weekly weight loss. Many of the participants had suspicion that some people would skip a meeting if they thought they had not lost enough weight.

Meeting Goals

The significant difference between groups in meeting weekly contracting goals was expected. The control group set specific weight loss goals, between .5 lbs and 2 lbs each week. While this group was permitted to alter their weight loss goals each week, it is difficult to anticipate when weight loss will or will not occur. Weight loss is not always under the individuals control, such as when a woman retains body fluid during her menstrual cycle, or when the body reaches a "plateau" after a significant weight loss. Therefore, the individual might set a low weight loss

goal and be quite careful and diligent in her weight loss efforts, but not lose the specified amount in a given week. On the other hand, the experimental group set behavioral goals which they could alter depending on their past success or their schedule for the upcoming week. For example, if a participant had been contracting to eat less than 50 grams of fat 5 days per week, but knew that she had a wedding and two parties to attend in the upcoming week, she might decide to change her goal to eating less than 50 grams of fat 4 days for that week. This type of altering weight loss techniques to fit one's own lifestyle and circumstances was observed by Kayman, et al. (1990) to increase the likelihood that weight loss would be maintained. Many factors operate on dieters and influence their potential for success. When a person "goes on a diet" it is often viewed as a temporary period of time when she cannot eat like a normal person, or is deprived. Often the specific changes made during such a diet are not reasonable for a person to maintain over time. Additionally, if a dieter goes off her diet, even for one day, she may feel like a failure and binge on high calorie foods. It was postulated that, since the experimental group was permitted to alter their behavioral goals, it would give them a sense of control over their behavior, helping them to realize that eating more than they had allotted for themselves in a given day did not mean they were failures. However, the lack of significant differences between the groups on the measure of self-efficacy does not support this idea.

Program Satisfaction

The expectation that the experimental group would be more satisfied with the program itself at the end of the six months was not supported. One reason for the

expected difference was related to the expected higher rate of meeting weekly goals in the experimental group. It is intuitive to assume that people are more likely to be satisfied with a program in which they meet with success than a program in which they fail to reach goals. In addition, more success meant not losing as much of their deposit. Simply looking at the group means reveals that both groups felt favorable toward the program. The range of possible scores for the program content scale was 1 to 5, with 5 being the most favorable. Mean score for the control group was 3.87, and for the experimental group it was 4.11. Similarly, the range of scores for the program components was 1 to 3, with 3 indicating the feeling that the various components were very important. Mean score for the control group was 2.83, and for the experimental group it was 2.72. The components that were rated as very important by most participants were regular weigh-ins (96%), personal goal setting (91%), the slow and steady weight loss philosophy (91%), and the "no deprivation" philosophy (87%).

Adherence to Program Techniques

The posttest measure of adherence was designed to reveal whether participants were learning and using the techniques for losing weight that were being taught in the training material. Analyses revealed a significant difference between groups, with the behavior change group using program techniques more often than the weight loss group. Again this is to be expected since the experimental group was rewarded directly for the use of these techniques, while the control group was rewarded only for their weight loss. However, the lack of significant difference in the measure of future use of these techniques indicates that neither group was more

likely to continue using the techniques. The techniques that were most likely to be used by participants in both groups were monitoring food intake (59%), lowering dietary fat intake (100%), increasing exercise (77%), and weighing oneself regularly (95%). Use of team members as a source of social support, and use of individual problem solving techniques were unlikely to be used by well over one half of the participants.

Weight Loss

The nonsignificant difference in amount of weight lost between the two groups is not surprising considering the small sample size in the study. Based on past literature on behavioral weight control programs, mean weight loss is approximately 10 to 15 lbs (Heckerman & Westlake, 1979). It was, however, unanticipated that the trend of the data would reveal that the experimental group lost slightly more weight than the control group. Given the differences in the goal setting criterion for the groups, it was expected that the higher weight loss might occur in the control group, while the experimental group would lose more slowly. Further research is needed to determine if this difference would be significant with larger samples. Based on power tables, in order to detect the difference that occurred between the two groups as statistically significant, with a power of .60, a sample size of 61 per group would be necessary. It is promising to consider that setting behavior change goals can be more successful in the short term than setting weight loss goals. Further research may prove useful if a method for recruiting this large number can be devised.

Self-efficacy and Weight Loss

The relationship between self-efficacy and weight, and between self-efficacy and success at losing weight is a complex one. The analyses performed in the present study attempted to clarify this relationship. Some researchers have shown that people classified as Internals on Locus of Control measures are more successful compared to Externals in a weight loss program stressing an increase in self-efficacy beliefs (Chambliss & Murray, 1979). Others have found correlational evidence linking high perceived self-efficacy and success in weight control. Weinberg, et al. (1984) found that, of 34 participants, those with a high initial self-efficacy lost more weight than those with low initial self-efficacy. Blair et al. (1989), found a positive relationship between perceived self-efficacy and self-reported success at weight loss. The authors noted that the relationship can be interpreted in two ways. First, participants may have higher self-efficacy due to their success in weight control. Second, participants who were higher in self-efficacy may have been more successful in controlling their weight than those low in self-efficacy. Because this study was based on recall by participants, a causal relationship cannot be inferred.

In the present study, participants were measured on both weight and self-efficacy at pretest and posttest. Based on analyses, it appears that participants who lost more weight scored higher on self-efficacy at both pretest and posttest than those who lost less weight. However, those who scored higher on self-efficacy at pretest did not lose significantly more weight than those who scored lower on self-efficacy. This apparent discrepancy merits further research. A possible explanation may be that those who scored high on the initial measure of self-efficacy and lost

more weight (i.e., high weight losers based on median split) still scored high on self-efficacy at posttest. However, some of the participants who scored high on initial self-efficacy were not in the high weight loss group. Therefore, based on these findings it cannot be said, as some researchers have postulated, that people who begin a weight-control program with high self-efficacy will be more successful.

If the sample size for the present study had been larger, analysis of high and low weight losers and self-efficacy could have been examined by condition. This would have given an indication of whether high initial self-efficacy was more predictive of success in weight loss for either group.

Conclusions

Since the 1970's research has clearly shown that behavioral weight control programs are effective in the short-term for groups, but are not effective in long-term maintenance. However, there are people who successfully lose weight and maintain their losses (Kayman, et al., 1990). The attempts to group people together on some variable(s) or to find a broad program to fit large groups of people appear to be futile. It is possible that researchers interested in weight control need to examine this issue using single-subject or case study designs.

Rather than turn back in history to an individual therapy approach, weight control and health professionals may need to simply be cognizant of individual differences. Consistent with past research, the present study did not reveal a consistent profile of a successful weight loss client. Acknowledgement and appreciation of individual differences may not only increase the chances of long-

term weight control, but may also increase the individual's confidence and self-acceptance.

Based on the present research, two overriding problems were apparent. As discussed earlier, much larger sample sizes would have been necessary to detect statistical significance. The other issue at hand is the statistical methodolgy used to detect the differences. Recommendations for future research could take two directions. One might be a suggestion for recruiting larger groups to take part in the research. Another might be to use case study analysis in an attempt to find patterns in weight loss and maintenance, or to detect characteristics of the successful client.

The initial tendency might be to focus on an increase in sample size, given the importance placed on group methodology in the behavioral literature. Based on past research, it appears that large drop out rates are typical with the recruitment method of advertising for participants. Participation in weight control programs must remain voluntary and rely on individuals to decide whether to remain in the study. Incentives appear to be effective for some participants to increase attendance and decrease attrition. However, directly rewarding for attendance has not been more successful than other contingencies, in terms of attendance or weight loss (Jeffery, et al., 1978; Epstein, et al., 1980; Jeffery, et al., 1984; Mavis, 1987). Few studies have been successful at recruiting and maintaining large sample sizes. Those that are successful tend to be associated with hospital-based or long running, well-funded projects (Romieu, et al., 1988; Jeffery, et al., 1978). Difficulties in securing funding for large scale projects prohibits this from being the norm for research endeavors.

On the positive side, many of the participants in this and past research programs have lost weight. Many of the participants in the present study also indicated that they had learned a lot about weight control, nutrition, and exercise, which they felt they could use in their continued efforts to control their weight. It is possible that some day certain factors will be identified which will allow all or most people to lose weight and maintain a healthy weight. It is also possible that no such factors exist for large numbers of people, and individual differences are the most important aspect to consider. The latter may be more likely. It seems that the focus for future research should thus be on redefining acceptable statistical analyses for behavioral weight control. In depth analysis of a few successful and unsuccessful participants in a program might reveal important findings, and contribute to the weight control knowledge.

Ethically speaking, the utility of weight control programs must be questioned in terms of the effect on the participants. It is well accepted that most programs will produce a weight loss in some people, but that only about 5% of those people will maintain their loss. A future area for research may be to compare the efficacy of typical programs with a new approach of focusing only on improving health rather than on losing weight. The goal of the behavior change group was to create a focus on behaviors rather than weight, but this could be carried a step further by only measuring outcome variables more directly related to health, such as cholesterol level and blood pressure. Weight change could be measured at the beginning and

end of the program to determine effects, but not during the program. Improving one's health may be a more useful goal for the individual, and for the entire field.

BIBLIOGRAPHY

BIBLIOGRAPHY

Adams, S. O., Grady, K. E., Wolk, C. H., & Mukaida, C. (1986). Weight loss: A comparison of group and individual interventions. Journal of the American Dietetic Association, 4, 485-490.

Agras, W. S., Taylor, C. B., Feldman, D. E., Losch, M., & Burnett, K. F. (1990). Developing computer-assisted therapy for the treatment of obesity. Behavior Therapy, 21, 99-109.

Alster, J. M. (1984, July). Repeated measures analysis using SPSS-X MANOVA. Paper published at the 1984 ISSUE Conference, Chicago, IL.

Anderson, J. E. & Gross, A. M. (1988). Behavioral obesity research: Where have all the single subjects gone? The Behavior Analyst, 11, 141-148.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. Psychological Review, 84(2), 191-215.

Baumeister, R. F., Kahn, J., & Tice, D. M. (1989). Obesity as a self-handicapping strategy: Personality, selective attribution of problems, and weight loss. The Journal of Social Psychology, 130, 121-123.

Bjorntorp, P., Carlgren, G., Isaksson, B., Krotkiewski, M., Larsson, B., & Sjostrom, L. (1975). Effect of an energy- reduced dietary regimen in relation to adipose tissue cellularity in obese women. The American Journal of Clinical Nutrition, 28, 445-452.

Black, D. R., Gleser, L. J., & Kooyers, K. J. (1990). A meta-analytic evaluation of couples weight-loss programs. Health Psychology, 9, 330-347.

Blair, A. J., Lewis, V. J., & Booth, D. A. (1989). Behaviour therapy for obesity: The role of clinicians in the reduction of overweight. Counselling Psychology Quarterly, 2, 289-301.

Bray, G. A. (1990). Obesity: Historical development of scientific and cultural ideas. International Journal of Obesity, 14, 909-926.

Brown, J. D., & Siegel, J. M. (1988). Exercise as a buffer of life stress: A prospective study of adolescent health. Health Psychology, 7, 341-353.

Brownell, K. D. (1985) The contribution of psychological and behavioral factors to a classification scheme for obesity. In J. Hirsch and T. B. Van Itallie (Eds.), Recent Advances in Obesity Research: IV (pp. 150-154). London: John Libbey.

Brownell, K. D., Cohen, R. Y., Stunkard, A. J., Felix, M. R., & Cooley, N. B. (1984). Weight loss competitions at the work site: Impact on weight, morale, and cost-effectiveness. American Journal of Public Health, 74, 1283-1285.

Brownell, K. D. (1979). Behavior therapy for weight control: A treatment manual. University of Pennsylvania.

Brownell, K. D., Greenwood, M. R. C., Stellar, E., & Shrager, E. E. (1986). The effects of repeated cycles of weight loss and regain in rats. Physiology and Behavior, 38, 459-464.

Brownell, K. D., Heckerman, C. L., & Westlake, R. J. (1979). The bahavioral control of obesity: A descriptive analysis of a large-scale program. Journal of Clinical Psychology, 35(4), 864-869.

Brownell, K. D., & Jeffery, R. W. (1987). Improving long-term weight loss: Pushing the limits of treatment. Behavior Therapy, 18, 353-374.

Brownell, K. D., Kelman, J. H., & Stunkard, A. J. (1983). Treatment of obese children with and without their mothers: Changes in weight and blood pressure. Pediatrics, 71, 515-523.

Brunner, B. C. (1967). Personality and motivating factors influencing adult participation in vigorous physical activity. The Research Quarterly, 40, 464-469.

Buchanan, C. (1988). Safety questions raised about over-the-counter diet pills. Environmental Nutrition, 11(6), 2-3.

Chambliss, C. A., & Murray, E. J. (1979). Efficacy attribution, locus of control, and weight loss. Cognitive Therapy and Research, 3, 349-353.

Clayson, D. E., & Klassen, M. L. (1989). Perception of attractiveness by obesity and hair color. Perceptual and Motor Skills, 68, 199-202.

Coehlo, R. J. (1983). An experimental investigation of two multi-component approaches on smokin cessation. Unpublished doctoral dissertation, Michigan State University.

Costanzo, P. R., & Schiffman, S. S. (1989). Thinness-not obesity-has a genetic component. Neuroscience and Biobehavioral Reviews,13, 55-58.

Crandall, C., & Biernat, M. (1990). The ideology of anti-fat attitudes. Journal of Applied Social Psychology, 20, 227-243.

Cullari, S., & Trubilla, R. S. (1989). Body-image distortion in normal-weight college women. Perceptual and Motor Skills, 68, 1195-1198.

Dale, D. V., Saris, W. H. M., & Hoor, F. T. (1990). Weight maintenance and resting metabolic rate 18-49 months after a diet/exercise treatment. International Journal of Obesity, 14, 347-359.

Davidson, W. S., Seidman, E., Rappaport, J., Berck, P., Rapp, N., Rhodes, W., & Herring, J. (1977). Diversion programs for juvenile offenders. Social Work Research Abstracts, 13(2), 40-49.

DeJong, W. (1980). Stigma of obesity: The consequences of naive assumptions concerning the causes of physical deviance. Journal of Health and Social Behavior, 21, 75-87.

DeLozier, M. G., Israel, R. G., O'Brien, K. F., Shaw, R. A., & Pories, W. J. (1986). Body composition and aerobic capacity in morbidly obese females. Adapted Physical Activity Quarterly, 3, 259-267.

Epstein, L. H., Wing, R. R., Thompson, J. K., & Griffin, W. (1980). Attendance and fitness in aerobics exercise: The effects of contract and lottery procedures. Behavior Modification, 4, 465-479.

Faubel, M. (1988). Body image and depression in women with early and late onset obesity. The Journal of Psychology, 123, 385-395.

Feuerstein, M., Papciak, A., Shapiro, S., & Tannenbaum, S. (1989). The weight loss profile: A biopsychosocial approach to weight loss. International Journal of Psychiatry in Medicine, 19(2), 181-192.

Fisher, E. B., Jr., Levenkron, J. C., Lowe, M. R., Loro, A. D., Jr., & Green, L. (1982). Self-initiated self-control in risk reduction. In R. B. Stuart (Ed.), Adherence, Compliance and Generalization in Behavioral Medicine (pp. 169-191). New York: Brunner/Mazel.

Fisher, E. B., Jr., Lowe, M. R., Levenkron, J. C., & Newman, A. (1982). Reinforcement and structural support of maintained risk reduction. In R. B. Stuart (Ed.), Adherence, Compliance and Generalization in Behavioral Medicine (pp. 145-168). New York: Brunner/Mazel.

Frey-Hewitt, B., Vranizan, K. M., Dreon, D. M., & Wood, P. D. (1990). The effect of weight loss by dieting or exercise on resting metabolic rate in overweight men. International Journal of Obesity, 14, 327-334.

Gardner, R. M., Morrell, J., Urrutia, R., & Espinoza, T. (1989). Judgements of body size following significant weight loss. Journal of Social Behavior and Personality, 4, 603-613.

Garrow, J. S. (1979). How to treat and when to treat. In J. F. Munro (Ed.), The Treatment of Obesity (pp. 1-17). Baltimore: University Park Press.

Grana, A. S., Coolidge, F. L., & Merwin, M. M. (1989). Personality profiles of the morbidly obese. Journal of Clinical Psychology, 45(5), 762-765.

Herman, C. P., & Mack, D. (1975). Restrained and unrestrained eating. Journal of Personality, 48, 647-660.

Hodgson, P. (1984). Review of popular diets. In J. Storlie & H. A. Jordan (Eds.), Nutrition and Exercise in Obesity Management (pp. 1-16). New York: Spectrum Publications.

Hubert, H. B., Feinleib, M., McNamara, P. M., & Castelli, W. P. (1983). Obesity as an independent risk factor for cardiovascular disease: A 26-year follow-up of participants in the Framingham Heart Study. Circulation, 67(5), 968-977.

Jacobs, S. B., & Wagner, M. K. (1984). Obese and nonobese individuals: Behavioral and personality characteristics. Addictive Behaviors, 9, 223-226.

Jeffery, R. W., French, S. A., & Schmid, T. L. (1990). Attributions for dietary failures: Problems reported by participants in the hypertension prevention trial. Health Psychology, 9(3), 315-329.

Jeffery, R. W., Snell, M. K., & Forster, J. L. (1985). Group composition in the treatment of obesity: Does increasing group homogeneity improve treatment results? Behavior Research Therapy, 23, 371-373.

Jeffery, R. W., Thompson, P. D., & Wing, R. R. (1978). Effects on weight reduction of strong monetary contracts for calorie restriction or weight loss. Behavior Research Therapy, 16, 363-370.

Jeffery, R. W., Wing, R. R., & Stunkard, A. J. (1978). Behavioral treatment of obesity: The state of the art 1976. Behavior Therapy, 9, 189-199.

Jeffery, R. W., Bjornson-Benson, W. M., Rosenthal, B. S., Kurth, C. L., & Dunn, M. M. (1984). Effectiveness of monetary contracts with two repayment schedules on weight reduction in men and women from self-referred and population samples. Behavior Therapy, 15, 273-279.

Johnson, D. W. & Johnson, R. T. (1985). The process of nutrition education: A model for effectiveness. Journal of Nutrition Education, 17(2-Supplement), S1-S27.

Kalodner, C. R., & DeLucia, J. L. (1990). Components of effective weight loss program: Theory, research, and practice. Journal of Counseling and Development, 68, 427-433.

Kayman, S., Bruvold, W., & Stern, J. S. (1990). Maintenance and relapse after weight loss in women: Behavioral aspects. American Journal of Clinical Nutrition, 52, 800-807.

Keim, N. L., Barbieri, T. F., & Belko, A. Z. (1990). The effect of exercise on energy intake and body composition in overweight women. International Journal of Obesity, 14, 335-346.

Killip, S. M. (June, 1984). Aerobic exercise and psychological well-being. Poster presented at the meeting of the Canadian Psychological Association, Ottawa, Ontario.

Lake, C. R., Rosenberg, D., & Quirk, R. (1990). Phenylpropanolamine and caffeine use among diet center clients. International Journal of Obesity, 14, 575-582.

Lake, C. R., Zaloga, G., Clymer, R., & Quirk, R. (1988). A double dose of phenylpropanolamine causes transient hypertension. The American Journal of Medicine, 85, 339-343.

Lando, H. A. (1977). Successful treatment of smokers with a broad spectrum behavioural approach. Journal of Consulting and Clinical Psychology, 45, 361-366.

Loro, A. D., Jr., Fisher, E. B., Jr., & Levenkron, J. C. (1979). Comparison of established and innovative weight-reduction treatment and procedures. Journal of Applied Behavior Analysis, 12, 141-155.

Maddox, G. L., Back, K. W., & Liederman, V. R. (1968). Overweight as social deviance and disability. Journal of Health and Social Behavior, 9, 287-298.

Mahoney, M. J. (1974). Self-reward and self-monitoring techniques for weight control. Behavior Therapy, 5, 48-57.

Margolis, L. H., Sparrow, A. W., &Swanson, G. W. (1989). Growing into healthy adults: Pediatric antecedents of adult disease. Lansing, MI: Michigan Department of Public Health.

Mavis, B. E. (1987). The use of monetary incentives in a social context in the modification of weight loss. Unpublished doctoral dissertation, Michigan State University.

Mermelstein, R., Cohen, S., Lichtenstein, E., Baer, J. S., & Karmack, T. (1986). Social support and smoking cessation and maintenance. Journal of Consulting and Clinical Psychology, 54, 447-453.

Metropolitan Life Insurance Company. (1983). Metropolitan height and weight tables. New York: author.

Miller, W. C., Lindeman, A. K., Wallace, J., & Niederpreum, M. (1990). Diet composition, energy intake, and exercise in relation to body fat in men and women. American Journal of Clinical Nutrition, 52, 426-430.

National Center for Health Statistics. (1992). Health United States, 1991. Hyattsville, Maryland: Public Health Service.

Newman, B., Selby, J. V., Quesenberry, C. P., King, M. C., Friedman, G. D., & Fabsitz, R. R. (1990). Nongenetic influences of obesity on other cardiovascular disease risk factors: An analysis of identical twins. American Journal of Public Health, 80, 675-678.

O'Block, F. R. & Evans, F. H. (1984). Goal-setting as a motivational technique. In J. M. Silva & R. S. Weinberg (Eds.) Psychological foundations of sport (pp. 188-196). Champaign, IL: Human Kinetics Publishers, Inc.

O'Leary, A. (1985). Self-efficacy and health. Behavior Research and Therapy, 23, 437-451.

Patterson, B. H., Block, G., Rosenberger, W. F., Pee, D., & Kahle, L. L. (1990). Fruit and vegetables in the American diet: Data from the NHANES II survey. American Journal of Public Health, 80, 1443-1449.

Pauley, L. L. (1988). Customer weight as a variable in salespersons' response time. The Journal of Social Psychology, 129(5), 713-714.

Pekarik, G., Blodgett, C., Evans, R. G., & Wierzbicki, M. (1984). Variables related to continuance in a behavioral weight loss program. Addictive Behaviors, 9, 413-416.

Penick, S. D., Filion, R., Fox, S., & Stunkard, A. J. (1971). Behavior modification in the treatment of obesity. Psychosomatic Medicine, 33(1), 49-57.

Pentel, P. (1984). Toxicity of over-the-counter stimulants. Journal of the American Medical Association, 252(14), 1898-1903.

Perri, M. G., Shapiro, R. M., Ludwig, W. W., Twentyman, C. T., & McAdoo, W. G. (1984). Maintenance strategies for the treatment of obesity: An evaluation of relapse prevention training and posttreatment contact by mail and telephone. Journal of Consulting and Clinical Psychology, 52, 404-413.

Ritt, R. S., Jordan, H. A., & Levitz, L. S. (1979). Changes in nutrient intake during a behavioral weight control program. Journal of the American Dietetic Association, 74, 325-330.

Rittenbaugh, C. (1982). Obesity as a culture-bound syndrome. Culture, Medicine and Psychiatry, 6, 347-361.

Robbins, S. B., & Slavin, L. A. (1988). A measure of social support for health-related behavior change. Health Education, 19(3), 36-39.

Romieu, I., Willett, W. C., Stampfer, M. J., Colditz, G. A., Sampson, L., Rosner, B., Hennekens, C. H., & Speizer, F. E. (1988). Energy intake and other determinants of relative weight. American Journal of Clinical Nutrition, 47, 406-412.

Ruderman, A. J. (1985). Dietary restraint and irrational cognitions. Paper presented at the Convention of the American Psychological Association, Los Angeles, CA.

Schlundt, D. G., Hill, J. O., Sbrocco, T., Pope-Cordle, J., & Kasser, T. (1990). Obesity: A biogenetic or behavioral problem. International Journal of Obesity, 14, 815-828.

Select Committee on Nutrition and Human Needs. (1977). Diet Related to Killer Diseases II. (Report No. 84-1070). Washington, D. C.: Government Printing Office.

Shavelson, R. J. (1988). Statistical reasoning for the behavioral sciences. Massachusetts: Simon and Schuster.

Smoll, F. L., & Schutz, R. W. (1990). Quantifying gender differences in physical performance: A developmental perspective. Developmental Psychology, 26, 360-369.

Snow, A. T., & Harris, M. B. (1985). Maintenance of weight loss: Demographic, behavioral and attitudinal correlates. The Journal of Obesity and Weight Regulation, 4(4), 234-257.

Stalonas, P. M., Perri, M. G., & Kerzner, A. B. (1984). Do behavioral treatments of obesity last? A five-year follow-up investigation. Addictive Behaviors, 9, 175-183.

Stunkard, A., & Kaplan, D. (1977). Eating in public places: A review of reports of the direct observation of eating behavior. International Journal of Obesity, 1, 89-101.

Stunkard, A. J., Sorensen, T. I. A., Hanis, C., Teasdale, T. W., Chakraborty, R., Schull, W. J., & Schulsinger, F. (1986). An adoption study of human obesity. The New England Journal of Medicine, 314, 193-198.

United States Department of Health, Education, and Welfare. (1975). Report of the National Commission on Diabetes to the Congress of the United States: Vol 3, Part 3. (DHEW Publication # (NIH) 76-1023). Washington, D.C.: National Institutes of Health.

Van Itallie, T. B. (1986). Bad news and good news about obesity. The New England Journal of Medicine, 314, 239-240.

Van Ittalie, T. B. (1979). Obesity: Adverse effects on health and longevity. American Journal of Clinical Nutrition, 32, 2723-2733.

Van Koten-Chappell, C. (1982). Self-efficacy as a predictor of weight loss. Unpublished doctoral dissertation, University of Oregon.

Vener, A. M., & Krupka, L. R. (1985). Over-the-counter anorexiants: Use and perceptions among young adults. In J. P. Morgan, D. V. Kagan, & J. S.

Brody (Eds.), Phenylpropanolamine: Risks, Benefits, and Controversies (pp. 132-149). New York: Prager.

Weinberg, R. S., Hughes, H. H., Critelli, J. W., England, R., & Jackson, A. (1984). Effects of pre-existing and manipulated self-efficacy on weight loss in a self-control program. Journal of Research in Personality, 18, 352-358.

Westover, S. A., & Lanyon, R. I. (1990). The maintenance of weight loss after behavioral treatment. Behavior Modification, 14(2), 123-137.

Williamson, D. F., Serdula, M. K., Anda, R. F., Levy, A., & Byers, T. (1992). Weight loss attempts in adults: Goals, duration, and rate of weight loss. American Journal of Public Health, 82(9), 1251-1257.

Wilson, G. T. (1985). Psychological prognostic factors in the treatment of obesity. In J. Hirsch & T. B. Van Itallie (Eds.), Recent Advances in Obesity Research: IV (pp. 301-311). London: John Libbey.

Wilson, G. T. (1978). Methodological considerations in treatment outcome research on obesity. Journal of Consulting and Clinical psychology, 46(4), 687-702.

Wing, R. R., Epstein, L. H., Marcus, M., & Shapira, B. (1981). Strong monetary contingencies for weight loss during treatment and maintenance. Behavior Therapy, 12, 702-710.

Wing, R. R. & Jeffery, R. W. (1984). Sample size in clinical outcome research: The case of behavioral weight control. Behavior Therapy, 15, 550-556.