This is to certify that the

thesis entitled

The Use of Monetary Incentives
For the Maintenance of Weight Loss

presented by

Camala Ann Riessinger

has been accepted towards fulfillment
of the requirements for

Master's degree in Psychology

Major professor
Dozier Thornton, Ph.D.

Date January 18, 1988

THE USE OF MONETARY INCENTIVES FOR THE MAINTENANCE OF WEIGHT LOSS

By

Camala Ann Riessinger

A THESIS

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

MASTER OF ARTS

Department of Psychology

1988

ABSTRACT

THE USE OF MONETARY INCENTIVES FOR THE MAINTENANCE OF WEIGHT

By

Camala Ann Riessinger

The purpose of this study was to determine the relative efficacy of a weight contingent monetary incentive (WCMI) with respect to weight maintenance. Also, examined were the relationships between a WCMI and the following: program attendance, self-efficacy, number of weekly types of physical activities, and the number of social supporters.

The sample consisted of 45 participants (6 men and 39 women) who were recruited from a 12 week weight loss program. A WCMI group (N = 23) and a no incentive group (N = 22) received the same 6 month maintenance program.

Using Analyses of Covariance, no differences were detected between the two groups with respect to: weight maintenance, self-efficacy, physical activities, and social supporters. A t-test indicated that there was no difference between the two groups with respect to program attendance. A Chi-square analysis indicated the attrition rate of the two groups was significantly different and favored the WCMI group.

To my friend, Nancy Ridley, who was always willing to help me in any possible way. You quietly endured my times of emotional stress and understood my feelings of being overwhelmed. During the times that I felt I could no longer go on, your support, patience, and encouragement carried me through to the completion of this thesis.

ACKNOWLEDGMENTS

The completion of this project depended on help and support from a large number of people.

I thank Dr. Dozier Thornton for his thoughtful reading and support of my research. His willingness to provide assistance and enthusiasm for my work increased my motivation.

I am grateful for the opportunity and privilege to work with Dr. Bertram Stoffelmayr. His encouragement aided me in the pursuit of this endeavor. His enthusiastic interest in this research topic and his intellectual challenges continue to inspire me.

I thank Dr. Charles Hanley for agreeing to serve on my committee and providing me with useful comments on my writing style. His generous commitment of time in helping me with the statistical analyses is deeply appreciated.

I feel indebted to Dr. Brian Mavis who provided me with the opportunity to work in this research area. I deeply appreciate his willingness to provide assistance and his continuous support and encouragement throughout my research project. I am grateful my the numerous times he motivated me to continue my work.

I thank Tom Fuller who generously helped me run the sessions throughout the project. I appreciate his cooperation and flexibility which helped me get through the six month program. His encouragement and support are especially appreciated.

Also I thank Dr. Bertram Stoffelmayr, Dr. Robert Lent, Dr. Brian Mavis, and Tom Fuller for their devotion of time to participate in weekly discussions of this research topic. All of their comments and suggestions lead to the progression of our discussions and posed interesting research questions.

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CHAPTER I

INTRODUCTION

Obesity is a significant problem that frustrates overweight individuals and professionals who seek a remedy. The problem afflicts a large portion of the population in the United States. An estimated 30 percent of American women and 20 percent of American men suffer from obesity, which means that they weigh at least 20% in excess of ideal body weight according to actuarial tables from the Metropolitan Life Insurance Company (Grande, 1974; Bray, 1979). It is ironic that obesity in the United States is prevalent, yet Americans live in a culture that praises the slim human body. In wealthy countries, obesity is more prevalent than any other disease, except undiagnosed atherosclerosis (Grande, 1974; Bray, 1979).

The high prevalence of obesity would be less alarming if obesity did not have such serious health consequences. Obesity is considered a predisposing factor in hypertension, atherosclerosis, hernia, gall bladder disease, diabetes mellitus, liver disease, degenerative joint disease, and hyperuricemia (Berg, Williams, & Sutherland, 1979). Further, most researchers believe that excess weight increases the risk of surgery and pregnancy. The link of obesity to cardiovascular and pulmonary disorders is also under consideration by many researchers.

Obesity is viewed as a complex problem that is not easily treated. Encouraging an individual to lose weight is far more difficult than simply prescribing a diet or demanding that the person eat less and exercise more.

For a long time, it was believed that "fat persons eat more than thin persons." However, Rodin (1979) emphasized that there is not a great amount of experimental evidence from well conducted research that obese individuals eat significantly more on the average than their thin counterparts. Now, investigators are searching for alternative explanations. Various explanations for the development of obesity have been proposed which include: genetic and organic, psychological, behavioral, and socioeconomic.

Each year millions of people devote large amounts of time and money, and risk harmful effects to attaining a thin body through weight loss treatment. There are numerous approaches used in the treatment of obesity. Traditional attempts to modify obesity, such as medical, dietary, and psychotherapeutic methods have been used with varying degrees of success in treating obesity (Stunkard & McLaren-Hume, 1959). These traditional approaches have been labeled as unsuccessful because most studies report a 20 pound weight loss in 12-29% of the patients (Stunkard & McLaren-Hume, 1959). Over the past 25 years, the treatment results from traditional weight loss procedures have not improved their effectiveness. In 1959, behavior modification procedures had begun to be used in the treatment of obesity. The behavioral approach has produced more promising results in maintaining the weight loss than the traditional methods.

All of the treatment approaches to obesity share two important obstacles. Attrition is one of the problems that hinders the obesity treatments. It is a challenge to keep obese individuals involved in their treatment. Obviously, it is important that the individuals attend the treatment program in order for the treatment to be effective. The other problem with many of the obesity treatments is the failure of maintaining

the weight lost during the treatment. In other words, the various treatment approaches are successful at obtaining some weight loss, but are unsuccessful at maintaining the weight loss.

The unresponsiveness of obesity to treatment is familiar to the individuals who lose weight and gain it back countless times and is well known to professionals who deal with the problem. In 1959, Stunkard and McLaren-Hume noted that only 5% of obese individuals lose a significant amount of weight and keep it off. After 23 years of research in this area, not much progress has been made in weight maintenance. It is clear that the failure of individuals to maintain the weight lost during treatment presents an important clinical problem. Therefore, maintenance of weight loss is a crucial issue in the treatment of obesity.

Investigators recognize that there are numerous factors associated with obesity and its treatment. These factors are: physical activity, self-efficacy, social support, and incentives. Each of these factors is believed to be involved in successful weight reduction treatment and maintenance of weight loss.

Physical activity is a factor related to the treatment of obesity and maintenance of weight loss. Many treatment and maintenance programs encourage individuals to become more physically active. There are several reasons for emphasizing increased physical activity levels to control weight. Exercise increases caloric expenditure and the metabolism of fat, and it decreases appetite. Physical activity also has some psychological and physiological benefits.

It is important for individuals to be motivated for self-regulation of their behaviors in order to initiate new behaviors and maintain desired behaviors. Self-efficacy is a key for the self-regulation process. Self-efficacy

is a personal judgment of one's ability to carry out certain roles or activities under a variety of conditions (Bandura, 1981). Thus, it is one's expectations of how well one can execute certain actions that determines the amount of effort expended for the necessary changes.

Social support is important in the enhancement of one's motivation in the treatment of obesity and weight loss maintenance. Many programs include efforts to mobilize family, friends, and coworkers to support program participants and create support groups for participants during and after the program has concluded (Levine & Sorenson, 1984).

Another way to enhance an individual's motivation for the initiation and maintenance of a behavioral change is through the use of incentives. There is considerable evidence suggesting that the effectiveness of weight loss programs is enhanced with the use of monetary incentives (Wing & Jeffery,1979). Little research exists on the relative effectiveness of incentive procedures with weight maintenance programs.

The present study was done in order to compare the effects of weight contingent monetary incentives in a 6 month maintenance program. When lottery procedures were compared to more traditional continuous reinforcement procedures, it was found that the lottery system was at least as effective as continuous reinforcement in producing behavioral change (Epstein, Wing, Thompson, & Griffin, 1980; Osborne, Powers, & Anderson, 1974; Mavis, 1987). Since the effects are approximately equal in these two incentive procedures (continuous reinforcement procedure and lottery system) and the lottery system is more easily administered, lottery procedures were used in the present study. The same 6 month maintenance program was administered to two groups. One group received weight contingent monetary incentives and the second group did not receive

monetary incentives. Throughout the 6 month program, self-efficacy, social support, and physical activity were assessed in relation to the utilization or nonutilization of a weight contingent monetary incentive.

The present study contributes to the literature by assessing the effectiveness of a weight contingent monetary incentive in a weight maintenance program. Also, the study provides information about the relationship between a weight contingent monetary incentive and the following: program attendance, self-efficacy, the number of an individual's social supporters, and the reported number of weekly types of physical activities. Such information helps in efforts to understand and promote weight maintenance.

Research Hypotheses

1. The group getting the weight contingent monetary incentives using a lottery system will be more effective than the no incentive group in promoting weight maintenance, defined in terms of weight at the end of the weight maintenance program as compared to the beginning of the program.

2. The group getting the weight contingent monetary incentive procedures using a lottery system will show higher attendance at the program than the group getting no incentives.

3. The two groups will not differ with respect to the number of reported weekly types of physical activities.

4. The two groups will not differ with respect to perceptions of self-efficacy relating to eating restraint.

5. The two groups will not differ with respect to the number of reported social supporters.

Chapter II reviews the literature regarding the proposed causes of obesity, various approaches in the treatment of obesity, weight maintenance strategies, and factors associated with successful treatment of obesity and maintenance of weight loss. Methods of the present study are outlined in Chapter III. Chapter IV contains information on the data analysis from the study. A discussion of the obtained information and recommendations for further research are contained in Chapter V.

CHAPTER II
LITERATURE REVIEW

This chapter consists of four main topics. First, the various proposed causes of obesity are described. Second, different approaches to the treatment of obesity are delineated. Third, weight maintenance strategies are delineated. Finally, important factors associated with the treatment of obesity and the maintenance of weight loss are reported.

Causes of Obesity

There is extensive research reported in the literature which attempts to identify the cause of obesity (Abramson & Wunderlich, 1972; Schachter, 1971; Slochower, 1976). There is no apparent single etiological explanation for obesity (Van Itallie, 1979). Researchers are recognizing that obesity is a complex phenomenon and that there are multiple factors associated with its etiology. Researchers are also recognizing that there are interactive effects of these multifactors.

It is becoming apparent that genetic factors, psychological factors, and defects in body regulators interact with food consumption and physical activity levels to form a complex causal relationship in the etiology of obesity. For instance, there are cases in which genetic and psychological factors interact with excessive food consumption and physical inactivity to promote obesity. A sedentary person with a physiological predisposition for obesity is likely to become overweight at a younger age than a sedentary counterpart who does not have a physiological predisposition to gain weight.

The obesity literature contains various causes for the development of obesity. These proposed causes are: behavioral, emotional and psychological, genetic and organic, and socioeconomic. The following is a summary of related literature on the various explanations for obesity and its perpetuation.

Behavioral Explanation of Obesity

Behavioral theorists believe that specific variables are responsible for the condition of obesity. These variables include: dietary habits, degree of responsiveness to external versus internal cues, activity levels, and family environment. Each of the variables or a combination of the variables is believed to produce a caloric imbalance. Caloric imbalance refers to greater caloric intake than caloric expenditure over an extended period of time (Burland, Samuel, & Yudkin, 1974; Mahoney, 1978; Schachter, 1971; Stunkard, 1980).

Dietary habits of the obese are believed to be different from normal weight individuals. Mahoney (1979) observed that eating habits of many obese individuals include: rapid consumption, "cleaning one's plate" of oversized portions, and ignoring feelings of satiety. These practices can lead to high caloric meals. Further, Stunkard (1977) observed that eating patterns of the overweight include: sporadic eating, frequent overeating, and binging of high fat and sugar laden foods. Efforts to modify these eating habits can prove to be beneficial in weight control management.

The responsiveness to external versus internal cues is another variable believed responsible for obesity. Schachter (1971) proposed that obesity is partially due to a greater sensitivity to food related environmental cues. He stated that "overweight persons are much more

likely to eat when presented with tempting food at any time, even if they have engaged in a very recent eating episode" (Schachter, 1971, p. 32). According to Schachter's (1971) externality theory, the obese person is sensitive to the influences of time, sight, smell, taste, and a number of food cues (e.g., having food in close proximity). Schachter stated that responsiveness to external signals or sensory cues are predominant over internal or physiological cues and occurs as a result of abnormal perception. Therefore, it is believed that fat persons cannot resist sensory food cues regardless of the presentation method (e.g., whether they are presented via television commercials or as savory kitchen aromas).

Schachter (1971) cited studies showing that obese individuals were less affected by caloric preloading than normal weight individuals, as evidence that obese individuals have a lack of internal responsiveness. In one study, overweight and normal weight subjects were fed a milk shake (preload to ice cream eating) in the hours immediately following a meal, and then were provided with an opportunity to consume varying amounts of ice cream (subsequent eating). Obese individuals ate more ice cream (following the milk shake preload) than did normal weight people.

This externality theory proposed by Schachter has stimulated a large amount of research and controversy. The notion of an obese person facing temptation and being persuaded to abandon self-control by the powerful cues in the environment has strong face validity. However, researchers are now finding indications that this internal/external concept may be too simple to explain why some people are obese and others are of normal weight.

Rodin (1975) criticized Schachter's heavy reliance on gastric contractions as an internal signal that predicts differential eating behavior

in normal weight and obese persons. He believes that Schachter was relying upon a cue (gastric contractions) that does not actually have much effect upon the initiation of eating. Referring to the "milk shake" study, Rodin (1975) suggested that rather than representing a lack of internal responsiveness, these findings may more simply indicate that the level of caloric preload was not enough to be detected by the overweight subjects. If the amount of calories and nutrition contained in the milk shake preload was insufficient to meet their nutritional needs (which may be different or greater than nonobese individuals' needs), then they would remain hungry and eat larger quantities of ice cream than normal weight subjects.

In support of Rodin's criticism, Stunkard (1980) found that no published data exists indicating whether or not the initiation of eating is actually correlated with hunger contractions. Further, Stunkard (1980) summarized studies that support the internal/external theory as being a much more complex construct than first believed. Normal weight people have also been found to be externally responsive to food cues. It is possible that people who do control their weight regardless of a sensitivity to food related stimuli are subject to shifts in which cues are important for them. In other words, occasionally normal weight people may experience short-term weight gain due to giving in to savory aromas, but their long-term weight management is in response to other factors (such as social pressure to remain slim or athletic). On the other hand, obese persons may not experience a shift in cue sensitivity in the short-term versus long-term; therefore, food related cues may remain more predominant than other factors in determining caloric intake.

Researchers today suggest that we do not view a dichotomy between internal and external controls, but instead consider them as

interdependent. For example, external cues may always initiate eating behaviors given the presence of certain physiological conditions. Furthermore, the strength of internal factors upon subsequent eating may change due to interaction with the large number of existing external stimuli.

Behaviorists hold that physical activity levels are another factor responsible for the development and perpetuation of obesity. Early studies have attempted to determine the relationship of physical activity to weight by comparing and contrasting physical activity levels of obese and normal weight individuals. Using a variety of measures (pedometer readings, self-report questionnaires, and observations), obese individuals were found to exhibit significantly lower levels of activity than normal weight persons (Chirico & Stunkard, 1960; Mayer, Roy, & Mitra, 1956; Stuart, 1967). After a review of the literature, Mayer (1968) found that in babies and children, obesity was more related to inactivity than ingestion of large numbers of calories. Further, Mayer (1968) found that obesity in adults was correlated with inactivity, indicating that obese individuals spent more time in sedentary recreation, such as watching television, movie going, and telephone conversing than did normal weight individuals.

Family environment is also believed to be a factor responsible for the development and perpetuation of obesity. Family eating habits have been held accountable for overweight children by some researchers. Burland, Samuel, and Yudkin (1974) claimed that "obesity is very much a family affair" (p. 112). His investigations demonstrated that spouses tend to share obesity. In reviewed studies, 15 percent of the husbands of obese women were found to be overweight. Whereas only 7.5 percent of the husbands of nonobese women were found to be overweight. One reason given for

spouses sharing obesity is the tendency for spouses to consume similar food intakes.

In addition, family beliefs and habits have been used as encouragement for obesity. Mead (1943) believes that changing eating patterns within the family becomes difficult when food has been closely associated with warmth, loving, and affectional ties. Further, equating leanness with an undesirable state of ill health has been a familial attitude which promotes overfeeding of children. Rewarding children who finish everything on their plates with dessert reinforces overeating with more calories. Finally, eating as entertainment rather than necessity contributes to the development and perpetuation of obesity (Burland, Samuel, & Yudkin, 1974).

Emotional and Psychological Explanations of Obesity

Psychoanalytic theorists emphasize that the cause of obesity is related to emotional aspects of food consumption. Bruch (1971) suggests that the nature of the mother-infant interaction may predispose a child to obesity. Bruch (1971) found that mothers of people who became obese had been unresponsive or had responded inappropriately to infant behavioral cues of hunger or satiety. These observations led Bruch to the conclusion:

> hunger awareness is not innate knowledge, but that it requires for its proper organization, early learning experiences which may be correct or incorrect, depending upon whether food is given in response to a child's signals of needing food (Bruch, 1971, p. 239).

Further, Bruch found that the mother's care of the child was related to obesity. She found that children who developed eating problems had been

given adequate physical care, but the care had been superimposed according to the mother's concepts, instead of being geared to clues given by the child. Consequently, Bruch proposed that as adults, obese individuals confuse eating as a response to hunger with the response to a variety of other states (Bruch, 1971; 1973). Thus, from the psychoanalytical perspective, it is hypothesized that obese persons have not learned to perceive hunger in response to the same signals as do normal weight people.

The issues surrounding emotional and psychological factors in obesity are confusing due to discordant data. On various psychological measures, a large proportion of obese persons have been classified as being depressed, stubborn, dependent, anxious, possessing body image problems, and other emotional disturbances (Bruch, 1971; Marshall & Neil, 1977; Mayer, 1968). In contrast, some other obese people had no measurable emotional problems, but only appeared to be in need of behavioral changes leading to a decrease in food intake and an increase in physical activity (Mahoney, 1978; Powers, 1980).

Further discordant data comes from Johnson, Swenson, and Gastineau (1976). These authors administered the Minnesota Multiphasic Personality Inventory (MMPI) to 116 obese subjects and compared their MMPI profiles to those 50,000 patients in a general medical clinic. Some statistical differences were detected, but there was no single personality characteristic of obese individuals. MMPI profiles did not predict success or failure in weight loss programs. Similarly, Weinberg, Mendelson, and Stunkard (1961) administered a battery of psychological tests and found no differences between the groups in levels of anxiety and dependency. In

the past, both anxiety and dependency levels have been believed to frequently typify profiles of obese individuals.

A hypothesis given for this inability to label psychological traits in many overweight people is that obesity serves as a shield from emotional conflict. In support of this hypothesis, it has been found that sometimes depression, anxiety, and occasionally psychosis occurs following weight loss (Powers, 1980; Stunkard, 1983). However, it is important to emphasize that causality should not be assumed. Also, Stunkard (1958; 1976) reported that the episodes of overeating occurred not only when depression was felt, but also in response to a wide variety of other negative emotional states: loneliness, anxiety, and periods of emotional turmoil. These psychiatric symptoms may represent psychological complications resulting from condemnation by family and society, and concurrent physiological alterations, rather than clusters of pre-existing emotional problems causing obesity. Darling and Summerskill (1953) proposed that alterations in body chemistry affect one's emotional state by generating feelings of insecurity, which in turn perpetuate the defeating cycle of overeating. The literature remains inconclusive in regard to emotional and psychological explanations in the development of obesity.

Genetic and Organic Explanations of Obesity

Advocates who propose genetic and organic explanations of obesity state that it has long been noticed that obesity tends to run in families. Stunkard (1980) reminds us that as far back as the 19th century, it was documented that most of the obese patients in treatment had at least one obese parent. In 1900, there was a similar observation by a physician and in the 1930's Rony found that over two-thirds of 250 obese patients in

Chicago had at least one obese parent. Such findings increase the possibility of genetic contributors to obesity.

Studies have been done that illustrate familial influences on obesity and suggest the likelihood of genetic explanation for obesity development. For example, Langone (1980) found that most of the Pima Indians of Arizona were grossly obese. He hypothesized that in times of food abundance, "thrift genes" allowed tribal members to store up calories as fat, which could later be used in time of famine. Today, the body of Pima Indians continue to hoard fat which explains their obesity. The studies that suggest genetic influences have received criticism for categorizing obesity as an "all or none" phenomenon. In other words, critics emphasize that along with common genes, family members often live in the same household. Thus, it is possible that the within family effect of obesity may be attributable to environment, or a combination of environment and genetic factors, rather than only to genetics.

Because of the many possible confounding environmental influences on obesity, it has been difficult to obtain a specific measurement of genetic contribution. Attempts to evaluate the contribution of genes to obesity have included large scale epidemiological studies, evaluation of somatotypes in families, the study of rare genetic diseases associated with obesity, twin studies, and adoptive studies.

Twin studies have provided support for the notion that genetics contributes to the emergence of obesity and its perpetuation.

> Twin studies have credited primary importance to genetic factors. Brook et al. reported heritability of .74 for 200 twin pairs in London, meaning that 74 percent of the variance in weight loss was accounted for by heredity. Also, Borjeson reported a heritability of .88 for Swedish twin pairs and

> unpublished results of Stunkard, Hrubec, and Rappaport yielded values of .78 and .77 for 4,000 twin pairs studied at an interval of 25 years (Stunkard, 1980, p. 29).

In contrast, adoption studies are not so easily interpreted because it is difficult to sort out environmental and biological contributions. Adoption studies are based on the logic that the resemblance of adopted children to their biological parents can be attributed only to genetic correlation, and the extent to which they are similar to their adoptive parents is a function of the environment. However, many adopted children have spent considerable time with their biological parents prior to adoption, or adoptive parents were selected who were similar to the biological parents. Also, some adoptions may involve a step-parent who is a blood relative to the biological parent of the child (Stunkard, 1980). These problems greatly affect the results of the adoption studies.

After consideration of currently available data, it is clear that genetics play a significant role in the development and perpetuation of obesity. Researchers agree that some types of obesity are the result of single genes, yet they caution that "genes are not destiny" (Stunkard, 1980). The problem of genetics versus environmental contribution to obesity needs to be approached with recognition of the polygenetic model and the various developmental stages in life. The source of individual genetic and environmental variation needs to be identified and their joint interaction documented throughout development.

Socioeconomic Explanations of Obesity

For the most part, the social and economic contributions to obesity have been largely ignored. Several researchers have stated that our

advancement in treatment will be impeded unless we understand these cultural reasons underlying food eating habits (Fleshman, 1973; Mead, 1943; Powers, 1980).

Advocates of socioeconomic explanations believe that weight control may be influenced by social network characteristics (Powers, 1980). The assumption is that non-nutritive meanings of food, food eating habits, and activity patterns are conveyed and passed along through social relationships and cultural norms (Fleshman, 1973; Powers, 1980). Further, Fleshman (1973) stated that food may be valued as a sacrament. For example, food is used in religious rituals, felt to be a sensation for esthetic pleasure, viewed as healthy or therapeutic, or is affiliated with status.

Society has passed through periods which differed greatly regarding acceptable weights. Throughout the 19th century, plump figures of men and especially women were acclaimed. This trend continued during the 1920's which is sometimes referred to as the "Age of Corpulence" in America. With the end of World War I, Americans began to emphasize exaggerated slimness. The 1950's and 1960's perpetuated the notion that thin was fashionable. Models such as Twiggy epitomized the "shapeless" figure. For the millions who cannot attain this form, a continuous battle rages, which often leads to self-belittlement.

People who possess undesirable traits or characteristics, which may be labeled as handicaps or weaknesses, are stigmatized in the American society (Kalisch, 1972). Rodin (1978) believes that obese individuals have been devalued by society and by themselves. Multiple negative attributes such as "unhealthy," "weak," "emotionally disturbed," "diseased," "immature," "suspicious," "neurotic," and "impulsive" are words used to describe many deviant or minority groups and of obese individuals

(Kaplan, Cassel, & Gore, 1977). Unlike minority groups, obese individuals have a further stigmatization because many people perceive obese individuals as having control and responsibility for their excess weight. People with this misperception believe that obese individuals can control their eating, but they are unwilling to do so.

At a very early age, overweight persons internalize society's negative view of obesity. Obese individuals may feel inadequate about themselves and other overweight individuals (Stunkard, 1976; Stunkard & Mendelson, 1967). The two most common effects of this internalizing process are: constant attention to weight, and perceptions of a derogatory body image. Most obese persons incorporate the enormous pressures to be thin into a persistent concern with dieting (Brownell, 1982; Stunkard, 1976). In addition, many overweight people have what Stunkard and Mendelson (1967) labeled "body image disparagement." This refers to a person perceiving his or her body to be detestable, unattractive, and repulsive to others. Stunkard (1976) noted the persistence of these feelings even when a person loses weight. These feelings were more prevalent among childhood-onset obese persons.

Burland, Samuel, and Yudkin (1974) reported that the prevalence of obesity varies with social class. It was found that there was twice the occurrence of obesity among persons of lower socioeconomic status versus people of higher socioeconomic status. Stunkard (1980) confirmed this striking correlation between obesity and socioeconomic status. A sample of 1660 persons from mid-town Manhattan showed that obesity was seven times more common in the lowest socioeconomic class than in the highest. Furthermore, Burland, Samuel, and Yudkin (1974) found this difference was especially noticeable with women. Also, it was found that within

urban communities in the United States and Britain, obesity was most common among middle-aged working class women, and far less common among younger women (Burland, Samuel, & Yudkin, 1974). Among those from the upper social classes, regardless of their age, obesity was less prevalent. While most people tend to add weight as they grow older, it appears that the social classes differ in regard to the knowledge and commitment to do something about it. Most people in the upper social class manage to control weight gain that accompanies increasing age (Burland, Samuel, & Yudkin, 1974).

Researchers are continuing to search for further information that can help explain the causes of obesity. By learning more about the possible causes of obesity, it can be hoped that the treatment of obesity will become more effective at weight loss and weight maintenance.

Treatment of obesity

The literature on obesity contains various approaches for the treatment of obesity. These approaches are: medical, dietary, psychoanalytic, behavioral, and multidisciplinary. The following is a summary of the related literature on treatment approaches designed to promote weight loss.

Medical Treatments For Obesity

There are several procedures used in the medical treatment in obesity. Medical treatment includes: suppressing caloric intake through the use of drug therapy, jejunoileal bypass surgery, jaw wiring, or gastric bypass surgery. Medical treatment also plays a part in treating obesity related problems, such as diabetes mellitus, hypertension, atherosclerosis,

hernia, gall bladder disease, liver disease, degenerative joint disease, and hyperuricemia.

After the discovery of the anorectic effect of sympathomimeticamines in the 1930's, a tremendous market arose for drugs that affected appetite enough to be used as a medical treatment of obesity. Many and varied studies on the "diet pills" have indicated that the drugs are relatively impotent. Mann (1974) pointed out the ineffectiveness and danger of the anorectic drugs. It is important to recognize that these drugs have the potential for drug dependence and abuse. Despite these negative effects, the market still exists and practitioners refuse to heed warnings of the limited usefulness of diet pills in the treatment of obesity.

Another medical treatment for obesity is the jejunoileal bypass surgery. This is regarded by many authorities as a hazardous choice. A major portion of the small bowel is bypassed. This produces intestinal malabsorption of ingested food and diarrhea by reducing the absorptive surface of the bowel. Because of the lessening caloric absorption, patients do lose weight, but a plateau is reached. Eventually, this procedure leads to hypertrophying of the small bowel, which causes a diminishing of the malabsorption and weight loss (Powers, 1980).

Jaw wiring is another medical procedure used in the treatment of obesity. The goal of jaw wiring is to reduce food intake. The teeth are wired together as in the standard treatment for a fractured jaw (Fordyce, Garrow, Kark, & Stalley, 1979). Two studies reported favorable short-term weight loss after the jaw wiring (Rodgers, Burnet, & Goss, 1977; Wood, 1977). However, long-term follow-up reports showed that the majority of individuals gain weight within three months of having the wires removed (Fordyce, Garrow, Kark, & Stalley, 1979).

Gastric bypass surgery is another available medical procedure for obesity treatment. This consists of a complete division of a small pouch in the stomach from the remainder of the stomach, which is then joined to the second portion of the small intestine (Mason & Ito, 1969). This procedure does not interfere with absorption and digestion; thus, it is better tolerated than the jejunoileal bypass surgery. Patients who undergo gastric bypass surgery show initial weight losses and continue to show weight loss after at least two years (Fordyce, Garrow, Kark, & Stalley, 1979). However, certain health risks are involved in any surgical procedure.

All of the various medical approaches result in weight loss. Unfortunately, these procedures have serious side-effects and health risks (e.g., at times death can occur as a result of surgery). In spite of their ability to cause weight loss, these procedures fail at maintaining weight, except for gastric bypass surgery. It is hoped that increased medical technology will result in safer and more successful treatments for long-term weight maintenance.

Dietary Approach to Treatment of Obesity

There are many fad diets available to the consumer. Fad diets are adopted quickly and they usually are without scientific evidence of their effectiveness. They exhibit two common features: elaborate promises of success and an understatement of the rigors involved in the diet.

Fad diets usually result in rapid weight loss, but then end in weight gain after the diet has ended. Most people do not remain on such diets long enough to lose many pounds of fat. A substantial portion of the initial weight lost with the use of fad diets is water. As soon as individuals return to a more regular food intake, their bodies rehydrate (retain water) and

they are discouraged to see that only a few real pounds were lost. Then old eating habits that promoted and sustained the overweight condition are resumed and the few pounds lost are quickly regained (Stunkard, 1980).

Protein-sparing fasts are recommended in many cases where weight loss is the primary medical intervention for certain medical conditions. For example, patients with arterial hypertension, hyperlipemia, diabetes mellitus, orthopedic problems, and a body weight at least 20 percent greater than the calculated ideal weight are placed on protein-sparing fasts (Wadden, Stunkard, & Brownell, 1983). The diet is basically a food fast that is supplemented by small amounts of lean meat, fish, or chicken as sources of protein. Some programs use powdered supplements, for protein in place of the real foods. Patients are also given vitamin and mineral supplements and some programs include small amounts of carbohydrate to prevent severe ketosis. Patients are seen by a physician for a thorough examination and then are monitored at least every other week by the physician during the program.

The protein-sparing diet has impressive results. Some patients lose as much as 8-10 pounds the first week (Wadden, Stunkard, & Brownell, 1983). Many patients report absence of hunger while on the diet. Despite the promising results at weight loss, maintenance of weight is difficult to attain with this diet. The few studies that have examined long-term results show high relapse rates (Wadden, Stunkard, & Brownell, 1983).

Psychoanalytical Approach to Treatment of Obesity

According to the psychoanalytical approach, obesity represents a complex set of psychological and social problems. Obesity is viewed as being symptomatic of emotional conflicts. Psychoanalysts believe that

individuals' emotional states are responsible for obesity. Thus, in order to treat obesity, psychoanalysts explore emotional states of the individuals. Psychoanalysts also search for points of origin and factors that appear to perpetuate the obese condition. Most psychoanalysts believe that weight loss and maintenance can only occur when the "emotional needs" are exposed and resolved. Rand (1978) has shown that weight loss has been associated with therapeutic attention to emotional conflicts. Also, Rand (1978) reviewed longitudinal studies finding that weight losses, resulting from psychoanalytic treatment, have been maintained for long periods of time for many patients. Advocates of this approach believe that psychoanalysis functions as an indirect treatment for obesity by addressing its underlying emotional conflicts.

Psychoanalytic theory has also focused on the role of group process in the treatment of obesity. Bruch (1971) believes group process to be important since the group setting can address possible psychoanalytic concepts, lend support, and save clients time and money. Certainly some of the oldest and most successful obesity treatments provide some group therapy and group support. For example, Take Off Pounds Sensibly (TOPS) and Weight Watchers have long acknowledged the positive association between group meetings and successful weight loss.

Criticism from professionals operating from different treatment approaches focuses on the length of time involved in the psychoanalytic weight loss process and the amount of money spent by the client in treatment. However, psychoanalytically oriented therapists believe that only by taking this time to explore underlying issues can hidden emotional conflicts be resolved. Then, and only then, is gradual weight loss possible.

Behavioral Approach to Treatment of Obesity

Many reviews of the behavioral literature concerning the treatment of obesity have been published (Abrams, 1984; Hall and Hall, 1974; Jeffery, Wing, & Stunkard, 1978; Leon, 1976; Stunkard and Mahoney, 1976; Wooley, Wooley, & Dyrenforth, 1979). Behavior modification can be described as a mixture of Pavlovian conditioning, operant conditioning, and common sense (Burland, Samuel, & Yudkin, 1974). The focus of treatment is specifically on the individual. The therapist carefully observes and records the client's behavior. Then, a therapeutic procedure involving positive and negative reinforcement for the desired and undesired behavior is developed.

The major assumption in the behavioral treatment of obesity is that excess food consumption resulting from faulty eating habits is the cause of the overweight condition. Behaviorists hypothesize that learned behaviors contribute to being overweight by working as operants. These operants are reinforced by the pleasure of eating. Such learned behaviors are believed to be under the control of environmental cues associated with eating, which then serve as discriminative stimuli for eating behavior (Wooley, Wooley, & Dyrenforth, 1979). This view of the interplay between learned behaviors and response to environmental cues suggests that obese individuals need to adopt different eating styles or lifestyles, in order to limit those cues and thus alter food consumption.

The initial development of behavioral techniques was derived from the learning theory approach of Ferster, Nurnberger, and Levitt (1962). These authors reported on an operant method of developing self-control of eating behavior. Their procedure was based on the theory that lengthening the chain of responses leading to food intake will weaken the tendency to start that chain.

Based on the approach of Ferster, Nurnberger, and Levitt (1962), Stuart (1967) developed a behavioral treatment program for overeating. This program required the individual to monitor the quantity of food and drink intake and the circumstances in which the consumption occurred. The individual was required to record body weight at specific periods each day, determine activities that were positively reinforcing with respect to food intake, and record weight related fears, such as developing cardiovascular disease. In addition, a step-by-step behavioral curriculum was established to modify eating patterns. Step one required that the person interrupt his/her meal for predetermined periods of time and sit without eating. The interruption in the meal enabled the individual to experience control over the process of eating behavior. Step two required that the person remove food from all places in the house other than the kitchen and keep in the house only those foods which require preparation. In step three, the person is instructed to eat without performing any other activity. The individual in step four is instructed to put a small amount of food in his/her mouth and to replace the utensils on the table until he/she has swallowed. In step five, the person is instructed to engage in a high probability behavior at times when he/she would normally eat Step six involves relaxation training and having the individual imagine an aversive event while eating.

Stuart (1967) reported therapeutic success with his behavior modification techniques. His results indicated greater weight loss and reduced attrition rates compared to studies using other treatment approaches when the duration of treatment was the same.

After Stuart's (1967) work, a massive amount of research and clinical interest in the behavioral treatment of obesity emerged from the

psychological and medical fields. Many modifications to the original treatment programs have been tested (Stunkard & Brownell, 1979). After Stuart's original uncontrolled study, researchers needed to determine the power of the intervention through comparisons to similar obese subjects experiencing other treatment approaches and subjects with no treatment at all. Harris (1969) compared two behavioral treatment groups to a no treatment control group. It was found that those subjects in the two behavioral groups lost more weight than those in the control group. Further, the behavioral group members continued to lose weight after the completion of the intervention.

The results from other studies were very encouraging in demonstrating the effectiveness of behavioral treatment. Stunkard (1972) declared that "Both greater weight loss during treatment and superior maintenance of weight loss after treatment indicate that behavior modification is more effective than previous methods of treatment for obesity" (p. 398). In a major review of treatment programs, Stunkard and Mahoney (1976) concluded that despite some variability in outcome,"In an unprecedently short time (behavioral techniques) have been shown to be superior to all other treatment modalities for managing mild to moderate obesity" (p. 54). Consistent with the results of Stunkard and Mahoney's (1976) investigation, Kingsley and Wilson (1977) found that behavioral treatments produce significantly greater initial weight reduction than nonbehavioral comparison treatment methods. A review of current behavioral therapies shows there is an average weight loss of about 12 pounds (Wing & Jeffery, 1979).

Further support for the effectiveness of behavioral treatment came from research by Wollerscheim (1970) and Penick and associates (Penick,

Filion, Fox, & Stunkard, 1971). Both studies compared behavioral programs to other treatment approaches. Wollerscheim's (1970) subjects in behavior therapy lost more weight at posttreatment and at two months follow-up than subjects in either a self-help or placebo group. Also, subjects in the no treatment control group gained weight during the course of the research. Penick and associates (1971) tested the power of behavior therapy by comparing a behavior therapy program delivered by beginners against a traditional weight treatment program delivered by experts. In two groups of subjects, the overall effectiveness of the behavioral program delivered by inexperienced therapists was superior to a traditional weight control program (Penick, Filion, Fox, & Stunkard, 1971).

Foreyt, Scott, and Gotto (1982) provided additional support for the efficacy of behavioral interventions. The authors combined the results from 11 published studies with pre-, post-, and follow-up data. The pooled data represent 501 participants receiving behavior therapy, 157 receiving nonbehavioral supportive counseling, and 74 no treatment controls. The weighted means for the behavior modification groups were 174 pounds pretreatment, 167 pounds after eight weeks of treatment, and 167 pounds after 18 weeks of follow-up. In contrast, the other treatment group had a mean pretest weight of 172 pounds, a mean weight of 170 pounds after 12 weeks of treatment, and a mean weight of 174 pounds after a 28 week follow-up. The control group had a mean weight of 159 pounds at pretreatment, and means of 159 pounds and 156 pounds at 9 and 13 weeks of follow-up. The control group had a combined dropout rate of 43 percent. Based on this sample of the treatment literature, behavioral treatments produced greater sustained weight loss than nonbehavioral treatments.

In spite of its success, an evaluation of behavioral treatments had led Stunkard and Brownell to suggest that it would be erroneous to conclude that the evidence overwhelmingly supports the use of behavioral treatment as the treatment of choice (Stunkard & Brownell, 1979). A comparative outcome evaluation of 145 outpatient weight loss studies involving diet, drug, behavior, and exercise interventions by Wing and Jeffery (1979) provides a broad overview of current weight treatment outcomes. These authors reported that a group of 284 waiting list no treatment controls lost an average 1.1 pounds pooled across 23 studies, while 82 attention placebo controls in 9 studies lost an average of 6.1 pounds. Diet, drug, behavioral, and exercise interventions were all found to produce mean weight losses of 15 to 20 pounds. Behavior therapy and anorectic drugs were the most often used intervention strategies and each produced a rate of weight loss of approximately a pound per week. These researchers found that better than average weight loss was reported in those studies of longer duration, with an average correlation of 0.71 between weight loss and program duration.

In addition, evaluations of the effectiveness of behavioral techniques in the treatment of obesity have been less favorable because the superiority of behavior therapy is not maintained over follow-up. In a review of 16 behavioral programs with 12 month follow-up sessions, Foreyt, Goodrick, and Gotto (1981) found that for the year following treatment, the average rate of weight loss was zero and the maintenance was highly variable with mean weight losses at follow-up sessions ranging from 1 to 27 pounds. In addition, several studies (Gotestam, 1979; Graham, Taylor, Hovell, & Siegel, 1983) with longer follow-up periods of three to five years have revealed that the majority of participants experienced significant

relapses toward their pretreatment weight. Thus, the conclusion drawn by Stunkard and Penick in 1979 still holds true today: "The tendency for patients to regain weight they have lost in treatment may well be the most important problem facing behavior therapy for obesity" (p.801).

In conclusion, behavior modification methods have generally been shown to be among the most effective means of promoting weight loss among the mildly to moderately obese (Hirsch, 1977; Leon, 1976; Stuart, 1975; Stunkard, 1975). Behavioral weight control programs are associated with in-treatment weight losses, averaging about one pound per week (Wing & Jeffery, 1979). After treatment, most individuals do not continue to lose substantial amounts of weight (Jeffery, Wing, & Stunkard, 1978). Further, many people regain much of the weight they lost in treatment (Gotestam, 1979; Graham, Taylor, Hovell, & Siegel, 1983). This deterioration in rate of weight loss and occurrence of weight gain after treatment suggests that the behavioral changes obtained during treatment are not maintained. To support this statement, individuals report a decrease in the use of behavioral techniques and a deterioration of behavior changes during follow-up periods (Jeffery, Vender, & Wing, 1978; Foreyt, Goodrick, & Gotto, 1981).

Multidisciplinary Approaches to Treatment of Obesity

The catalyst for a multidisciplinary approach stems from the low statistical success rate of the unidimensional weight loss programs. From the available follow-up studies, it appears that only 8% of obese patients seen in traditional nutrition clinics maintained satisfactory weight loss (Blackburn & Greenburg, 1978). Multidisciplinary therapists have tried to

raise the success rate of weight loss treatment and maintenance by including environmental, medical, and etiological factors in their programs.

When dealing with obesity, multidisciplinary approaches (Blackburn & Greenburg, 1978) feature individualized behavior modification specifically designed for each person. The treatment design generally includes medical and nutritional education, exercise, and experiential training. However, different combinations of the various available treatment methods also fall into the multidisciplinary category.

At the center of the multidisciplinary models lies the behaviorist's assumption that readjustment of lifestyle is necessary in order to decrease fat mass (Blackburn & Greenburg, 1978). Also prevalent among the multidisciplinary model is the belief that environmental cues influence the obese individual's control over eating and that substitution behaviors need to be developed (Schachter, 1971; Stuart, 1967).

Because of the brief history of the multidisciplinary approach, its statistical comparison with other treatment modalities is limited. As our understanding of obesity increases and more factors are recognized as contributing to the development and perpetuation of obesity, the treatment of obesity will become more effective.

Problems with the Various Treatment Approaches

All of the current treatment approaches described earlier in this paper have two common problems (Stunkard, 1983). They include dropping out of treatment and failure of maintaining the weight lost during treatment. Attrition for general medical treatments can be as high as 80%, the dropout rate from the self-help and commercial groups is in the range of 50%-80%

(Stunkard, 1975; Wilson & Brownell, 1980), and the mean dropout rate for behavioral treatment is 16% (Wing & Jeffery, 1979).

The issue of dropout is of primary importance. If individuals do not remain in a program they cannot derive any benefits from the program. The usefulness of any program depends in part on the number of persons it attracts and the number of persons that complete the program (Wilson & Brownell, 1980). Attrition reduces the chances of successful weight loss. Also, attrition may reduce the likelihood of further attempts at weight reduction by promoting an attitude of resignation to being overweight. One of the reasons why people dropout of treatment programs is the development of emotional disturbances. Complaints of anxiety, preoccupation with food, irritability, and depression have often been reported by individuals (Halmi, Stunkard, & Mason, 1980; Stunkard & McLaren-Hume, 1959).

Weight Maintenance Strategies

As stated earlier, the second common problem in the treatment of obesity is the failure at maintaining weight loss after treatment termination. Research in the development of effective maintenance strategies is only beginning.

The most common weight loss maintenance strategy has been the use of booster sessions after the termination of weight loss programs. Booster sessions are prearranged to occur at fixed intervals to ensure the continued use of the self-regulatory strategies the individual acquired during treatment. The rationale for booster sessions is based on the notion that additional weight loss meetings scheduled during the follow-up period could increase adherence to techniques learned in treatment (Perri,

Shapiro, Ludwig, & McAdoo, 1984). Kingsley and Wilson (1977) did the first comparative investigation of the potential advantages of incorporating regularly scheduled booster sessions into a comprehensive behavioral treatment program. They found that booster sessions following the termination of an 8-week therapy program facilitated the maintenance of weight loss. In contrast, others (Ashby & Wilson, 1977; Beneke & Paulsen, 1979; Hall, Hall, Borden, & Hanson, 1975) have found no differences between groups treated with or without booster sessions. Thus, the evidence is mixed. However, the data suggests that simply providing booster sessions following treatment termination will not suffice to maintain weight loss on a long-term basis.

Relapse prevention training has been included in some weight loss programs as a way to enhance weight maintenance. Relapse refers to a breakdown or failure in a person's attempt to change or modify any target behavior. Relapse prevention is a cognitive behavioral strategy for preventing relapse in the addictive disorders that has been incorporated into weight control treatments (Marlatt, 1984).

Advocates of relapse prevention recognize that even people who have successfully lost weight will begin to deviate from therapeutic prescriptions after termination of the treatment. Sometimes after treatment, a person may exceed a prescribed calorie goal or may deviate from the techniques taught in treatment. Whether this slip becomes the start of a full blown relapse (i.e., return to previous patterns of overeating) or a cue for the re-entry of treatment may depend in part on the way the individual interprets the violation of posttreatment adherence to a program for control of weight gain. In other words, it may not be the violations per se that will determine subsequent behavior, but the meaning

that the person attaches to them. For example, obese persons who occasionally eat too much might decide that since they have "blown" the treatment program for that day. Then, they decide that they might as well overindulge for the remainder of the day and return to the treatment program the next day. It is a common negative reaction for the individual to interpret the slip as evidence confirming that he or she is a failure at self-control (Perri, Shapiro, Ludwig, McAdoo, 1984). Previous treatment success is discounted as insignificant. As a result, the individual may experience a sense of helplessness, continue to overeat, and not return to the behavioral changes acquired in treatment (Wilson, 1984).

The degree to which the individual will be able to resist these negative cognitive reactions to posttreatment setbacks in adhering to a controlled behavioral routine will depend in part on expectations of self-efficacy. As proposed by Bandura (1977b), efficacy expectations are the convictions that one can cope successfully with given situations. Self-efficacy theory holds that efficacy expectations will determine whether coping behavior will be initiated, what effort will be expended, and how confident one will be in continuing to cope in the face of the inevitable pressures and problems that are encountered by the individual struggling to control weight. The individual who, as a result of treatment, has strong self-efficacy expectations about coping with high risk situations is more likely to overcome the potentially destructive consequences of a posttreatment violations. Thus, one aim of any maintenance program should be to increase self-efficacy expectations surrounding an individual's ability to resist the urge to engage in undesirable eating behaviors.

Marlatt (1980) has developed a manual on relapse prevention which describes the process underlying relapse and strategies for decreasing the

probability that relapse will occur. A schematic diagram of the relapse model is shown in Figure 1. Marlatt's description of the model is as follows:

> The model proposes that the probability of relapse will increase in a high risk situation if the individual fails to cope adequately with the problem. Failure to cope effectively leads to decreased self-efficacy in which the person feels less capable of dealing with forthcoming events. If the subsequent situation involves the availability of the taboo substance (e.g., alcohol), the probability increases that a relapse will occur, especially if the individual harbors positive outcome expectancies for the effects of the substance or activity. Should a lapse occur under these conditions, the individual will experience a pronounced cognitive-affective reaction that we call the Abstinence Violation Effect (AVE). The AVE is characterized by two components: a sense of conflict and guilt (cognitive dissonance) associated with the transgression of the abstinence rule, and a tendency to attribute the lapse to personal failure (lack of willpower, etc.). This combination of guilt and self-blame increases the probability that the lapse will escalate into a full-blown relapse (Marlatt, 1980, p.30 from "The Addictive Disorders" by K. D. Brownell in C. M. Franks et al. (Eds.), Annual Review of Behavior Therapy, New York: Guilford Press, 1984).

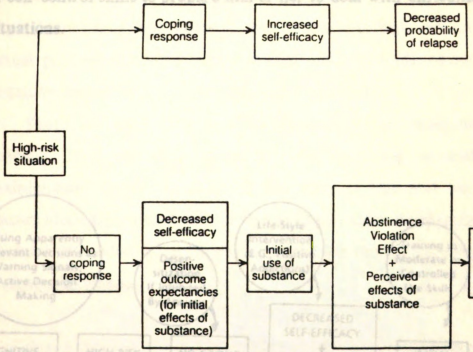

FIGURE 1

A schematic representation of the cognitive-behavioral model of the relapse process. (From "The Addictive Disorders" by K. D. Brownell in C. M. Franks et al. (Eds.), Annual Review of Behavior Therapy, New York: Guilford Press, 1984)

Marlatt and his colleagues (1980) take the model even further in proposing specific areas for intervention and specific interventions for each area of the cognitive-behavioral process of relapse. Figure 2, from

Cummings, Gordon, and Marlatt (1980) shows the point of intervention for the prevention of relapse. The model predicts that an individual may be a candidate for relapse prevention training if there are deficits in any of the steps in the chain. Thus, the treatment bolsters the individual's repertoire of self-control skills to prepare him or her to deal with difficulties in many situations.

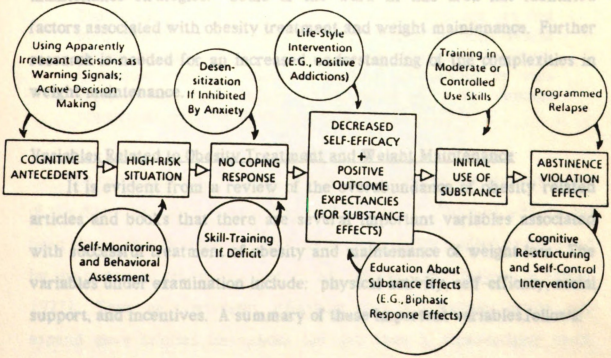

FIGURE 2

Points of relapse for each stage in the process of relapse. (From "The Addictive Disorders" by K. D. Brownell in C. M. Franks et al. (Eds.), Annual Review of Behavior Therapy, New York: Guilford Press, 1984)

Marlatt and Gordon (1980) recommended that several specific strategies be incorporated during treatment to prevent or minimize relapse following treatment. The maintenance package they suggested includes the following procedures: (a) identification of situations that are high risk for slips, (b) training in problem solving to deal with high-risk situations, (c) actual practice in coping with potential slips, and (d) development of cognitive coping techniques for negotiating setbacks.

There has been little research done on weight maintenance. The research that has been done has not produced successful weight maintenance strategies. Some of the work in this area has identified factors associated with obesity treatment and weight maintenance. Further research is needed for an increased understanding of the complexities in weight maintenance.

Variables Related to Obesity Treatment and Weight Maintenance

It is evident from a review of the overabundance of obesity related articles and books that there are several important variables associated with successful treatment of obesity and maintenance of weight loss. The variables under examination include: physical activity, self-efficacy, social support, and incentives. A summary of these important variables follows:

Physical Activity

Low levels of energy expenditure are typical of obese individuals. Mayer (1968) among others have indicated that this physical inactivity is a major factor in the development and perpetuation of obesity. Thus, exercise programs have been proposed in the treatment of obesity. There

are several reasons for emphasizing increased physical activity to control weight. Exercise not only increases caloric expenditure and the metabolism of fat, but it also decreases appetite, aids in the conditioning of one's body, and generally promotes a sense of psychological well-being (Bjorntorp, 1976; Horton, 1974). Because of these benefits, one important maintenance strategy is to engage individuals in exercise.

Physical activity facilitates weight reduction through an increased caloric expenditure (Gwinup, 1975; Lewis, Haskell, Wood, Manoogian, Bailey, & Pereira, 1976). Therefore, weight loss can be achieved without drastic reduction in caloric intake.

> The caloric cost of activity, although varying with age, sex and body weight, increases in direct proportion to the body weight during physical activity, therefore suggesting that the obese individual expends twice the number of calories as does someone else half his/her weight involved in an identical physical expenditure (Allen & Quigley, 1974, p. 437).

The relationship of physical activity to changes in the metabolic rate of the dieter has been identified as very important. Physical activity has been shown to accelerate a slowed metabolism which is often exacerbated by the restricted caloric intake of dieting (Mayer, 1968; Scheuer & Tipton, 1977). Thus, an overweight individual who is physically active may expend more calories throughout the day than a nonexercising obese counterpart, because the exercise maintains a higher basal metabolic rate (Stunkard, 1980). Researchers have acknowledged that the effect of physical activity on metabolism is an almost instantaneous rise in the basal metabolic rate which, in turn, helps in burning more calories. Allen and Quigley (1974) stated that the resting metabolic rate has been found to raise 25% above basal level for up to 15 hours after strenuous activity.

Many researchers have also suggested that elevated activity over an extended period of time will affect the metabolic rate on a long-term basis, providing a means for increased caloric expenditure. In addition, Allen and Quigley (1974) found that with physical activity, not only was there an increase in the specific dynamic action of food (i.e., the amount of energy expended in the ingestion and digestion of food), but also that the postexercise metabolic rate was increased.

One of the frequent misconceptions regarding the relationship of physical activity to appetite is that increased exercise will invariably result in an increased appetite. However, research suggests that this is not necessarily the case. Intricate physiological mechanisms act to balance food intake with energy expenditure, but research with both animals and humans suggests that these mechanisms only work adequately within normal ranges of physical activity (Mayer, 1968). It appears that animals require certain critical levels of activity for normal regulation of the intricately operating appetite regulatory mechanisms. Farmers have long been aware of the fact that animals will not restrict their food intake to balance extremely low levels of activity. Thus, farmers curtail the activity of animals they wish to fatten for market, which is a practice known as penning or cooping. For humans, it has been shown that at a truly sedentary level, food intake may actually increase slightly (Mayer, 1968). A change in activity patterns, such as from a sedentary level to a moderately active level, will not necessarily stimulate appetite so the benefit of added energy expenditure is cancelled. Instead, increased activity may in fact contribute to a reduction in food intake.

Additional support comes from Garrow (1974), Lewis, et al. (1976), and Stunkard (1980) who showed that when regular participation in

exercise programs was achieved by obese individuals their appetites tended to stabilize. This resulted in fewer calories consumed per day.

Another effect of physical activity, particularly in reference to repeated exercise sessions, has been found. It seems that an increase in lean body mass occurs concomitant with a decrease in fat cell size, thereby altering the body's ratio of muscle to fat (Powers, 1980). Allen and Quigley (1974) concluded that physical activity seems to assure less loss of muscle mass than occurs when people diet and experience a negative nitrogen balance. When one eats fewer calories than the body needs to function, the energy must be obtained from somewhere. Much of the energy comes from fat, but some also comes from the body's muscle stores. This muscle is also called "lean body mass." One can reduce the loss of muscle by having adequate protein, carbohydrate, vitamins, and minerals in the diet, but some muscle is almost always lost. It is unhealthy to lose muscle; thus, the goal is to lose as much fat as possible. This is where exercise is important because exercise can help minimize the loss of muscle when one is reducing and can increase the amount of muscle one adds if one regains weight. This is important for the long-term picture because many people gain and lose many times. When most people regain weight after they lose weight, they regain more rapidly than their body can replace the muscle that was lost. This means that the body becomes more fat and less muscle, even if weight does not change. Furthermore, less lean tissue and more body fat are lost when exercise and diet are combined than when diet restrictions are used alone (Sjostrom & Bjorntorp, 1974; Stunkard, 1980; Watson & O'Donovan, 1977).

Another important aspect of incorporating physical activity in the treatment of obesity are the psychological benefits of regular physical

exercise. Goodrick (1978) found that aerobic exercise has a more positive effect on the client's self-concept than dietary control. Aerobic training gives the client an opportunity to develop in a positive direction and to achieve cardiovascular fitness. The sense of achievement and the lifestyle changes stemming from an aerobic fitness program can help the client develop a new, more positive self-concept. The change to a more positive self-concept may be the crucial factor in helping the client maintain an appropriate caloric intake. Hanson and Nedde (1974) studied changes in self-concept in a group of eight adult nonobese women before and after eight months of physical conditioning. After the conditioning, self-satisfaction and self-acceptance increased and there was improvement in the perception of physical self, adequacy in social interactions, and overall levels of self-esteem and self-confidence.

In spite of its appeal, the effectiveness of regular exercise to weight loss has been evaluated in only a few studies. Research that has been done has shown the potential effect of physical activity on fat loss. Gwinup (1975) treated obese women using only aerobic walking. After one year, average weight loss was about 22 pounds among those who continued to do 1-2 hours of aerobic exercise daily. Miller and Sims (1980) treated obese patients using diet modification and one hour of daily exercise. The most successful patients, representing the top third in terms of weight loss one year after treatment, averaged a loss of 58 pounds. These studies seem to show that aerobic exercise of about one hour daily, 5 to 6 times each week, can produce lasting fat losses that are significantly greater than the average long-term losses obtained using dietary behavior modification alone.

Harris and Halbauer (1973) compared a behavioral program designed to change eating habits to the same program combined with exercise instructions. Weight losses for the two groups did not differ after 12 weeks of treatment, but the exercise group showed greater weight losses at the 7 month follow-up. Moreover, Miller and Sims (1980) found that exercise was one of the few factors that predicted long-term maintenance of the relatively large weight losses they obtained in their residential treatment program. Dahlkoetter, Callahan, and Linton (1979) also used exercise as an experimental variable and found that a combination of eating habit changes and exercise was more effective than either alone.

Further evidence supporting the relationship between physical activity and successful weight loss and maintenance was found in a study by Stalonas, Johnson, and Christ (1978). The effects of exercise and other components were evaluated on several follow-up occasions. Significant weight loss was observed for all groups at program termination and the 3-month follow-up. They found that only individuals who exercised and used contingency management maintained weight loss after one year.

Exercise has become a very popular activity to promote. Most obesity programs report on the importance of exercise. There are many reasons for the promotion of physical activity in obesity treatment and weight maintenance. The notion that exercise is important is recognized, but there is great variability in how exercise should be applied to weight loss and maintenance programs. Further, there is difficulty in motivation individuals to engage in physical activity. The compliance rates for a high level of physical activity have been generally low.

Self-Efficacy

Once a program is over, therapist support and external reinforcement are no longer available. The individual must take responsibility for initiating and sustaining change appropriate habits in order for weight to be maintained after the treatment program (Kanfer, 1979). Thus, individuals need to develop the motivation and self-regulation necessary to maintain changes made in treatment. Self-efficacy is the key component in this model of behavioral self-regulation process. Bandura (1977a) conceptualized that a person's expectations of efficacy represent a cognitive construct necessary for sustained behavioral change. Bandura's (1977a) theory of self-efficacy postulates that expectations of how well one can organize and execute courses of action necessary to deal effectively with prospective situations will determine the magnitude of effort expended. In other words, individual levels of self-efficacy determine how hard a person will try to perform a task in the face of ambiguity and obstacles. Therefore, the greater the perceived self-efficacy convictions, the more active the individual's efforts will be to cope with a given situation. Self-efficacy judgment differs conceptually from outcome expectancy, which has been defined as a person's belief that a given set of behaviors will lead to a certain outcome. Outcome expectancy, unlike self-efficacy expectancy, does not address the individual's perception of his/her ability to perform specific behaviors (Condiotte & Lichtenstein, 1981).

Bandura and his associates have demonstrated that people's self-efficacy expectancies have important effects on their thought patterns, the emotional arousal they experience, and their behavior (Bandura, 1977a; Bandura & Schunk, 1981). Persons with a low sense of self-efficacy for certain behaviors tend to avoid situations which are difficult for them. For

example, individuals who have never been able to lose weight might avoid subsequent attempts to manage their weight. Also, individuals successful in managing their weight may avoid situations which would put their success in jeopardy. Based on the self-efficacy theory, one aspect of a weight maintenance program is to increase self-efficacy expectations surrounding an individual's ability to resist the urge to eat.

A personal sense of self-efficacy is based on an integration of several sources of information (Bandura, Adam, & Beyer, 1977; Schunk & Carbonari, 1984). Individual performance is the most reliable indicator of self-efficacy level. Continual successes in a situation or task promotes a sense of confidence and ability, whereas continual failure leads to a sense of helplessness or hopelessness. Vicarious learning is another way that knowledge about one's abilities is provided. Therefore, a person can learn about his/her capabilities and limitations by watching the activities of others. The likelihood that the model's successes will be seen as potential successes for the observer is increased when there is greater perceived similarity between the individual and the model observed. Finally, physiological changes can provide feedback of success or failure about a plan of action. For example, when cravings for sweets diminish, one's level of self-efficacy is increased because this change represents success.

Many overweight individuals have a long history of attempts to control their weight. The long history is indicative of many failures and usually a sense of hopelessness about one's ability to be successful. It is important that weight programs address the issue of self-efficacy to help the individual face the countless daily cues associated with food consumption. Promoting self-efficacy provides motivation to attempt new

weight control efforts and the confidence necessary to resume these efforts in the face of temporary setbacks and failures.

There has been some debate about the self-efficacy model proposed by Bandura (1977a). Much of the debate is focused on the distinction between efficacy expectations and outcome expectations. Critics stated that self-efficacy theory is conceptually problematic and, in particular, that the central concept of efficacy expectations is not unambiguously differentiated from outcome expectations, despite Bandura's (1978) claim that these are relatively distinct entities. Also, critics have suggested that what is actually being assessed in the empirical studies is unclear (Eastman & Marzillier, 1984). Other areas of debate focus on the theoretical and the methodological levels with the self-efficacy theory (Marzillier & Eastman, 1984) In addition, Eysenck (1978) questioned conceptual and methodological issues raised by the self-efficacy theory. The conceptual issues include the interrelationships of self-efficacy and other constructs such as competence, incentives, and cognitive appraisal to which it has been related and the interdependence of efficacy and outcome expectations. The assessment issues addressed whether the method of measuring self-efficacy contributes to the correlations obtained between expectations and performance and the need to validate self-efficacy measures. For a complete discussion of the current controversy, interested readers can refer to the first volume of Advances in Behavior Research and Therapy (1979) in which two-thirds of the issue is devoted to a critique of the theory. Currently, there is no resolution to the quarrel. In spite of this, both critics and advocates of the model recognize the importance of the construct in the integration of cognition and behavior (Eastman & Marzillier, 1984).

After reviewing the research literature on self-efficacy and health behavior, O'Leary (1985) concluded that perceived self-efficacy plays a consistent mediating role in the effectiveness of therapeutic interventions. Drawing from research on smoking cessation, weight control, pain management, and cardiac rehabilitation, O'Leary (1985) stated that enhancing self-percepts of efficacy is important in health related interventions.

Few studies have applied self-efficacy theory to the problem of obesity and weight control. Chambliss and Murray (1979) administered a placebo medication to participants of a weight program by stating that the medication was a metabolic stimulant. After two weeks, the researchers manipulated self-efficacy by telling some participants that the medication was inert. They encouraged participants to attribute their successful weight loss to their own efforts to change. Posttreatment results showed that for those participants with an internal locus of control, attributions of self-efficacy increased the participants' ability for weight control. In another study, participants were assessed to determine pre-existing levels of self-efficacy. Following the assessment, they were divided into high and low self-efficacy groups (Weinberg, Hughes, Critelli, England, & Jackson, 1984). All participants were tested to assess their exercise self-control. They were given false feedback which related to the degree of exercise self-efficacy. The results of the study indicated that pre-existing self-efficacy was significantly related to weight loss. Those individuals with higher initial self-efficacy lost more weight. In addition, individuals given high self-efficacy feedback lost more weight than those given low self-efficacy feedback.

The research reviewed on the role of self-efficacy in mediating behavior change is in agreement insofar as the construct seems useful in explaining outcome. However, the research findings are unclear as to the role that self-efficacy plays in obtaining these outcomes. Differences in treatment populations and the type of program has made it difficult to compare the various studies. At this point, a reasonable conclusion might be that in behavioral treatments, there is a positive relationship between self-efficacy and successful weight loss.

Social Support

Social support acts to enhance the effect of the treatment and often contributes to an increased maintenance of weight loss at follow-up (Wilson & Brownell, 1978). Many treatment programs have made efforts to mobilize family, friends, and coworkers to support program participants (e.g., Brownell, Heckerman, Westlake, Hayes, & Monti, 1978; Hickey, Friedman, Harper, Foreyt, & Bornstein, 1985; Wilson & Brownell, 1978). There have also been efforts to create support groups for participants at the conclusion of programs (Levine & Sorenson, 1984).

The rationale for social support is based on the view that successful weight loss and maintenance requires constant vigilance and the willingness to reinstate self-regulatory procedures when faulty behaviors occur (i.e., eating restricted food). Eating is responsive to social influence; thus, support from family, friends, and fellow workers may help the obese person adhere to the rigors of a weight loss program.

The literature has emphasized that a person's family network may be of importance in the treatment of obesity. Mahoney (1978) found a positive association between an individual's success and an index of

his/her supportive relationships. Thus, the greater the support, the greater the success. Kingsley and Wilson (1977) suggest that continued self-management of weight loss requires social support from significant others (e.g., friends and family who also value staying healthy via exercise). Further, Powers (1980) implied that interactions between family members during mealtimes may be symptomatic of emotional and underlying family psychopathology. The use of food to maintain control over family members can have long-term detrimental effects.

As stated above, social support from significant others can aid in the battle of obesity and maintenance of weight loss. Thus, spouse involvement has been examined by researchers. Some studies found that including the spouses of obese individuals in behavioral programs resulted in superior weight loss and maintenance of weight loss. Brownell, Heckerman, Westlake, Hayes, and Monti (1978), for example, demonstrated that the inclusion of spouses in the standard behavioral treatment program produced significantly greater weight loss at 3- and 6-month follow-up evaluations than treatments in which spouses did not participate. In their couples training program, spouses learned to monitor their partners' behavior, to model prescribed eating habits and set a good example, and to assist their obese partners in coping with high-risk situations by engaging them in activities that were incompatible with eating. Subjects in couples training (spouse present) treatment showed an average weight loss of nearly 30 pounds 8.5 months after the beginning of treatment. The magnitude of weight loss was considerably larger than usual, with nearly one-third occurring during the 6-month maintenance phase. This suggests that spouse training may facilitate both weight loss and long-term maintenance. Pearce, LeBow, and Orchard (1981) compared a couples

training group to a behavioral program for wives alone, an alternative nonbehavioral treatment, and a delayed treatment control group. As in the Brownell, Heckerman, Westlake, Hayes, and Monti (1978) study, results at posttreatment indicated that the behavioral groups were more effective than the control groups, but that they did not differ significantly from each other. At 3-, 6-, 9-, and 12-month follow-ups, however, the couples training group was significantly superior to the wives alone group in weight loss. Women in the couples training group not only maintained weight loss, but even lost more weight after treatment termination. Some other spouse involvement programs have also shown better weight losses, both at posttreatment (Rosenthal, Allen, & Winter, 1980) and particularly at follow-up (Fremouw & Zitter, 1979; Pearce, LeBow & Orchard, 1981).

In studies comparing group versus individual therapies, it has also been demonstrated that support from others enhances weight loss and maintenance. Kingsley and Wilson (1977) randomly assigned subjects to conditions in which they received a behavioral program in small groups or in individual sessions with trained counselors. The two approaches did not differ in weight loss at the end of an initial treatment phase. However, during a one year follow-up period, the subjects assigned to small groups were superior in maintenance. It is possible that group cohesiveness may encourage adherence to weight reducing strategies and serve to support continued interest in weight loss.

Self-help groups and commercial groups provide other forms of social influences that can be used to promote weight loss and maintenance. The effects of these groups range from scandalous to safe. Some professionals do not look favorably on these groups. This is due in part to lack of knowledge about these groups, the absence of scientific evaluation of most

groups, and a general distrust of money making enterprises for weight loss (Brownell & Foreyt, 1985).

A detailed view of self-help and commercial groups will not be given here. If further information is desired, readers are referred to Stuart and Mitchell (1980), Stunkard and Brownell (1979), and Colletti and Brownell (1982). These reviews have shown that the major shortcomings of these groups is attrition. Between 50% and 80% of enrollees dropout of these groups within 6 weeks. The average person who joins Weight Watchers has joined three times before. For those who remain in the program, weight losses are usually moderate.

Some studies have found that different forms of social support are beneficial in weight loss treatment and maintenance. However, other studies have failed to replicate these promising findings (Brownell & Stunkard, 1981; Dubbert & Wilson, 1984). The inconsistency in outcome among similar studies using the same interventions remains to be explained.

Incentives

The importance of incentives in facilitating behavior change and increasing program participation has been documented in several studies. In a review of 145 obesity outpatient studies, Wing and Jeffery (1979) concluded that external reinforcements are an important part of the treatment program. Programs that encourage individuals to lose weight by providing external support, as in frequent therapist contact, social pressure or monetary incentives, generally are more successful.

It has been found that requiring individuals to pay for weight loss programs has an affect on their weight loss. Stanton (1976) assigned

patients seeking a hypnotic treatment for weight control to one of two groups. Both groups were given the same audiotaped presentation. One group paid for the treatment while the other did not. All ten members of the fee paying group lost at least 14 pounds whereas only five members of the free group were as successful.

The findings of several research studies indicate the power of behavioral contracting in modifying health related behavior. Certain authors (Harris & Brunner, 1971) have reported somewhat successful attempts at controlling obesity with contractual procedures. The objective of a contract is to reach a verbal or written agreement with the client concerning problem areas that need the most immediate attention. The rationale for contracting is that an agreement between therapist and client increases the likelihood of client involvement and cooperation in the treatment effort. In addition, through a mutual focusing on one problem area at a time, it is possible to maximize the efficiency and speed with which behavior modification is initiated.

A review by Shepard and Pearlman (1983) indicated that programs which incorporate behavioral contracts typically produce results superior to those without contracts. An experimental study conducted with volunteer subjects confirmed this finding (Coehlo, 1983). Available evidence indicates that the effects of behavioral contracts are highly specific. That is , if the contract specifies weight loss, then weight loss will be achieved. If it stipulates the completion of food diaries, then food diaries will be completed (Hagen, Foreyt, & Durham, 1976). Further, Fisher and associates found that contracts result in behavioral changes even in the absence of detailed instruction in self-management techniques (Fisher, Levenkron, Lowe, Loro, & Green, 1982).

The most common method to facilitate behavior change has been through deposit contracts. The use of deposit contracts has been explored in the context of a variety of behavior modification programs, including weight control (Rozensky & Bellack, 1976), smoking cessation (Lando, 1977), and exercise (Epstein, Wing, Thompson, & Griffin, 1980). In weight management programs, the client deposits a fixed amount with the therapist. Then, the typical deposit contract is a written document drawn up between a therapist and client, which stipulates that a given portion of the fee will be returned to the client when a predetermined target weight is reached. Often there are also time constraints specified in the contract. A contract might require the loss of a pound and a half every week or the maintenance of current weight for five weeks.

Abrahms and Allen (1974) compared behavior therapy and social pressure to a similar group who also had a monetary deposit contract for weight loss. Weight loss was enhanced through the use of the monetary incentive procedure. Further support comes from minimal intervention studies that demonstrated the effectiveness of incentives in behavioral weight management programs (Black & Friesen, 1983; Brownell, Cohen, Stunkard, Felix, & Cooley, 1984; Castro & Rachlin, 1980; Colvin, 1979; Colvin, Zopf, & Myers, 1983). In each of these programs, the amount of information provided to the participants varied, although actual therapist contact was minimal. The duration of the studies ranged from 5 to 38 weeks with mean weight losses of 5 to 15 pounds. All but one study cited above incorporated some sort of monetary incentive procedure, usually a refundable deposit contract. The single study which did not use monetary incentives, relied on social support and pressure at the work site to maintain participant motivation (Colvin, 1979).

A meta-analysis of 97 studies found significantly lower attrition rates in those studies incorporating the use of deposit contracts (Eufemia & Wesolowski, 1985). In fact, there appears to be a linear relationship between the effectiveness of the contracting procedure and the amount of money on deposit: larger monetary deposits are associated with better program performance (Fisher, Lowe, Levenkron, & Newman, 1982; Hagen, Foreyt, & Durham, 1976; Jeffery, Thompson, & Wing, 1978). Coates and associates found a significant correlation between weight loss and the amount of money deposited for contractual refund (Coates, Jeffery, Slinkard, Killen, & Danaher, 1982).

Although many studies support the efficacy of behavioral contracts, there is at least one report where participants did not perceive contingency contracts as helpful. Fisher and associates reported that participants in a smoking cessation program rated the helpfulness of contingency contracts ninth out of eleven procedures, although there were clear outcome differences related to contract adherence (Fisher, Lowe, Levenkron, & Newman, 1982).

Considerable evidence exists which suggests that monetary incentives and contracts increase the effectiveness of weight loss programs. However, little research has been reported comparing the various types of incentive procedures which can be used with contracts. Each of the four principal schedules of reinforcement (i.e., continuous positive reinforcement, response cost, interval schedule of reinforcement, and ratio schedule of reinforcement) can be applied to contingency contracts (Epstein & Wing, 1984). However, the most common procedure used with contingency contracts in weight loss is continuous positive reinforcement (Epstein & Wing, 1984). When a continuous positive reinforcement is used with a

contingency contract, the individual is rewarded a portion of the deposit each time he/she is successful in meeting the criteria defined in the contract. The refund can be contingent on weight loss, program attendance, or a specific behavior change. According to learning theory, this procedure encourages rapid acquisition of the target behavior, although satiation and rapid extinction are also likely (Reese, 1966). In practical terms, this suggests that with continuous positive reinforcement, participants would initially show a high degree of adherence to program requirements, which over time would diminish. Few behavioral changes would be expected to be maintained at the conclusion of the program.

Response cost has also been used with contingency contracts in the treatment of obesity. This method is based on aversion techniques (Weiner, 1962). With this method, the participant loses money each time he/she does not comply with the conditions of the contract. In effect, each time the participant fails to lose weight according to the agreement, they are fined and a portion of their deposit is lost. A review of the use of response cost attendance contracts in weight management programs has illustrated the superiority of these procedures over no contract control groups (Epstein & Wing, 1984).

There is little research that supports a clear decision as to the effectiveness of response cost compared to continuous reinforcement. In support of its use, Kazdin (1972) found that response cost procedures were superior to reinforcement in the modification of speech disfluencies. In contrast, a study by Sindelar and associates of distractable children in a tutorial setting did not report any significant differences (Sindelar, Honsaker, & Jenkins, 1982). Aragona, Cassady, and Drabman (1974) compared response cost procedures with a combination of response cost

and reinforcement in the treatment of 15 obese children. Although there was no difference between the two experimental groups, both lost more weight than the control group. The similarity of outcomes between the two groups may have resulted from treatment contamination, since parents in the response cost condition were reported to have spontaneously reinforced their daughters' weight loss. This created conditions similar to the response cost reinforcement contract of the other parents.

Both response cost and continuous reinforcement as described earlier, rely on a payoff which is predictable. However, according to basic learning theory, the use of unpredictable payoff intervals elicit higher response rates of behaviors, which are more stable over time (Reese, 1966). The results of variable interval and variable ratio learning trials with animals have provided the basis for the theory. The attraction for many people of gambling and games of chance illustrates the power of the unpredictable payoffs.

The use of unpredictable payoff schedules, such as lotteries, has been well documented in the employee health promotion literature as a way of promoting behavior change and reducing absenteeism (Fisher, Lowe, Levenkron, & Newman, 1982; Washington Business Group on Health, 1986). However, behavioral research providing controlled evaluation of the strategy is limited (Epstein, Wing, Thompson, & Griffin, 1980; Foxx & Schaeffer, 1981; Iwata, Bailey, Brown, Foshee, & Alpern, 1976; Muir & Milan, 1982; Nord, 1969; Osborne, Powers, & Anderson, 1974; Pedalino & Gamboa, 1974). Very few of these studies have investigated the use of lotteries in the modification of health related behaviors. Five of the seven studies listed involved a simple comparison of a lottery reinforcement procedure to a no treatment control. In all cases, the lottery reinforcement

increased the incidence of the desired response and was uniformly viewed as favorable by the participants. The two studies which compared lottery procedures to the more traditional continuous reinforcement procedures reported that the lottery was at least as effective as reinforcement in producing behavioral change (Epstein, Wing, Thompson, & Griffin, 1980; Osborne, Powers, & Anderson, 1974).

Mavis (1987) assessed the relative efficacy of four monetary contingency conditions: continuous monetary positive reinforcement, monetary response cost, monetary positive reinforcement with a lottery system, and a monetary response cost with a lottery system. Using the lottery system, participants either received (continuous monetary positive reinforcement) or lost (monetary response cost), a lottery ticket rather than a sum of money. At the end of the program, the lottery tickets were pooled, then prizes were drawn from the pool of all lottery tickets. A no incentive control group was used to test the effectiveness of the program without any incentive scheme. Also, an attendance contingent group was used to test for differences associated with the specific contingencies. In the attendance contingent condition, the group members received monetary reinforcement for attending the program meetings. Mavis (1987) found that there was no consistent evidence that differences in weight loss exist with respect to the four weight contingent incentive groups. Thus, the two contingency conditions using the lottery system did not differ from the two contingency conditions without the lottery system. He also found that there was less variability in the weight loss attained for the four weight contingent incentive groups compared to the no incentive group. The mean weight loss for the no incentive group was smaller than those attained by the other groups; however, the test statistic was not

significant. Mavis (1987) stated that one reason for nonsignificant test statistic may have been the large within group variance which acts to obscure between group differences. Thus, he concluded that there was a difference in weight loss between the four weight contingent incentive groups and the attendance contingent and no incentive groups.

Chapter Summary

From the background literature reviewed, several conclusions can be drawn:

1. Obesity is a complex problem with many contributing factors which makes treatment difficult.

2. Most forms of treatment are effective at producing weight loss. However, behavioral treatment is superior in terms of weight maintenance as compared to other treatment approaches.

3. Chronic problems plaguing obesity treatment include high levels of attrition and failure to maintain weight loss. Improving program adherence is one of the primary goals in the effort to enhance treatment effects. Another important issue in the treatment of obesity is to prevent weight lost in treatment to be regained.

4. The use of external reinforcers and incentives to increase individual motivation has proven effective in promoting program attendance and weight loss.

5. Important objectives for treatment programs are providing awareness of faulty behaviors, increasing the strength of clients' self-efficacy levels, increasing social support, and increasing physical activity levels. These factors are thought to facilitate the maintenance of behavioral changes beyond the confines of treatment.

CHAPTER III
METHOD

Subjects. Maintenance group participants were recruited from a 12 week weight loss program, which was conducted by Mavis (1987). The 120 participants for Mavis' weight loss program were volunteers solicited from the community via local newspaper advertisements. Individuals who were either diabetic, pregnant, or under treatment for hypertension were excluded from the weight loss program. Participants were asked to sign a waiver to this effect. A physician was available at the initial sessions of the weight loss program for consultation. Individuals who completed the weight loss program were given the opportunity to participate in the maintenance groups. There were 45 individuals who chose to participate in this study of weight maintenance. Of the 45 participants, there were 6 men and 39 women. The mean age of the weight maintenance participants was 44.1 years, with 15.5 mean years of education. The mean beginning weight of the 45 participants was 209.7 pounds. Mean beginning weight was calculated in two steps. First, for each participant a mean value was determined by using their weight at the end of the 12 week weight loss program and their weight at the first session of the weight maintenance program. Then, these 45 values were used to calculate the mean beginning weight of the 45 participants. Table 1 summarizes this data on the 45 participants. The 45 participants were 35% overweight at the start of the maintenance program. Thus they were obese since they were more than 20% overweight as defined by the height/weight standard table. The percentage overweight for the participants is shown in Appendix E.

There were 21 participants who did not dropout of the weight maintenance program. A dropout was defined as any participant who did not attend the last program session or make alternative arrangements for weigh in at the end of the program. Of the 21 participants, there were 2 men and 19 women. The mean age of those completing the weight maintenance program was 44.2 years, with 15.6 mean years of education. The mean beginning weight of the 21 participants was 195.3 pounds. Table 2 summarizes this data on the 21 participants.

Table 1

Sex and Age by Group for 45 Participants

		SEX			CHOSE TO SIGN
GROUP	N	MALES	FEMALES	MEAN AGE	CONTRACT
1	23	3	20	43.0	13
2	22	3	19	45.2	***

Group 1 - Weight contingent Monetary Incentive Contract

Group 2 - No Incentive

*** No choice given for incentive contract due to group assignment.

Table 2

Sex and Age by Group for 21 Participants

		SEX		
GROUP	N	MALES	FEMALES	MEAN AGE
1	12	1	11	43.8
2	9	1	8	44.8

Group 1 - Weight contingent Monetary Incentive Contract
Group 2 - No Incentive

Therapists. All of the groups were led by the author, who is a female clinical psychology graduate student and a male counseling psychology graduate student.

Design. There were two maintenance groups. The weight contingent monetary incentive group met on Monday nights and the no incentive control group met on Wednesday nights. These groups received identical program content throughout the 6 months. Table 3 shows the experimental design. Participants were randomly assigned to one of the two maintenance groups, after two preferences were considered. First, it should be noted that each of the natural groups (i.e., couples, friends, carpoolers, etc.) occurring in the pool of subjects was treated as one subject when assigning them to a group. For example, three subjects who carpooled together were all assigned to the same group. This was for the convenience of the subjects. Second, subjects were asked about their preference for the day that sessions met. These preferences were taken into account when assigning participants to the groups. For instance, if a subject indicated that Monday night sessions could not be attended, then

the subject was assigned to the Wednesday night group. When subjects indicated their preferences for day of meetings, the subjects did not know that the two days differed with respect to incentive versus no incentive procedures.

This present weight maintenance study started with 45 individuals who were recruited from a 12 week weight loss program. There were 22 participants in the no incentive group and 23 in the weight contingent monetary incentive group. However, participants of the weight contingent monetary incentive group were given the choice to sign the weight contingent deposit contract making them eligible for a chance to win money back. The participants were given the choice to refuse because this was considered to be a substantial financial burden for some participants. After the participants made their decisions, there were 12 individuals who chose to be in the weight contingent monetary incentive group. The participants of the incentive group deposited $50.00 and signed a weight maintenance contract. A sample contract is included in Appendix A. The individuals who were originally assigned to the incentive group, but chose not to sign the contract, attended sessions with the participants who paid the deposit. The data from those participants assigned to the incentive group, but who decided not to sign the contract, were not included in the data analyses (N = 5). The no incentive participants did not pay for the program and did not receive any monetary incentives.

Table 3

Experimental Design

Session	Program Content	Monday Night Session Monetary Incentives	Wednesday Night No Incentives
1	Self-Monitoring	X	X
4,8	Behavioral Contracting	X	X
1-8*	Group Discussions	X	X
2,3,5,6	Informational Lectures	X	X
----	Structured Social Events		
7	Diet Potluck Dinner	X	X
1-8*	Exercise as a Group	X	X
4	Problem Solving	X	X
6	Group Brain Storming	X	X

* performed on a voluntary basis.

Procedure. This study was conducted during early June through mid-November and consisted of eight sessions over a period of six months. The author and a male graduate student served as program leaders for each of the two maintenance groups, so each subject was seen by the same leaders throughout the duration of the study.

Subject Recruitment. All of the maintenance participants had taken part in a behavioral weight loss program (Mavis, 1987) that consisted of 10 sessions over a period of 12 weeks. The program included basic principles of nutrition education and behavior modification. Each participant was required to deposit $40.00 with the program and the amount was matched by the researcher. By meeting behavioral objectives (i.e., reach the

determined weight loss goal each week), each participant had a chance to win back money, except for the no incentive group. The amount of money that the individual won varied among the five different payoff groups. The payoff schedules used were: (1) continuous reinforcement where money was returned to participants at each program checkpoint if compliance with the criterion had been met; (2) in response cost a given sum of money was placed in each participant's account at the beginning of the program. If noncompliance with the program requirement occurred, either nonattendance or not reaching the weight criteria, a portion of the money in the account was lost; (3) continuous reinforcement using a lottery procedure was similar to that described under (1), but instead of money participants received a lottery ticket for a chance at winning a monetary prize from the pooled money from deposits and researcher matched funds. At the termination of the weight loss program, all lottery tickets received were placed in a pot and a drawing was made at the last session; (4) response cost with a lottery system which was similar to (2), except that the participants lost a lottery ticket rather than a sum of money; (5) this was a control condition in which program participants received a given amount of money only for attending the sessions. The sixth condition was a no incentive control group which received the program with no incentive system. The no incentive group did not pay for the program and did not receive any monetary incentives. However, all groups received the same behavioral weight loss program.

Maintenance Program Orientation. The leaders of the maintenance program attended the last meeting of Mavis' weight loss program, in order to explain the overall weight maintenance program. The participants were

asked to sign up if they wished to be involved in the maintenance program and asked about their preference for the day of meetings.

Organizational Meeting. Two weeks after the final session of the weight loss program, the maintenance program leaders held an organizational meeting in order to have informed consent forms signed by each participant. A brief talk stressing the importance of attendance at each of the eight sessions was given by the author. The leaders asked that if the subject could not attend a session that he/she call the leaders at least one hour before the scheduled meeting. Each participant was asked to confirm their willingness to participate, asked their preference for day of meetings, and if they would be attending the sessions with anyone. After this information was collected, participants were randomly assigned to the two groups with preferences of session day and natural occurring groups taken into consideration.

In addition, participants were asked if they would like to volunteer to make phone calls to other group members before each meeting. Those who volunteered were asked to sign up on a sheet of paper. Then, all participants were given a form to complete as to their permission to be on the volunteers' phoning list. This form also asked the participants' consent to release their phone number. The leaders encouraged all participants to call other group members and engage in activities outside of the meetings (e.g., get together for walks, meet for lunch, to talk, etc.).

Money Collection Procedures. Each participant in the incentive group paid $50.00, with personal checks made out to Michigan State University. The author deposited this money into a special research account with the university.

Program Outline

Session 1. Two weeks after the organizational meeting, the two groups met separately for the beginning of the weight maintenance program. See Table 4 Program Outline for a description of the session's program content.

Session 2. Two weeks after the first session, the two groups met for the second session of the weight maintenance program. See Table 4 Program Outline for a description of the session's program content.

Session 3. Two weeks after the second session, the two groups met for the third session of the weight maintenance program. See Table 4 Program Outline for a description of the session's program content.

Session 4. Three weeks after the third session, the two groups met for the fourth session of the weight maintenance program. See Table 4 Program Outline for a description of the session's program content.

Session 5. Three weeks after the fourth session, the two groups met for the fifth session of the weight maintenance program. See Table 4 Program Outline for a description of the session's program content.

Session 6. Four weeks after the fifth session, the two groups met for the sixth session of the weight maintenance program. See Table 4 Program Outline for a description of the session's program content.

Session 7. Five weeks after the sixth session, the two groups met for the seventh session of the weight maintenance program. See Table 4 Program Outline for a description of the session's program content.

Session 8. Three weeks after the seventh session, the two groups met for the eighth and final session of the weight maintenance program. See Table 4 Program Outline for a description of the session's program content.

Table 4

Program Outline

Week 1 -12	Behavioral Weight Loss Program
interval 2 weeks	
	Organizational Meeting for Maintenance Program Ask for Volunteers to do Phoning
interval 2 weeks	
Session 1	Conceptualization Training of the Maintenance Program Discuss the Importance of Self-Monitoring and Distribute Self-Monitoring Sheets Organize Phoning Volunteers Explain that Group Walks After Each Session Will Be Available For Those Interested Pre-Measures Completed

Table 4 (cont'd)

interval 2 weeks	
Session 2	Collect Self-Monitoring Charts Guest Lecturer on Exercise Group Walk With Lecturer For Those Interested
interval 2 weeks	
Session 3	Continuation of Guest Lecturer on Exercise Group Walk With Lecturer For Those Interested
interval 3 weeks	
Session 4	Problem Solving Behavioral Contracting-Goal Setting Mid-Measures Given Out So Participants Can Complete Questionnaires At Home Group Walk For Those Interested
interval 3 weeks	
Session 5	Guest Nutritionist Lecturing on Diet Foods Collect Questionnaires Group Walk For Those Interested
interval 4 weeks	
Session 6	Stress Management Discussion Group Brain Storming Group Walk For Those Interested
interval 5 weeks	

Table 4 (cont'd)

Session 7	Dieter's Potluck Dinner Share Recipes Group Walk For Those Interested
interval 3 weeks	
Session 8	Check on Behavioral Contracts Group Discussion Debriefing Post-Measures Completed Three Prizes Drawn From All Lottery Tickets

Assessment Procedures

Pretreatment. During the organizational meeting held two weeks before the first maintenance session, participants were asked to fill out the informed consent forms. Then each participant was weighed individually after removing his/her shoes, outdoor clothing and any heavy jewelry. The Fairbanks (FN - 42) scale was used throughout the study. The scale was located in the Human Performance Laboratory on the Michigan State University campus and the weight maintenance program was held in a small room adjacent to the laboratory. The complete program schedule was explained to all participants. See Table 4 Program Outline.

During Treatment. Each participant was individually weighed at the beginning of every session. For the incentive group, participants' weight was recorded on their contracts which they signed. The program leader kept the contracts so participants did not take them with them. For the no incentive group, weight was recorded on a the program leader's data sheet.

Most participants in both groups wrote their weight down on their own paper they brought with them to each session. Attendance was taken at each session for both groups.

During the course of the six month program, all participant completed various questionnaires. At the first maintenance session, participants were asked to fill out the eating behavior and physical activity questionnaire, social support questionnaire, and self-efficacy scale. At the fourth session, participants completed the self-efficacy scale, social support questionnaire, eating behavior and physical activity questionnaire, and group support scale. Then at the last session, participants filled out the self-efficacy scale, social support questionnaire, eating behavior and physical activity questionnaire, group support scale, and program evaluation questionnaire. See Table 5 for a time table indicating the administration of the various measures throughout the study.

Table 5

Scheduling of Measures

QUESTIONNAIRE	1ST SESSION	4TH SESSION	8TH (LAST) SESSION
Self-Efficacy	X	X	X
Social Support	X	X	X
Eating Behavior and Physical Activity	X	X	X
Group Support		X	X
Program Evaluation			X

NOTE: At each session attendance was taken and weight was measured.

Treatment Conditions. The maintenance program consisted of eight sessions over a six month period. The two maintenance groups met on different evenings. The intervals in between sessions varied. It began with two weeks for a total of two times. Then the interval was three weeks for a total of two times. The interval between the fifth and sixth sessions was a four week interval. Because of a scheduling conflict, the interval between the sixth and seventh session was five weeks. Finally, the last interval was three weeks. See Table 4 for the program schedule.

Program Description.

In order to test for the effectiveness of the incentive procedure compared to a no incentive strategy, participants received the same weight maintenance program. The only difference between the two groups was the use of incentives.

The incentive group was required to deposit $50.00 and sign a weight maintenance contract. A sample contract is included in Appendix A. For the first three months of the maintenance program (sessions two through five), each participant received one lottery ticket for maintaining his/her weight. Maintenance was defined as not gaining more than one pound above the value of the weight recorded on the first session of the weight maintenance program. Thus, the weight recorded at the first maintenance session served as the baseline weight. Also, during sessions two through five each participant received one lottery ticket for losing the specified amount of weight (based on the weight loss program's weekly weight goal). For the last three months of the maintenance program (sessions six through eight), the lottery ticket system was different. The participants no longer received lottery tickets for losing weight. Instead, each participant

received two lottery tickets for maintaining his/her weight. It should be noted that participants did not receive any lottery tickets at the first maintenance session.

At the last session, each participant of the incentive group placed their lottery tickets into a pot. Three prizes were drawn from the pot. Three prizes were drawn from the pool of money collected from the monetary deposits collected from the participants in the monetary incentive group. The first prize equaled $400.00, second prize was $175.00, and third prize was $75.00.

Dependent Measures

Weight Maintenance. The goal of both maintenance groups was to be effective in helping the individual maintain his/her weight (or if the individual wished to continue to lose weight). Weight maintenance that was used for data analyses was defined as the difference between the total group's mean beginning weight and the total group's mean ending weight. Beginning weight was calculated by adding the weight of each individual at the end of Mavis' weight loss program to the weight at the maintenance organizational meeting (2 weeks before the first session of the weight maintenance program) and then dividing by 2. Beginning weight was defined this way because some participants missed the first maintenance session; thus, they did not have a weight recorded.

For the incentive group participants, weight maintenance was the criterion for success in obtaining a lottery ticket. Weight maintenance on the individual level, for the contract, was defined as not gaining more than one pound above the value of the weight recorded on the first session of the weight maintenance program. Therefore, weight maintenance for each

session was calculated as the difference between total weight on the day of the scheduled session (e.g., weight on the day of session four) and weight as determined at the first session. If the individual did not gain more than one pound above the weight recorded at the first maintenance session, a lottery ticket was awarded.

Social Support. The maintenance of weight is facilitated by supportive social environments. The social support questionnaire asked for the names of people who provide support to the participant. The Adult Social Support Questionnaire (ASSQ) (Bogat, Chin, Sabbath, & Schwartz, 1983) was used to assess social support. The ASSQ measures quantitative and qualitative aspects of adults' social support networks. There are 16 questions which are divided into four categories of social support in which people provide support to an individual. These components include: emotional support (e.g., "Who can you count on to comfort you when you are upset?"), companionship (e.g., "In an average week, who do you enjoy chatting with?"), practical assistance (e.g., "Who can you count on to take you someplace you need to go?"), and guidance and information (e.g., "Who can you rely on for information and advice about spiritual/religious matters?"). There are four questions within each of these four categories. For each question, the individual may list as many as 10 supporters. The relationships between supporters (e.g., co-workers, friend) were indicated. There is no published data on the reliability or validity of the ASSQ. For this study of weight maintenance, the questionnaire was tailored to address weight loss and maintenance issues. The number of reported nonrepeating social supporters was used for the analyses of this study. See Appendix B for a sample copy of this questionnaire.

Self-Efficacy. The behavior of a person is influenced by the person's belief in personal competence. Efficacy expectations determine the choice of activities that one attempts, the amount of effort expended, and the persistence to complete the activity at hand (Bandura, 1977). Self-efficacy with regards to eating restraint was assessed.

The self-efficacy scale used in this study was based on a Weight Loss Self-efficacy Measure developed by Van Koten Chappell (1982). The original measure was composed of 49 situations typically associated with eating, and asked individuals to rate the percentage probability that they could restrain from eating in each situation. The ratings of self-efficacy are determined using a certainty scale ranging in 10 unit intervals from 0% to 100%. Van Koten Chappell did not report any reliability or validity data for her measure.

Mavis (1987) shortened the original 49 items scale to reduce the response time needed to complete the questionnaire. A sample of 30 items from the original scale was used. Mavis found that as a result of analysis there are four self-efficacy clusters. Based on the definers of each cluster, Mavis interpreted them and obtained a test-retest reliability estimate of the self-efficacy measure: (1) emotional eating, reliability = .91; (2) situational eating, reliability = .71; (3) eating associated with social anxiety/emotional disequilibrium, reliability = .55; and (4) appetitive behaviors, reliability = .80.

In this present study, the thirty items that Mavis used were also used to measure perceptions of self-efficacy in terms of the ability to restrain from eating. The self-efficacy of an individual was calculated by obtaining the mean score of the 30 ratings responses See Appendix C for a sample copy of this questionnaire.

Eating Behavior and Physical Activity Questionnaire. Eating behavior and physical activity were assessed at three different times throughout the duration of the program. This questionnaire is a comprehensive measure about one's range of eating behavior and level of physical activity. The eating behavior of participants was not analyzed.

The number of reported weekly nonrepeating physical activities of participants was analyzed. The Eating Behavior and Physical Activity Questionnaire contains questions about one's number and types of physical activities, both daily and weekly. Physical activity, for purposes of this study, is defined as a means of expending calories represented by a wide range of possible activities: climbing stairs, cleaning house, walking, running, biking, etc. The number of reported weekly nonrepeating types of physical activities was used for the analyses of this study. The frequency of physical activity was not assessed. Thus, if the individual played tennis two times a week, it was recorded as one type of physical activity. See Appendix D for a sample copy of this questionnaire.

CHAPTER IV
RESULTS

The results of this study are reported in six sections. Each of the first five sections is related to one of the research hypotheses, while the sixth section is related to attrition. A probability level of .05 was used as the criterion for significance for each hypotheses tested. Statistical analyses were performed using the SYSTAT microcomputer statistical package on a Zenith PC computer. Only data based on randomly assigned participants were used for the comparative analyses.

The hypotheses refer to the effects of treatment outcomes; thus, all of the results are based on the data for those participants who did not dropout of the maintenance program. A dropout was defined as any participant who did not attend the last program session or make alternative arrangements for weigh-in at the end of the program. Although some participants chose not to dropout, they might have only elected to attend few of the program sessions. Also, some participants could not attend several sessions because of time conflicts with other activities.

Each of the hypotheses refers to the effects of treatment outcome based on weight contingent monetary incentive group versus the no incentive group. The participants who were assigned to the incentive group were given a choice of signing or not signing the contract (i.e., depositing $50.00 and participating in the weight contingent monetary incentive contract). The participants, who were originally assigned to the incentive group, but did not sign the contract, attended the program

sessions with those participants who signed the contract, but their data was not included in the data analyses.

Hypothesis 1: 1. The group getting the weight contingent monetary incentives using a lottery system will be more effective than the no incentive group in promoting weight maintenance, defined in terms of weight at the end of the weight maintenance program as compared to the beginning of the program.

Since the groups differed at the beginning of the maintenance program, Analysis of Covariance was used to statistically equate the two groups according to pretreatment weight. The means and standard deviations for pre- and post- weights are shown in Table 6. The means for weight over time by group are shown in Table 7. Individual weight over time for each of the 21 participants is shown in Table 8. Appendix F contains the individual weight over the 6 month maintenance program for each of the 45 participants. The Analysis of Covariance, in Table 9, indicated that the incentive did not have a statistically significant effect on the maintenance of weight ($F(1, 18) = 0.263$).

Table 6

Means and Standard Deviations for Pre- and Post- Weights

		PRE WEIGHT		POST WEIGHT	
GROUP	N	MEAN	ST. DEV.	MEAN	ST. DEV.
1	12	187.900	26.420	188.825	28.863
2	9	205.167	49.317	203.000	45.880

Group 1 - Weight contingent Monetary Incentive Contract

Group 2 - No Incentive

Table 7

Means for Weight Over Time by Group

	SESSION NUMBER							
GROUP	1	2	3	4	5	6	7	8
1	189.2	187.3	187.4	178.1	185.6	185.1	190.9	188.8
N =	10	12	11	9	10	8	10	12
2	205.2	203.4	209.5	205.6	188.0	193.8	191.9	203.0
N =	9	9	5	8	5	4	8	9

Group 1 - Weight contingent Monetary Incentive Contract

Group 2 - No Incentive

Table 8

Individual Weight Over Time by the Group for 21 Participants Used in Data Analyses

For Participants Assigned to Group 1, Agreed to Contract, Did Not Dropout:

SUBJECT & SEX		SESSION NUMBER 1	2	3	4	5	6	7	8	MEAN
1	F	170.7	167.9	171.3	168.5	172.2	169.1	170.3	171.0	163.8
2	F	176.8	177.0	177.4	178.4	179.4	------	192.2	193.0	182.0
3	F	226.9	225.4	224.0	------	------	------	231.9	227.2	227.1
4	F	187.9	189.1	------	186.1	183.4	182.7	181.9	183.6	185.0
5	F	211.5	206.9	206.6	208.5	200.7	------	------	203.3	206.3
6	F	187.5	185.2	184.6	184.1	184.2	186.7	187.3	185.7	185.7
7	F	183.2	181.0	182.7	------	185.6	187.6	187.9	189.4	185.3
8	M	230.4	229.2	230.9	------	231.2	238.3	243.6	245.4	235.6
9	F	------	217.9	217.5	215.4	215.2	211.7	205.7	205.0	212.6
10	F	------	156.9	156.4	153.6	153.2	154.4	------	155.3	155.0
11	F	161.9	157.9	157.4	155.0	------	------	158.2	157.2	157.9
12	F	154.6	152.6	152.7	152.9	150.9	150.1	149.8	149.8	151.7

For Participants Assigned to Group 2, Did Not Dropout:

SUBJECT & SEX		SESSION NUMBER 1	2	3	4	5	6	7	8	MEAN
1	F	246.2	241.6	242.3	238.4	235.8	241.6	241.6	246.0	241.7
2	F	-----	160.2	160.8	163.8	------	------	157.8	152.5	159.0
3	M	191.5	189.5	-----	------	------	194.1	193.4	191.8	192.1
4	F	146.5	144.0	------	143.9	144.2	145.1	148.3	146.5	145.5
5	F	295.5	292.2	------	290.3	-----	------	------	288.5	291.6
6	F	------	201.1	199.3	201.6	198.6	------	204.3	205.5	201.7
7	F	204.9	199.8	200.6	200.4	197.2	194.4	199.1	202.1	199.8
8	F	243.9	242.8	244.4	242.4	------	------	225.1	226.5	237.5
9	F	156.1	159.3	------	164.0	164.3	------	165.6	167.6	162.8

Table 9

Analysis of Covariance for Pre- and Post- Weight

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F	P
Treat	23.480	1	23.480	0.263	.615
Pre	24394.513	1	24394.513	272.861	.000
Error	1609.250	18	89.403		

Hypothesis 2. The group getting the weight contingent monetary incentive procedures using a lottery system will show higher attendance at the program than the group getting no incentives.

A one tailed *t*-test indicated that the difference in the mean attendance of the two groups was not statistically significant (t = 1.679, df = 19). Thus, there was no difference in program attendance between the two groups. Group comparisons based on the means and standard deviations are presented in Table 10. The distribution of attendance over time by group for the 21 participants is shown in Table 11. In Table 12, this same information is presented for all 45 participants.

Table 10

Means and Standard Deviations for Attendance

GROUP	N	MEAN	STANDARD DEVIATIONS
1	12	6.667	0.985
2	9	5.667	1.732

Group 1 - Weight contingent Monetary Incentive Contract

Group 2 - No Incentive

Table 11

Distribution of Attendance Over Time by Group for 21 Participants

	SESSION NUMBER							
GROUP	1	2	3	4	5	6	7	8
1	10	12	11	9	10	8	10	12
2	9	9	5	8	5	4	8	9
TOTAL	19	21	16	17	15	12	18	21

Group 1 - Weight contingent Monetary Incentive Contract

Group 2 - No Incentive

Table 12

Distribution of Attendance Over Time by Group for 45 Participants

	SESSION NUMBER							
GROUP	1	2	3	4	5	6	7	8
1	15	19	15	12	13	8	11	13
2	12	18	9	11	6	5	8	9
TOTAL	27	37	24	23	19	13	19	22

Group 1 - Weight contingent Monetary Incentive Contract

Group 2 - No Incentive

Hypothesis 3. The two groups will not differ with respect to the number of reported weekly types of physical activities.

Since the two groups differed at the beginning of the maintenance program, Analysis of Covariance was used to make the two groups statistically equate according to the number of reported pretreatment types of physical activities . Table 13 compares the two groups according to the means and standard deviations of pre- and post- reported number of weekly types of physical activity. The Analysis of Covariance, shown in Table 14, indicated that the incentive did not produce statistically significant different results on the reported number of weekly types of posttreatment physical activities ($F(1,18) = 3.668$).

Table 13

Means and Standard Deviations for Pre- and Post- Number of Reported Weekly Types of Physical Activities

		PRE PHYSICAL ACTIVITY		POST PHYSICAL ACTIVITY	
GROUP	N	MEAN	ST. DEV.	MEAN	ST. DEV.
1	12	1.500	0.905	2.167	1.030
2	9	3.000	1.118	1.778	1.202

Group 1 - Weight contingent Monetary Incentive Contract

Group 2 - No Incentive

Table 14

Analysis of Covariance for Pre- and Post- Physical Activities

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F	P
Treat	3.863	1	3.863	3.668	.071
PreAct	4.263	1	4.263	4.048	.059
Error	18.959	18	1.053		

Hypothesis 4. The two groups will not differ with respect to perceptions of self-efficacy relating to eating restraint.

Because the two groups differed at the beginning of the maintenance program, Analysis of Covariance was used to statistically equate them according to the pretreatment self-efficacy perceptions. Group comparisons based on the means and standard deviations are shown in Table 15. The Analysis of Covariance indicated that the incentive did not have a statistically significant effect on the posttreatment self-efficacy perceptions (F (1,18) = 1.869). Table 16 shows the Analysis of Covariance for pre- and post-perceptions of self-efficacy.

Table 15

Means and Standard Deviations for Pre- and Post- Perceptions of Self-Efficacy

		PRE SELF-EFFICACY		POST SELF-EFFICACY	
GROUP	N	MEAN	ST. DEV.	MEAN	ST. DEV.
1	12	50.300	20.525	46.483	19.288
2	9	55.700	11.757	58.022	12.961

Group 1 - Weight contingent Monetary Incentive Contract

Group 2 - No Incentive

Table 16

Analysis of Covariance for Pre- and Post- Perceptions of Self-Efficacy

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F	P
Treat	337.540	1	337.540	1.869	.188
Preself	2185.747	1	2185.747	12.104	.003
Error	3250.465	18	180.581		

Hypothesis 5. The two groups will not differ with respect to the number of reported social supporters.

An Analysis of Covariance was used to statistically equate the two groups according to the number of reported pretreatment social supporters, since the groups differed at the beginning of the maintenance program. See Table 17 for the means and standard deviations for pre- and post- reported number of social supporters. The Analysis of Covariance, shown in Table 18, indicated that the weight contingent monetary incentive did not produce statistically significant different results in the number of reported posttreatment social supporters ($F(1,18) = 2.630$).

Table 17

Means and Standard Deviations for Pre-and Post- Reported Number of Social Supporters

		PRE SOCIAL SUPPORTERS		POST SOCIAL SUPPORTERS	
GROUP	N	MEAN	ST. DEV.	MEAN	ST. DEV.
1	12	7.583	5.054	8.750	4.634
2	9	11.333	5.612	8.556	4.503

Group 1 - Weight contingent Monetary Incentive Contract

Group 2 - No Incentive

Table 18

Analysis of Covariance for Pre- and Post- Reported Number of Social Supporters

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F	P
Treat	28.532	1	28.532	2.630	.122
Presupp	203.213	1	203.213	18.733	.000
Error	195.259	18	10.848		

Attrition

The distribution of dropouts among the two groups is shown in Table 19. There were a total of 14 dropouts from both groups for an overall attrition rate of 31.1%. Table 20 shows the distribution of attrition over time by group for all 45 participants.

A Chi-square analysis was performed comparing the attrition of the two groups. Group comparsions based on Chi-square analysis are shown in Table 21. The Chi-square analysis indicated that there were significant variations from what would be expected if attrition and group membership were independent ($\chi^2 = 8.93$, $df = 1$, $p < .01$). The incentive group had a lower than expected attrition rate while the no incentive group had higher than expected rates of dropout. There was a difference in participation rates among the two groups. The high attrition rate for the no incentive group was not surprising.

Table 19

Participant Attrition Rates by Treatment Groups For Subjects Used In Data Analyses

Group	Assigned to Group	Signed Contract	Stayed In	Dropped Out	Did Not Sign Cntrt`	Stayed In *	Dropped Out
1	23	13	12 (92%)	1 (8%)	10	3 (30%)	7 (70%)
2	22	**	9 (41%)	13 (60%)			
TOTAL	45	13	21#(60%)	14 (40%)			

Group 1 - Weight contingent Monetary Incentive Contract
Group 2 - No Incentive

* Only data for those participants who signed the contract were analyzed.
** Not allowed to sign the contract
\# Based on N - 35, since Group 1 (N - 13) and Group 2 (N - 22).
` Cntrt refers to contract

Table 20

Distribution of Attrition Over Time by Group for All 45 Participants

	SESSION NUMBER								
GROUP	1	2	3	4	5	6	7	8	N
1	4	0	3	1	0	0	0	0	8
2	4	0	3	3	1	1	1	0	13
TOTAL	8	0	6	4	1	1	1	0	21

Group 1 - Weight contingent Monetary Incentive Contract
Group 2 - No Incentive

Table 21

Chi-square Analysis Comparing Groups by Attendance

		Attendance Status	
		Dropout	Stay In
Group	1 (Incentive)	1	12
	2 (No Incentive)	13	9
	Total	14	21
	N = 35		

Attendance Status (X^2 = 8.93, df = 1, $p < .01$)

CHAPTER V
DISCUSSION AND RECOMMENDATIONS

The discussion of this study is divided into three sections. The first section discusses the implications of this study's results. The next section examines the limitations of this study. This is followed by a section dealing with suggestions for future research.

Implications of the Results

According to the first hypothesis, participants in the weight contingent monetary incentive group should have maintained their weight better than the no incentive group participants. The data showed that there was no evidence to support this hypothesis. Thus, it cannot be concluded that the incentive was superior to the no incentive group in promoting weight maintenance.

This finding is somewhat surprising given the strong empirical support for the effectiveness of incentives used in weight loss programs. The majority of studies examining the effect of incentives on weight loss indicated that it promotes weight loss (Epstein, & Wing, 1984; Wing & Jeffery, 1979; Epstein, Wing, Thompson, & Griffin, 1980). Incentives can be thought of as a way to increase one's motivation for a behavioral change. Perhaps the present findings can be explained by the fact that the sum of money deposited for the program was not a large enough amount for enhancing the participants' motivation for behavior change. Another possible explanation is that the monetary incentive would have been more effective if the participants received a reward (i.e., money) immediately following successful weight maintenance at each program session instead of

being rewarded (i.e., have the lottery drawing for three prizes) at the end of the 6 month program. Bandura (1982) argued that short-term (proximal) goals are particularly important in improving performance because they provide immediate incentives and feedback about an individual's progress, whereas long-term (distal) goals are too far removed in time to summon much effort or direct one's present actions. In other words, focusing on the distant future makes it easy to slacken efforts in the present. On the other hand, the attainment of subgoals provides indicators of mastery that in turn enhance one's self-confidence and feelings of competence. In support, Bandura and Simon (1977) found that subjects who used proximal rather than distal goals were most successful at maintenance. Kirschenbaum (in press) argues that the results of this study is ambiguous. He points out that the results of the Bandura and Simon study are unclear because the grops that utilized short-term goals also utilized long-term goals. Since long-term goals were utilized by both groups, the study did not provide a true test of the differential effects of long- and short-term goals as was claimed. Thus, the superiority of short-term goals in and of themselves is still in question. It is possible that both short-and long-term goals used in combination would be helpful to obtain success at a specific behavior change.

The second hypothesis stated that participants in the weight contingent monetary incentive group should have higher program attendance than the no incentive group participants. The incentive group had a higher mean program attendance than the no incentive group, but the results did not reach statistical significance. One reason for this may be the large within group variance, which acts to obscure between group differences. A Chi-square analysis was used to compare the mean attendance data for the incentive group to the no incentive group. Based on this analysis, it was

found that the incentive and the mean attendance status were significantly related. Thus, the incentive group had statistically less dropouts than the no incentive group. Perhaps the nature of the present findings could be explained by the participants in the incentive group feeling more committed to coming to the program because money was involved. Thus, these individuals were more invested in the weight maintenance program than the no incentive group participants.

The use of incentives and deposit-refund procedures is supported by empirical evidence. Brownell and Foreyt (1985) used a deposit-refund system as a standard part of weight loss treatment. The system requires the individual to make a financial deposit. The deposit is then refunded for attendance, weight loss, completion of records, or any behavioral requirement of the staff. In a review by Wilson and Brownell (1980), average attrition was 19.3% in studies not using a deposit and 9.5% in studies with a deposit. The deposit-refund appears to work both by discouraging nonmotivated individuals from joining a program and by encouraging participants to remain in the program once it begins.

Evidence was found to support the third, fourth, and fifth hypotheses of this study. According to the third hypothesis, the weight contingent monetary incentive group and the no incentive group should not differ with respect to the number of reported weekly types of physical activities. The data indicated that there were no significant differences in the number of physical activity types among the two groups. The fourth hypothesis stated that the perceptions of self-efficacy relating to eating restraint would not differ between the two groups. Again, the data showed that there were no significant differences in self-efficacy among the two groups. Finally, the fifth hypothesis stated that the number of reported nonrepeating social

supporters would not differ between the two groups. The data also supported the acceptance of this hypothesis.

Limitations of the Research Plan

In this study, the attempt was made to better understand the use of weight contingent monetary incentives in weight maintenance. Initially, it was hypothesized that the incentive would be more effective at promoting weight maintenance than the absence of an incentive. However, the results showed that the incentive was not more effective at producing weight maintenance. Several limitations of this research plan could account for this finding.

First, it is possible that the choice about signing a deposit contract given to the participants in the weight contingent monetary incentive group served as a self-selection process. Participants could decide if the incentive procedure would be beneficial to them or not. However, the author believed that participants had the right to refuse to pay and still receive the maintenance program.

Second, some individuals in the weight contingent monetary incentive group may not have liked the lottery system as a way to receive a reward for weight maintenance. Therefore, reactance to the reinforcement procedures may have forced participants to decide against signing the $50.00 deposit contract. It is possible that if these individuals were required to sign the contract, different results may have been obtained.

A third possible limitation is that many of the participants of the maintenance program felt that they had a lot of weight to lose before they wanted to maintain their weight. Therefore, the design of the maintenance program was not effective in motivating these individuals to neither lose or

maintain their weight. Although it was stressed to these individuals that they could continue to lose weight and still be a part of the maintenance program, these individuals were caught in a dilemma. On the one hand, these individuals wanted to lose weight, but the program was not structured to be a weight loss program. On the other hand, these individuals were in a maintenance program for which they were not ready to make a commitment to maintain their weight. It is possible that these individuals may have made the maintenance program appear less effective than it actually was.

Suggestions for Future Research

Weight maintenance studies after weight loss programs has been minimal. More studies need to be conducted in order to add to our knowledge about the process of weight maintenance. This information can help health care providers and overweight individuals create conditions for successful weight maintenance.

There are several specific areas suggested for conducting future research. One area involves gaining more information about how monetary incentives operate to affect weight maintenance. More research could be done varying the amount of money required for deposit into the incentive contract. It is possible that the amount used in this study ($50.00) was not a large enough amount to motivate the participants. Also, a study comparing the effects of proximal versus distal rewards in a weight maintenance program would provide helpful information. It is possible that the incentive procedure would have been more effective at promoting weight maintenance if the participants were rewarded throughout the 6 month program.

While conducting this study, the author made two interesting observations, which have implications for future research. First, as the program came closer to termination, more and more concerns about possible weight increase were voiced from most of the participants in both groups. Participants were worried that after the end of the program, their weight would increase, just as it had done in the past. It seems that the individuals were feeling that they would no longer be accountable to the program leaders for their behavior. Most participants even requested further program sessions. The power of accountability was demonstrated in the following example. One of the participants stated that she controlled her eating because she knew she was going to be seeing people she knew and she had to come weight in at the session. Research examining the issue of participants' accountability would help researchers obtain a better understanding its role in weight maintenance.

The second observation occurred during the week before the pot luck dinner took place at the seventh program session. Three weeks before the pot luck dinner, the author called each participant and told them to bring a specified kind of a food dish to the dinner. Each individual was assigned a different kind of food (e.g., vegetable dish, salad, or dessert), in order for the group to have a complete meal. The participants were told that each group member was bringing a different kind of food. It was observed that each individual who could not come to the pot luck dinner session called the program leader to inform them that they could not attend the pot luck dinner. These participants, who could not attend the dinner, expressed concern about being absent. Also, they offered to make arrangements to bring their assigned food dish to the program leader so the group would have their complete meal. It is interesting to note that none of the

participants had called to inform the leaders of their absences at previous sessions. A possible explanation for this behavior is that the individuals who called felt a sense of responsibility to the group to be present and bring a particular type of food so there would be a complete meal at the dinner. This sense of responsibility to each other appeared to be a powerful motivator. If this sense of responsibility could be enhanced throughout a weight maintenance program, it is possible that is would be beneficial to promote high program attendance and weight maintenance. This notion of employing a sense of responsibility in the participants is another area that could be explored through research.

APPENDICES

APPENDIX A

Sample Weight Contingent Monetary Incentive Contract

APPENDIX A
Sample Weight Contingent Monetary Incentive Contract

I, _____ agree to deposit $50.00 as part of a program to help me maintain (or continue to lose) my weight. The program will run for 8 sessions. For sessions 2 through 5, I will be credited with one raffle ticket for successfully maintaining my weight. Successful maintenance is defined as having my weight be the same or not exceeding one pound above my weight as it was at the first session of the weight maintenance program (June 9th). Also, during sessions 2 through 5, I will be credited with a second raffle ticket if I lose weight at a rate of 1 pound per week.

For sessions 6 through 8, I will be credited with two raffle tickets for successfully maintaining my weight. Successful maintenance is defined as having my weight be the same or not exceeding one pound above my weight as it was at the first session of the weight maintenance program (June 9th). The determination of my success is based on the scale used by the program leader for all participants. A record of my achievement is given below:

SESSION	MAINT. CREDIT*	LOSS CREDIT**	SIGNATURE
1 ____			_____
2 ____	_____	_____	_____
3 ____	_____	_____	_____
4 ____	_____	_____	_____
5 ____	_____	_____	_____
6 ____	_____		_____
7 ____	_____		_____
8 ____	_____		_____

TOTAL _____

* indicates amount credited for weight maintenance

** indicates amount credited for weight loss

APPENDIX B

Social Support Questionnaire

APPENDIX B
Social Support Questionnaire

NAME: _____ DATE: _____

Instructions: The following questions ask about people who are part of your life who provide you with help or support with respect to weight loss and weight maintenance. There are 9 questions. On the lines underneath each question, list all the people, excluding yourself, who you can count on for help or support in the manner described. Give only the first name of each person. If two people have the same first name, please provide the initials of their last names as well.

List only those persons who come quickly to mind when you read the questions. Do not list more than twenty persons per question. If you have no support or help for a certain question, write "no one" in the space provided.

Next to the name of the person indicate the sex of the person. In addition, indicate the relationship that you have with each person you have listed.

SEX: Write a M for male
Write a F for female

RELATIONSHIP: Write the number that corresponds with the main relationship that you have with this person.

1. Member of the maintenance group
2. Romantic attachment
3. Immediate family
4. Other relative
5. Friend
6. Person living nearby
7. Co-worker
8. Member of a group to which I belong

9. Professional (doctor, minister, etc.)
10. Other (state the relationship)

Please answer all of the questions as best you can. All of your responses will be kept confidential.

Question 1: IN AN AVERAGE WEEK, WHO DO YOU TALK TO ABOUT ISSUES RELATED TO YOUR WEIGHT AND WEIGHT LOSS EFFORTS?

NAME	SEX	RELATIONSHIP

Question 2: WHO DO YOU GO OUT WITH (FOR EXAMPLE, TO PARTIES, DINNER, SHOPPING, MOVIES, ETC.)?

NAME	SEX	RELATIONSHIP

Question 3: WHO CAN YOU COUNT ON FOR ADVICE OR INFORMATION ABOUT WEIGHT LOSS MATTERS?

NAME	SEX	RELATIONSHIP

_____	____	_____
_____	____	_____

Question 4: WHO CAN YOU COUNT ON FOR ADVICE OR INFORMATION ABOUT PERSONAL MATTERS (FOR EXAMPLE, PROBLEMS WITH YOUR CHILDREN, FRIENDS, OR SPOUSE, COPING WITH A PERSONAL SITUATION OR CRISIS, ETC.)?

NAME	SEX	RELATIONSHIP
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____

Question 5: WHO CAN YOU COUNT ON TO BE DEPENDABLE WHEN YOU NEED HELP WITH REGARDS TO WEIGHT MAINTENANCE (FOR EXAMPLE, HELPING YOU TO RESIST FOOD, REMIND YOU TO EAT SLOW, ETC.)?

NAME	SEX	RELATIONSHIP
_____	____	_____
_____	____	_____

_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____

Question 6: WHO CAN YOU COUNT ON TO HELP YOU OUT WHEN YOU ARE IN A BIND (FOR EXAMPLE, NEED A RIDE TO SOMEWHERE, NEED A LOAN, NEED TO BORROW SOMETHING)?

NAME	SEX	RELATIONSHIP
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____

_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____

Question 7: WHO CAN YOU COUNT ON TO COMFORT YOU IF YOU'RE EXPERIENCING A HARD TIME WITH REGARDS TO WEIGHT MAINTENANCE?

NAME	SEX	RELATIONSHIP
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____

Question 8: WHO EXPRESSES INTEREST AND CONCERN ABOUT HOW THINGS ARE GOING FOR YOU?

NAME	SEX	RELATIONSHIP
_____	____	_____
_____	____	_____

_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____

Question 9: LIST THE MEMBERS OF THE WEIGHT MAINTENANCE GROUP THAT YOU HAVE GOTTEN TOGETHER WITH (EXCLUDING SCHEDULED SESSIONS WITH THE WHOLE GROUP) AND BRIEFLY DESCRIBE THE ACTIVITY THAT YOU DID TOGETHER (FOR EXAMPLE, ANN O. WALKING, TALKING ON PHONE).

NAME	SEX	RELATIONSHIP
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____
_____	____	_____

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

DIRECTIONS: Circle one answer for each of these four questions.

VERY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	VERY SATISFIED
1	2	3	4	5

1. In general, how satisfied are you with the EMOTIONAL SUPPORT that you receive? 1 2 3 4 5

2. In general, how satisfied are you with the PRACTICAL ASSISTANCE that you receive? 1 2 3 4 5

3. In general, how satisfied are you with the COMPANIONSHIP that you receive? 1 2 3 4 5

4. In general, how satisfied are you with the ADVICE or INFORMATION that you receive? 1 2 3 4 5

APPENDIX C

Self-efficacy Measure

APPENDIX C
Self-efficacy Measure

NAME: _____ DATE: _____

Below is a list of 30 situations in which people frequently eat. Please read each one carefully. Then circle the number which best describes THE PROBABILITY THAT YOU WOULD BE ABLE TO RESTRAIN FROM EATING IN THAT SITUATION. If you are absolutely certain that you would not eat in that situation if it should arise, circle 100%. If you have no confidence in your ability to resist the urge to eat in that situation, circle 0%.

More likely, your confidence will vary. For instance, if you are pretty sure you will be able to resist the urge to eat when you feel really happy, but not absolutely certain, you might circle 80%. On the other hand, if you are pretty sure you WOULD NOT be able to resist the urge to eat, but aren't absolutely certain, you might circle 20%.

EAT RESIST

1. When you feel really happy.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

2. When you feel anxious.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

3. When you want to sit back and enjoy a cigarette.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

4. When you are nervous.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

5. When you feel annoyed.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

6. When you want to relax.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

7. When you are worried.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

8. When you feel angry.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

9. When you feel tired.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

10. When you feel embarrassed.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

11. When you feel bored.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

12. When you feel you need more energy.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

13. When you are drinking an alcoholic beverage.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

14. When you see others eating.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

15. When you want to reward yourself for something you have done.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

16. When someone offers you some food.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

17. When you are waiting for someone or something.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

18. When you feel uncomfortable.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

19. When you want to cheer up.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

20. When you want to avoid smoking or drinking.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

21. When you feel depressed.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

22. When you want to take a break from work or some other activity.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

23. When you are overly excited.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

24. When you feel upset.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

25. When you feel frustrated.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

26. When you are angry with yourself.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

27. When you feel overwhelmed and don't know what to do first.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

28. When you are thinking of money problems.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

29. When a crisis occurs.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

30. On special celebrations like Christmas, Birthdays, or Thanksgiving.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

APPENDIX D

Eating Behavior and Physical Activity Questionnaire

APPENDIX D
Eating Behavior and Physical Activity Questionnaire

1. Do I eat most of my food during a certain time of day? If so, when?

2. Are there long periods when I go without food? If so, when?

3. Are there certain times when I get especially hungry? If so, when (for example, late afternoon before supper)?

4. Are there activities that I perform regularly while eating (for example, watching TV)? If so, what?

5. Are there certain places where I do most of my eating? If so, where?

6. Are there certain people who I do most of my eating with? If so, who (write their first name and last initial and relationship to you)?

Name:	Relationship:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

7. Are there certain foods that I have an especially hard time resisting? If so, what?

8. Are there certain people who I go out with who encourage me to eat? If so, who (write their first name and last initial and relationship to you)?

Name:	Relationship:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

9. Are there certain moods that make me feel like I want to eat? If so, what are the moods (for example, when I'm depressed)?

10. Are there certain social activities that I go to that makes it hard for me to resist food (for example, a party)? If so, what?

11. Are there certain kinds of foods that are around the house that are tempting to you? If so, what kind of food and who leaves them around the house (write the food, the person's first name and last initial and their relationship to you)?

Food:	Name:	Relationship
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

12. Do you generally leave the table immediately after eating?

13. Do you generally eat before going to bed?

14. Do you generally eat meals at the same time each day?

15. Do you generally leave some food on your plate?

16. Do you generally take the stairs instead of the elevator?

17. Do you generally park farther from places and walk?

18. Are there certain physical activities that you engage in **each day**? If so, list them and state the time of day that you engage in them and the length of time that you engage in them.

Activity:	Time:	Length:

19. Are there certain physical activities that you engage in **each week**? If so, list them and state the time of day that you engage in them and the length of time that you engage in them.

Activity:	Time:	Length:

20. Are there certain people who exercise with you? If so, list their first name and last initial and their relationship to you.

Name:	Relationship:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

21. Do you generally feel less hungry after physical activity?

Do you feel that you do not have time for physical activity because you have other commitments that are more important? If so, list the other commitments (for example, attend church meetings, coach softball, etc.).

23. Describe how you generally feel after exercising?

24. Do you generally look forward to engaging in some kind of physical activity?

25. Do you believe that you are generally well coordinated?

26. Do you believe that you are able to perform most physical activities satisfactorily or better?

27. Do you exercise with other members of the weight maintenance group? If so, write their first name and last initial, the activity you do together and how often you exercise together (for example, Ann O., walk, every day).

Name:	Activity:	Frequency of exercise together:
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

28. What is your past competitive sports experience? (Check all that apply)

____ Youth sports team

____ Junior High sports team

____ High school sports team

____ Coached a sport team

____ College sports team

____ Outside league(s), Clubs

____ College intramurals

____ Play sports with family or friends

____ None, I've never played sports other than physical education classes I was required to take.

APPENDIX E

Percentage Overweight For the Participants

APPENDIX E
Percentage Overweight For the Participants

Formula for percentage overweight calculation:

1.

Weight taken at 1st session* - expected average weight** - pounds overweight

2.

$$\frac{\text{pounds overweight}}{\text{weight taken at 1st session}} \times 100 = \text{percentage overweight}$$

* for those subjects who did not attend the first session, weight at the organizational meeting was used (which took place 2 weeks before the first session)

** The 1983 Metropolitan Life Insurance Company Height and Weight Table was used to determine the expected average weight. The largest weight expected for a medium frame was used for women. The largest weight expected for a large frame was used for men.

For All 23 Participants Assigned to Group 1:

SUBJECT	SEX	PERCENTAGE OVERWEIGHT
1#	F	23
2#	F	15
3#	F	40
4#	F	27
5#	F	34
6#	F	26
7#	F	24
8#	M	18
9#	F	33
10#	F	12
11#	F	18
12#	F	11
13	F	32
14	F	45
15	M	47
16	F	39
17	F	44
18	F	14
19	F	48
20	M	7
21	F	6
22	F	0
23	F	16

Total for 23 participants	25.2%
Total for 12 participants	23.4%

# indicates that it was included in the data analyses

For All 22 Participants Assigned to Group 2:

SUBJECT	SEX	PERCENTAGE OVERWEIGHT
1#	F	42
2#	F	9
3#	M	2
4#	F	10
5#	F	51
6#	F	31
7#	F	31
8#	F	46
9#	F	14
10	F	9
11	F	31
12	F	35
13	F	18
14	F	36
15	M	23
16	F	30
17	F	39
18	F	40
19	F	33
20	F	34
21	F	50
22	M	42

Total for 22 participants	50.3%
Total for 9 participants	30.0%

# indicates that it was included in the data analyses

APPENDIX F

Individual Weight Over Time by Group for All 45 Participants

APPENDIX F
Individual Weight Over Time by Group for All 45 Participants

For All 23 Participants Assigned to Group 1:

SUBJECT & SEX	SESSION NUMBER 1	2	3	4	5	6	7	8	MEAN
1* F	170.7	167.9	171:3	168.5	172.2	169.1	170.3	171.0	163.8
2* F	176.8	177.0	177.4	178.4	179.4	------	192.2	193.0	182.0
3* F	226.9	225.4	224.0	------	------	------	231.9	227.2	227.1
4* F	187.9	189.1	------	186.1	183.4	182.7	181.9	183.6	185.0
5* F	211.5	206.9	206.6	208.5	200.7	------	------	203.3	206.3
6* F	187.5	185.2	184.6	184.1	184.2	186.7	187.3	185.7	185.7
7* F	183.2	181.0	182.7	------	185.6	187.6	187.9	189.4	185.3
8* M	230.4	229.2	230.9	------	231.2	238.3	243.6	245.4	235.6
9* F	------	217.9	217.5	215.4	215.2	211.7	205.7	205.0	212.6
10* F	------	156.9	156.4	153.6	153.2	154.4	------	155.3	155.0
11* F	161.9	157.9	157.4	155.0	------	------	158.2	157.2	157.9
12* F	154.6	152.6	152.7	152.9	150.9	150.1	149.8	149.8	151.7
13 F	------	------	-----	------	------	------	------	------	-----
14 F	-----	------	------	------	------	------	-----	------	------
15 M	351.0	351.6	354.1	363.1	346.4	-----	------	------	353.2
16 F	211.7	211.0	210.4	206.6	205.7	-----	------	------	209.1
17 F	230.9	234.9	229.9	230.8	230.6	----	240.7	236.9	233.5
18 F	------	160.0	159.1	-----	------	------	------	------	159.6
19 F	------	310.4	------	-----	------	------	------	------	310.4
20 M	209.6	211.8	-----	------	------	------	------	-----	210.7
21 F	155.9	154.8	------	-----	------	------	------	------	155.4
22 F	-----	------	------	------	------	------	------	------	-----
23 F	-----	------	------	------	------	------	------	------	-----

* indicates that it was included in the data analyses

For All 22 Participants Assigned to Group 2:

SUBJECT & SEX		SESSION NUMBER 1	2	3	4	5	6	7	8	MEAN
1*	F	246.2	241.6	242.3	238.4	235.8	241.6	241.6	246.0	241.7
2*	F	-----	160.2	160.8	163.8	------	------	157.8	152.5	159.0
3*	M	191.5	189.5	-----	------	------	194.1	193.4	191.8	192.1
4*	F	146.5	144.0	------	143.9	144.2	145.1	148.3	146.5	145.5
5*	F	295.5	292.2	------	290.3	-----	------	------	288.5	291.6
6*	F	------	201.1	199.3	201.6	198.6	------	204.3	205.5	201.7
7*	F	204.9	199.8	200.6	200.4	197.2	194.4	199.1	202.1	199.8
8*	F	243.9	242.8	244.4	242.4	------	------	225.1	226.5	237.5
9*	F	156.1	159.3	------	164.0	164.3	------	165.6	167.6	162.8
10	F	------	150.3	151.8	-----	------	------	------	------	151.1
11	F	-----	------	-----	------	------	------	------	------	------
12	F	217.3	216.6	-----	216.7	217.1	------	------	------	216.9
13	F	------	177.0	------	178.6	------	185.9	-----	------	180.5
14	F	225.9	230.1	229.9	------	-----	------	------	-----	228.6
15	M	243.6	247.5	245.8	-----	------	------	------	------	245.6
16	F	------	187.3	------	-----	------	------	------	------	187.3
17	F	------	247.6	------	------	------	------	------	-----	247.5
18	F	204.1	205.4	------	-----	------	------	------	------	204.8
19	F	-----	------	------	------	------	------	------	------	-----
20	F	230.1	227.1	223.1	218.8	-----	------	------	------	224.8
21	F	-----	------	------	------	------	------	------	-----	------
22	M	-----	------	------	------	------	------	------	-----	------

* indicates that it was included in the data analyses

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