



Using a direct mail approach in weight reduction
by Melodie Dawn Anacker

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Home Economics
Montana State University
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Abstract:

The purpose of this study was to investigate the effectiveness of a monthly newsletter in promoting weight loss over a one-year period in a group of overweight women who had attended a three-day weight control workshop. The study measured whether treatment (monthly newsletter) was more effective than control (no newsletter) in: (1) increasing losses of body weight and body fat; and (2) promoting lifestyle (diet and exercise) changes that would improve weight loss efforts and favor maintenance of weight loss.

Results showed that over the one-year period, the monthly newsletter did not produce significant body weight losses, body fat losses, or lifestyle changes in the treatment group. It was discovered that active correspondents in both groups who mailed back three quarterly self-reports achieved a mean weight loss of 3.14 pounds. Inactive correspondents who did not mail back any quarterly self-reports experienced a mean weight gain of 6.17 pounds. Less active correspondents who mailed back one or two self-reports also had a mean weight gain of 4.88 pounds and 4.5 pounds, respectively. There was a greater number of active correspondents in the treatment group.

The majority of subjects in both groups did report dietary changes, but these changes were not associated with weight loss. Although there was no significant difference in exercise habits between the two groups, subjects in both groups who gained more than 10. pounds reported no regular physical activity.

Women in this study reported their weights 4.29 pounds less than their actual weights. As measured weight increased, so did the tendency to underestimate weight. A similar pattern was found for degree of overweight.

It can be concluded that the monthly newsletter did increase the number of active correspondents in this study who did achieve a mean weight loss. The marked variability of weight loss in subjects over time shows the need for long-term followup to determine the effectiveness of any weight control program.

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A thesis submitted in partial fulfillment
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of

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MONTANA STATE UNIVERSITY
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APPROVAL

of a thesis submitted by

Melody Dawn Anacker

This thesis has been read by each member of the author's graduate committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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TABLE OF CONTENTS

	Page
APPROVAL.....	ii
STATEMENT OF PERMISSION TO USE.....	iii
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES.....	vii
LIST OF FIGURES.....	ix
ABSTRACT.....	x
CHAPTER:	
1. INTRODUCTION.....	1
Purpose.....	2
2. REVIEW OF RELATED LITERATURE.....	4
Incidence.....	4
Health Implications.....	5
Dietary Approach.....	8
Exercise Approach.....	12
Behavior Modification Approach.....	16
Lifestyle Changes.....	20
Use of the Mail as a Communication Strategy.....	22
Conclusions.....	25
3. RESEARCH DESIGN.....	26
Subjects.....	26
Experimental Design.....	27
Treatment.....	27
Workshop.....	27
Deposit.....	30
Treatment.....	30
Control.....	30
Data Collection.....	30
Instrumentation.....	30
Measurements.....	32

TABLE OF CONTENTS--Continued

	Page
Self-Reports.....	32
Final Evaluation.....	32
Nonrespondents.....	32
Data Analysis.....	33
4. RESULTS.....	34
Subjects.....	34
Anthropometrics.....	39
Body Weight.....	39
Body Fat.....	39
Body Mass Index.....	41
Self-Reports.....	41
Pre- and Post-Treatment Self-Reports.....	41
Mailed Quarterly Self-Reports.....	43
Food Habits.....	44
Weekly Food Budget.....	44
Meal Number.....	44
Meals Eaten Out.....	44
Usage of Salt.....	45
Food Frequencies.....	46
Changes in Food Habits.....	49
Physical Activity.....	51
Other Measurements.....	54
Medical Problems.....	54
Vitamin and/or Mineral Supplements.....	55
Social Support.....	55
Personal Evaluation.....	57
Personal Problems or Events.....	58
5. DISCUSSION.....	60
6. CONCLUSIONS.....	66
REFERENCES CITED.....	68
APPENDICES.....	77
A. Sample "Weight Control" Newsletter.....	78
B. Anthropometric Data Form, Pre-Questionnaire, Post-Questionnaire.....	83

LIST OF TABLES

Table		Page
1.	The "Losing Weight Sensibly" workshop topics.....	29
2.	"Weight Control" newsletter topics.....	31
3.	Demographic characteristics of subjects.....	35
4.	Weight loss methods used by subjects.....	37
5.	Weight control method used for the longest time by subjects.....	37
6.	Reasons given by subjects for failure at weight loss efforts.....	38
7.	Reasons chosen by subjects (by age) for wanting to lose weight.....	38
8.	Summary of means for body weight (lbs), body fat, and body mass index.....	40
9.	Mean and standard deviation of the difference between reported and measured weight for all subjects by weight.....	42
10.	Mean and standard deviation of the difference between reported and measured weight for all subjects by percent overweight.....	42
11.	Comparison of weight change (lbs) by number of quarterly self-reports mailed by subjects.....	43
12.	Summary of means for weekly food budget, number of meals eaten at home (per day), and number of meals eaten away from home (weekly).....	45
13.	Food habit changes desired by subjects before treatment and food habit changes reported by subjects after treatment.....	50
14.	Satisfaction with eating habits and/or food.....	51

LIST OF TABLES--Continued

Table		Page
15.	Means for number of physical activities, frequencies, and time spent doing physical activity.....	52
16.	Types of physical activity, frequency, and time spent doing activity for all subjects.....	53
17.	How subjects felt weight affected their physical activity.....	53
18.	Types of medical problems and medications used by all subjects.....	54
19.	Number and types of vitamin and/or mineral supplements used by subjects.....	56
20.	Subjects' perception of social support.....	56
21.	Reasons subjects reported for not achieving their weight loss goals.....	57
22.	Personal problems or events affecting weight loss efforts of subjects.....	58

LIST OF FIGURES

Figure		Page
1.	Geographical distribution of subjects.....	28
2.	Comparison of mean pre- and post- treatment weekly food frequencies for all subjects.....	47
3.	Comparison of mean pre- and post- treatment weekly food frequencies by treatment group.....	48

ABSTRACT

The purpose of this study was to investigate the effectiveness of a monthly newsletter in promoting weight loss over a one-year period in a group of overweight women who had attended a three-day weight control workshop. The study measured whether treatment (monthly newsletter) was more effective than control (no newsletter) in: (1) increasing losses of body weight and body fat; and (2) promoting lifestyle (diet and exercise) changes that would improve weight loss efforts and favor maintenance of weight loss.

Results showed that over the one-year period, the monthly newsletter did not produce significant body weight losses, body fat losses, or lifestyle changes in the treatment group. It was discovered that active correspondents in both groups who mailed back three quarterly self-reports achieved a mean weight loss of 3.14 pounds. Inactive correspondents who did not mail back any quarterly self-reports experienced a mean weight gain of 6.17 pounds. Less active correspondents who mailed back one or two self-reports also had a mean weight gain of 4.88 pounds and 4.5 pounds, respectively. There was a greater number of active correspondents in the treatment group.

The majority of subjects in both groups did report dietary changes, but these changes were not associated with weight loss. Although there was no significant difference in exercise habits between the two groups, subjects in both groups who gained more than 10 pounds reported no regular physical activity.

Women in this study reported their weights 4.29 pounds less than their actual weights. As measured weight increased, so did the tendency to underestimate weight. A similar pattern was found for degree of overweight.

It can be concluded that the monthly newsletter did increase the number of active correspondents in this study who did achieve a mean weight loss. The marked variability of weight loss in subjects over time shows the need for long-term followup to determine the effectiveness of any weight control program.

CHAPTER 1

INTRODUCTION

The newspapers and media are filled with engaging advertisements for commercial weight-loss programs and products. Some of the hottest selling paperbacks are those that feature new diets. Dieting has become a national obsession. As a result of societal pressure to be thin and attractive, many women are always on a diet. This is evidenced by the chronic dieter whose weight is continually fluctuating up and down like a yo-yo. One-half of all households contain a dieter, a person consciously watching what he or she eats, for either medical or cosmetic reasons.

Treatment methods for obesity have included psychotherapy, diet, behavior modification, drugs, surgery, hypnosis, and self-help groups. The rate of success with all methods has been disappointingly low and the relapse rate has been alarmingly high.

The relationship of overweight to health is well documented. A variety of diseases occur in the obese in excess of the expected rate, including hypertension, hyperlipidemia, and cardiovascular disease. Most authorities agree that obesity is hazardous to health and detrimental to well-being. Because of its high prevalence, obesity constitutes a major public health problem.

Effective, low-cost programs for changing health behaviors are a high priority area for public health research. The prevalence of health

problems, like obesity, far exceeds the capacity of the existing health care system to provide effective individualized treatment (Jeffrey, et al., 1982a). In many rural areas, such as those in Montana, there may be no health care system available to provide treatment for obesity. Alternatives are needed for obese individuals who, for personal or financial reasons, will not enroll in an intensive, time-consuming program for weight reduction.

Two issues need to be considered in developing effective alternatives to clinics: (1) the frequency and type of support needed to encourage initial and lasting change, and (2) the extent to which less costly minimal-contact forms of support can be substituted for more traditional face-to-face counseling. Gillespie et al. (1983) suggest that the ideal communication system might be one that combines the effectiveness of interpersonal communication with the efficiency of mass-mediated communication.

Weight reduction programs employing both an interpersonal and media approach have primarily been conducted by psychologists. Dietitians and other nutrition educators have utilized these communication channels in nutrition education for parents of young children and for the elderly (Gillespie et al., 1983; Shannon and Pelican, 1984), but not for weight reduction.

Purpose

The purpose of this study was to develop a monthly newsletter entitled "Weight Control" and to determine its effectiveness in promoting and sustaining weight loss among overweight, adult women who

participated in the 1985 Woman's Week Montana State University Cooperative Extension program, "Losing Weight Sensibly." The first question to be answered was, "What anthropometric changes would occur in participants who received the monthly newsletter, 'Weight Control,' compared to participants who did not receive the monthly newsletter?" The second question to be answered was, "What lifestyle changes would occur in participants who received the monthly newsletter, 'Weight Control,' compared to those participants who did not receive the monthly newsletter?" The third question was, "Would there be a relationship between anthropometric and lifestyle changes in participants who received the monthly newsletter, 'Weight Control,' compared to those who did not receive the monthly newsletter?"

CHAPTER 2

REVIEW OF RELATED LITERATURE

Weight reduction is an obsession for many Americans, especially women, who feel pressured by society to be thin and attractive. In addition to appearance, health and lessened physical mobility may be important reasons for attempting to lose weight. Treatment methods for obesity have included diet, exercise, and behavior modification in attempts to promote lifestyle changes in overweight people. Individual and group counseling settings for the treatment of obesity are typically utilized by dietitians. However, there are many obese people who are not reached by these traditional channels of communication.

Incidence

The incidence of obesity among adults in the United States is estimated to be from 20 to 50% (Stewart and Brook, 1983). This incidence appears to vary inversely with socioeconomic status. The Midtown Manhattan Study (cited in Stuart and Davis, 1972) found that 32% of the men and 30% of the women in lower socioeconomic groups were obese in contrast to 16% of the men and 5% of the women in the upper socioeconomic groups. Similar results were obtained from the Ten State Survey and the Health and Nutrition Examination Survey (U.S. Department of HEW, 1972, 1975).

Health Implications

In February 1985, the National Institutes of Health (NIH) convened to examine the scientific evidence regarding the harmful medical consequences of obesity and its effects on longevity and to formulate a consensus statement of findings and recommendations. They concluded that the evidence was overwhelming that obesity has adverse effects on health and longevity and is strongly associated with hypertension, hypercholesterolemia, Type II (maturity onset) diabetes, an excess of certain cancers, other specific medical problems, and a decreased life span (Burton and Foster, 1985).

Obesity is associated with elevated blood pressure, blood lipids, and blood glucose. The consensus had been that the increased risk among overweight persons was due primarily to the influence of the associated risk profile and not the degree of obesity. Hubert et al (1983) did a 26-year followup of the cardiovascular incidence in Framingham men and women. Their data indicate that obesity is a significant, independent predictor of cardiovascular disease, particularly among women.

There is a well-established relationship between overweight and blood pressure. Intervention trials have suggested that weight reduction is accompanied by a corresponding reduction in blood pressure, independent of salt intake (Berchtold et al., 1983).

There is a high prevalence of impaired glucose tolerance and hyperglycemia among obese people. This type of diabetes mellitus, Type II, responds well to weight reduction (Goodhart and Shils, 1980).

There is evidence relating gallbladder disease to obesity at all ages, especially in women. Obese persons tend to hypersecrete biliary cholesterol, which is more lithogenic, being more saturated with cholesterol, than bile salts and phospholipids (Kannel, 1983).

The NIH panel examined evidence from numerous epidemiological studies of obesity and site-specific malignancies. Obese males were found to have a higher mortality from cancer of the colon, rectum, and prostate. Obese females had a higher mortality from cancer of the gallbladder, biliary passages, breast (postmenopausal), uterus, and ovaries (Burton et al., 1985).

Obesity can affect functional status and even restrict activities of an individual. Stewart and Brook (1983) found that the overweight people in their sample attributed 13% of all their functional limitations to their weight problem. These authors conclude that the morbidity of overweight, in terms of functional status, general health perceptions, pain, worry, and restricted activities, is a substantial problem.

Studies of selected samples have shown that various kinds of psychosocial disability are more common among the obese. The obese are subject to social, economic, and other discrimination (Kannel, 1983). In contemporary America, obesity is a social stigma. As a result, the obese are subject to disparagement and may have a poor self-image (Bruch, 1963).

The NIH panel (Burton et al., 1985) found convincing evidence that obesity is adversely associated with longevity. Investigations of the mortality experience of insured lives have consistently indicated an

association of overweight with excess mortality. The Society of Actuaries concluded from its 1959 Build and Blood Pressure Study that the less the weight, the lower the risk of death, to a point of minimum mortality well below the average weight for height. In 1979, the Society of Actuaries completed a new study that indicated that the optimal weight for reduced mortality was 10 to 15 pounds heavier than the optimal weight in the 1959 study. However, the 1979 study screened out all individuals with conditions such as cancer, diabetes, and heart disease.

Sorlie et al. (1980) analyzed the results of the Framingham study and concluded that the lowest risk of mortality occurred in men that were slightly above average weight and that the risk increased as weight increased, starting at 20% above average weight. In a more recent analysis of the Framingham data, Garrison et al. (1983) demonstrated that the men in the study who were near the average weight showed a significantly elevated mortality.

The NIH panel (Burton et al., 1985) recommended using two methods to determine obesity in adults: (1) estimation of relative weight (RW = measured body weight divided by the midpoint of medium frame desirable weight recommended in the 1959 or 1983 Metropolitan Life Insurance Company tables), and (2) calculation of body mass index (BMI = [body weight in kg] divided by [height in m²]). The panel agreed that an increase of 20% or more above desirable body weight constitutes an established health hazard. The corresponding body mass indexes are 27.2 and 26.9 for men and women, respectively, using the 1983 tables and 26.4 and 26.9 for men and women, respectively, using the 1959 tables.

The NIH panel (Burton et al., 1985) also recommended using the 1959 and 1983 revised Metropolitan Life Insurance Company tables of desirable weights by heights as tools to help establish the presence of obesity. However, they cautioned that neither table reflects the current weight and mortality relationship for the present American population, nor do they provide information on body fat distribution or degree of obesity. Simpoulos (1985) suggests that the 1959 tables be used for determining the recommended range of weights.

Mayer suggests the use of skinfold thickness measurements as one of the simplest and most practical methods to determine the extent of obesity. The accepted national recommendation is to use a caliper designed to exert a pressure on the caliper face of 10 gm per sq mm and with a contact surface of 20 to 40 mm (Goodhart and Shils, 1980).

Dietary Approach

In 1959, Stunkard and McLaren-Hume reviewed the papers on the treatment of obesity that were published between 1929 and 1959 for effectiveness in the treatment of obesity. Using a loss of 20 pounds and 40 pounds as a criterion of success, they found 25% of the subjects lost 20 pounds and 5% lost 40 pounds. Their own study was even less successful, as only 12% lost 20 pounds and only one patient lost 40 pounds. At that time, prescription of a low-calorie diet was the only medically acceptable way to treat obesity. Today, it is recognized that diet is more effective when used in conjunction with other treatment modalities such as exercise and behavior modification.

Dieting is still viewed by many people as the main method to lose weight. The chronic dieter best exemplifies this attitude. This individual, usually a woman, follows one fad diet after another resulting in a constant fluctuation of her weight. Gormally et al. (1980) found chronic dieters in their study lost the most initial weight during treatment but also relapsed the most during followup.

These substantial fluctuations in weight can be more harmful physically than staying at a stable, higher weight (Stuart and Davis, 1972). A chronic dieter may regain up to 110% of her pre-diet weight and may also decrease her basal metabolic rate by 15 to 30% (Brownell, 1982). Bray (1969) has shown that this decrease can exceed 20% in as little as two weeks and begin within 24 to 48 hours after the caloric restriction has begun. This process, known as caloric adaptation, is a response that occurs in starvation and acts as a survival mechanism, making the body an efficient user of a lower amount of calories. Donahoe et al. (1984) found in their study that dietary restriction alone lowered the resting metabolic rate of subjects by an amount nearly double that expected on the basis of the resulting weight loss. Leibel and Hirsch (1984) examined the energy requirements of 26 obese patients at maximum weight and after a mean 115-pound weight loss and discovered the reduced obese subjects required approximately 25% less energy than anticipated on the basis of metabolic body size. Some of these subjects still had reduced metabolic needs four to six years after weight loss.

A diet works by decreasing energy intake, thus producing an energy deficit. If this deficit persists long enough, weight is lost. There are five basic dietary approaches: (1) reduction in caloric

intake, (2) manipulation of dietary constituents to reduce energy intake, (3) reduction in the efficiency of energy utilization, (4) use of poorly absorbed foods, and (5) promotion of incompletely metabolized substrates (Van Itallie, 1980).

The first approach, a reduction in caloric intake, is the most direct approach to weight reduction. However, calorie counting can be tedious and doesn't provide any guidance about the types and quality of foods chosen.

The second approach, manipulation of dietary constituents to reduce energy intake, is the basis for a nutritionally balanced diet. Recommendations are for a caloric distribution of 12-14% protein, 30-35% fat, and 50-60% carbohydrate. There should be sufficient variety of food to meet the Recommended Dietary Allowances (Committee on Dietary Allowances and Food and Nutrition Board, 1980) for all nutrients. A weight loss of one to two pounds per week is suggested which indicates a reduction in daily intake of 500 to 1000 calories. A total caloric intake of less than 1000 calories is not advisable because of the likelihood of not obtaining all of the necessary nutrients.

The U.S. Senate Select Committee in 1977 recommended that, to improve their health status, the American people should increase consumption of complex carbohydrates, reduce consumption of refined sugars, reduce consumption of fat, saturated fat, and cholesterol, and limit intake of sodium. Several studies have utilized these suggestions with good results. Weinsner et al. (1982) used a 1000 calorie, high complex carbohydrate diet for 26 weeks with 60 obese subjects. The results of this study were an 18-pound average weight loss. Duncan et

al. (1983) compared the effects of a low energy density diet with that of a high energy density diet and found both obese and nonobese consumed a daily intake on the low energy density diet of 1570 calories compared with an intake of 3000 calories on the high energy density diet.

The third approach, reduction in the efficiency of energy utilization, is associated with the specific dynamic action of foodstuffs. Fat, when ingested in excess of maintenance requirements, is used with 79 to 85% efficiency. When carbohydrate or protein are taken in excess of maintenance needs, they are used with 62 to 77% efficiency. Thus, a diet high in carbohydrate would be less likely to lead to obesity than an isocaloric diet high in fat. More studies need to be done to determine which energy sources in the diet are relatively inefficient in promoting fat storage.

Use of poorly absorbed foods, the fourth approach, has stimulated considerable research. Techniques for interfering with the digestion or absorption of normal foods have included bile acid sequestration to decrease fat digestion and the development of food-like materials (such as sucrose polyester) that resist normal digestion and absorption. None of these approaches has been reported as a successful or reliable method for weight control.

The fifth dietary approach, promotion of incompletely metabolized substrates, is often the basis for many fad diets such as the low carbohydrate diets. This type of diet is nutritionally unsound and may be hazardous to an individual's health. Dwyer (1980) provides an excellent nutritional analysis of many popular fad diets available on the market.

Diet can be an important component in a weight reduction program when used in a reasonable and planned manner to achieve both a caloric deficit and an adequate nutrient intake. In addition, factors such as palatability, economics, convenience, and adaptability to the lifestyle of each individual are necessary considerations (Weinsier et al., 1984). The diet should help to re-educate the individual and, in a modified form, provide a maintenance diet. The National Dairy Council publication, Weight Management: A Summary of Current Theory and Practice (1985) and the Exchange Lists for Meal Planning booklet (American Diabetic Association, Inc. and American Dietetic Association, 1986) offer excellent resources for dietary planning.

Exercise Approach

Obese adults are thought to be less active than those of normal weight. This inactivity may be a consequence of the obesity rather than a cause of the obesity (Brownell and Stunkard, 1980). Pacy et al. (1986) reviewed 16 reports comparing the level of activity in thin and obese individuals and found only six of these reports indicated less activity in obese subjects.

Some researchers have found that exercise produces a greater weight loss than expected from the amount of calories directly expended and suggest that physical activity affects physiological responses like appetite and metabolism (Brownell, 1982). Woo et al. (1982a,b) found obese women did not increase their dietary intake while doing mild to moderate exercise. An increased metabolic rate may help counteract the decrease in metabolic rate due to caloric restriction. Donahoe et al.

(1984) found that exercise erased the decline in resting metabolic rate in women who had been dieting only, a 5% increase compared with a 4.4% decline.

Segal and Gutin (1983) found thermogenesis, the capacity to dissipate heat, was increased by exercise. The response was lower in obese women than nonobese women. These authors suggest that the obese may have a different physiological response to activity resulting in a conservation of energy. In a recent review of literature, Pacy et al. (1986) found little good evidence supporting the contention that there is a prolonged thermogenic effect of exercise except following intense physical activity. They recommend more studies be done to determine what the threshold level of activity is to promote thermogenesis in obese individuals.

Exercise affects both body fat and body weight. Lewis et al. (1976) found a 5% reduction in body fat and a loss of 9.2 pounds in obese women on a 17-week program of planned walking and jogging. Gwinup (1975) found a regular program of walking produced a weight loss of 22 pounds and a 10 to 22 mm decrease in tricep skinfold measurements in the obese women who participated for one year. These obese women did not lose weight unless they walked more than 30 minutes each day. Hadjolova et al. (1982) had 32 obese women engage in physical exercises, gymnastics, and sports games for 10 hours per day. At the end of a 45-day period, the women showed improved heart rate response, a loss of 8% body fat, and a weight loss of 28 pounds. Unfortunately, the more strenuous the activity, the less willing and able obese people are to participate.

Weight lost through dieting alone consists of 75% fat and almost 25% lean body mass. On the other hand, weight lost through a combination of diet and exercise is about 98% body fat (Stuart and Davis, 1972). Hagan et al. (1986) found that diet (1200 kcal/day) in combination with exercise (30 minutes/5 days) was more effective in promoting fat and weight loss than diet only, a loss of 16.5 pounds and 12.1 pounds, respectively.

Exercise may also benefit the obese individual by producing positive changes in plasma insulin and blood lipid levels, blood pressure and in cardiovascular fitness (Brownell and Stunkard, 1980). Lewis et al. (1976) found the ratio of high density lipoproteins to low density lipoproteins was increased although no significant changes in cholesterol or triglycerides occurred. Hagan, et al. (1986) discovered diet and exercise significantly decreased triglycerides in females and reduced cholesterol and very low density lipoproteins in men. However, neither sex showed any change in high density lipoproteins.

The American College of Sports Medicine (Pollock, 1978), in their position statement on exercise, recommended that for body fat loss, one should exercise at least three times per week with a minimal energy expenditure of 900 kcals per week.

The general guidelines for aerobic conditioning are to exercise three to five days per week for 15-60 minutes per exercise session at a work intensity corresponding to 60-90% of maximal heart rate reserve (Sheldahl, 1986).

Factors to consider in suggesting exercise regimens for obese individuals include special problems that some may encounter in exercise

training such as weight bearing stress on joints, limited mobility, instability, and heat intolerance (Sheldahl, 1986). Exercise tolerance in the severely obese ($BMI \geq 40$) is very poor. Such individuals have to be closely supervised during a specifically graded program (Pacy et al., 1986).

The dropout rates in exercise programs range from 25 to 70% (Brownell and Stunkard, 1980). Gwinup (1975) lost 68% of his subjects from a one-year program that required only walking.

To attain the recommended energy expenditure and aerobic conditioning, large muscle energy expenditure, especially the aerobic type, is the most effective. Walking and stationary cycling are the two most commonly recommended forms of exercise (Brownell and Stunkard, 1980). Aquatic exercise, due to the buoyancy and thermal properties of water, may be well suited as a method of exercise for obese individuals. In addition to swimming, aerobic dance and cycling can be performed in a water environment. The cycling is used now as a research tool and does not require the individual to have special swimming skills (Sheldahl, 1986).

Increased physical activity should be encouraged as such activity may be more conducive to weight loss and promotes a feeling of well-being and fitness, as well as a general change of lifestyle for the better. In the long run, exercise may also serve to reduce the risks of cardiovascular disease.

Behavior Modification Approach

In 1967, Stuart published the first paper reporting the application of behavioral methods to the treatment of obesity. In his study, eight obese women lost an average of 38 pounds over a one-year period, an unprecedented success. The original behavioral model was based on several assumptions: that the obese were more sensitive to food cues, overate, had a different eating style, and needed training to learn to eat like a nonobese person (Mahoney, 1975). These assumptions appear to be simplistic now, but there is evidence that some obese people do exhibit a pattern of eating that may hinder their weight loss efforts (Gormally et al., 1980; Keefe et al., 1984; Russ et al., 1984).

Behavioral programs flourished and led Jeffrey et al. (1978b) to express the growing concern that, "Research on the behavioral treatment of obesity had achieved a popularity verging on faddism." They reviewed 21 behavioral studies conducted from 1969 to 1974. The typical behavioral program was conducted in small groups with a weekly therapist contact of 10 to 15 weeks and focused on self-control techniques. The average weight loss was one pound per week, resulting in a total 10 to 15 pound weight loss per person. These weight losses persisted for one year after treatment, but on the average clients were not able to achieve further losses on their own and interclient variability was high. They concluded that behavioral programs seemed to benefit greatly only a few and should be recommended for a subset of eating problems. These studies did not identify any demographic background or personality measures reliably related to outcome.

Attrition rates have been reduced in weight reduction programs as a result of behavioral strategies. Attrition rates in traditional and self-help programs range from 20 to 80% (Stunkard, 1975; Volkmer et al., 1981). With the use of refundable monetary contracts that are based upon performance of a task or attendance, the attrition rate drops to 9.5% for behavioral programs irrespective of the size of deposit required (Jeffrey et al., 1983).

Various contingencies have been used in behavioral programs to increase the amount of weight lost. The results have differed. Mahoney (1974) found that reward for habit change rather than reward for weight loss resulted in a 16.6 pound weight loss in eight weeks. Chapman and Jeffrey (1978) compared the effects of setting self-standards (goals) with self-rewards. They found that the self-standard group lost significantly more weight during treatment and at the eight-week followup. The self-reward techniques were seen by subjects as being of little benefit, were seldom used, and made participants feel anxious and overly pressured. Norton and Powers (1980) evaluated commitment contingencies based on completion of study and behavior change. In their study, behavior change contingencies resulted in eating behavior changes but did not affect exercise change. Wing et al. (1984) used contact with a therapist as a reinforcer for weight loss and found it was not effective. They concluded that the obese people who saw the therapist only when they did not lose weight saw the contact as punishment.

Because maintenance of weight loss was a critical issue, Stunkard and Penick (1979) examined ten behavioral therapy programs that included

followup studies and also did a five-year followup on a study they had conducted in 1971. Like Jeffrey et al. (1978b), they found good maintenance of weight loss in the first year after treatment in all studies. In their five-year followup study, however, the majority of clients in both treatment and control groups had regained their weight back to pretreatment levels.

Booster sessions have been tried as a means of improving maintenance. Kingsly and Wilson (1977) found booster sessions gave favorable results, whereas Ashby and Wilson (1977), Hall et al. (1975), and Paulsen and Beneke (1979) found booster sessions produced no difference in the maintenance of weight loss. Abrams and Follick (1983) used a structured versus a nonstructured maintenance protocol as part of their behavioral program. The structured maintenance approach, which included dietary fading, problem-solving training, relapse prevention, and social support, was taught. Abrams and Follick suggest that most booster sessions have failed because no new knowledge has been given and no maintenance skills taught.

Social support systems such as the family and peers have been thought to influence the obese person's efforts to lose and keep weight off during maintenance. In 1978(b), Brownell et al. included spouses in the standard behavioral treatment program and found that weight loss was greatest at the three and six month evaluations for those whose spouse had been involved. Since that time, results have been mixed (Brownell, 1982). Hertzler and Schulman (1983) found that of those working women who had been successful at dieting, some viewed their families as sources of positive support and others saw their families as giving

negative support. These studies indicate that the social support system needs to be considered in a weight reduction program. If others, such as the family, are encouraged to help, or at least avoid hindrance, the long-term outcome for the obese person may improve.

Cognitive maintenance strategies may be a factor in resisting relapse. Berman (1975) found self-defeating behaviors to be related to low self-esteem and recommended that weight reduction programs include activities to increase self-esteem. An example of a self-defeating behavior would be an obese person who overeats on ice cream and then feels she has "blown it" for the whole day. A coping technique, such as positive self-talk, would allow her to rationalize to herself that she had made a small mistake and could keep right on with her program. Wing et al. (1983) found positive changes in mood were associated with weight loss. Jeffrey et al. (1978a) also found changes in thoughts about food were the best predictors of success in weight loss.

Individuals who feel they can handle high-risk situations successfully after treatment may do better than those individuals who have no confidence in their abilities to cope (Bandura, 1977). Mitchell and Stuart (1984) found Weight Watcher dropouts were significantly more likely to report low self-efficacy at the beginning of their membership. Dropouts were also significantly less likely to feel successful in weight control and behavior change, even though their rate of weight loss did not differ significantly from those who remained in the program. Bolocofsky et al. (1984) discovered dropouts in their program tended to attribute the responsibility for their weight to external

factors and may have felt relatively powerless to achieve successful weight change.

Jacobs and Wagner (1984) found that former obese individuals regarded food as the least reinforcing activity, suggesting that a type of cognitive dissonance could be in operation in which the once obese individuals have convinced themselves that food is less pleasurable.

Several authors have included in their program evaluations a list of behavioral techniques that have been most used or liked by study participants (Adams et al., 1983; Hudiburgh, 1984; Jeffrey et al., 1983; Murphey and Labbe, 1982; Paulsen et al., 1981). Record-keeping and self-monitoring were viewed as a vital component of a successful maintenance program. Cue elimination, preplanning, and increased activity were also useful to these participants.

Behavioral therapy has provided a sensible group of procedures and principles that can be utilized in nearly all approaches to lifestyle changes and weight control. It has also helped to reduce the attrition rate, especially when a deposit-refund system is used. The more recent addition of cognitive change strategies in behavioral therapy to increase an individual's self-efficacy may be essential in long-term maintenance of weight loss.

Lifestyle Changes

Data on behavioral changes of successful participants have not been gathered routinely in research, perhaps because of the faulty assumption that behavior change can be inferred from the successful weight loss (Mahoney, 1975). Brownell and Stunkard (1978) have concluded that it is

unclear what type of behavioral change is correlated with success in behavioral obesity treatment.

Some studies have found that eating habit behavior change occurred in successful participants. Orkow and Ross (1975) found that dietary habit changes which subjects continued to use after treatment were associated with success, whereas exercise failed to become a regular part of the subject's lifestyle. Gormally et al. (1980) found similar results in their study. Murphey and Labbe (1982) found that although self-reported compliance with behaviors was variable, compliance with several behaviors (self-monitoring of intake and expenditure, regular exercise, and putting down silverware between bites) was significantly related to treatment and followup weight loss. Jeffrey et al. (1978a) found their clients reported significant changes in eating behavior after treatment but only the use of self-monitoring and situational restriction behaviors significantly correlated with weight loss.

Other studies have found exercise to be very important in the long-term maintenance of weight loss. Stalones et al. (1978) compared exercise and self-managed contingencies and observed that the influence of exercise at followup was significant. Norton and Powers (1980) found changes in exercise behavior predicted weight loss; changes in eating did not.

Both eating behavior and exercise changes have also been related to weight-loss success. Graham et al. (1983), in a 4.5 year followup study, found that the most successful weight-loss maintainers reported adhering to several behavioral procedures and being more physically

active. Dahlkoetter et al. (1979) compared eating and exercise change and found the best results were with the combination of both.

Colvin and Olson (1983) interviewed men and women who had been successful at maintaining a significant weight loss for two or more years. The men in the study reported using exercise more to maintain weight loss. The women reported using both better nutrition and regular exercise to maintain the weight loss. The women had used mainly diet to lose the weight because they had thought exercise had little benefit. In addition, many of the women were employed outside the home after the weight loss, whereas before they had been mainly housewives.

Use of the Mail as a Communication Strategy

The first study reporting the use of the mail as a weight reduction approach was by Hagen (1974) who sent behavioral materials in weekly mail packets and achieved the typical one-pound-per-week weight loss with minimal therapist, phone, and mail contact.

In 1975, Stunkard discussed the possibility that behavioral methods could be presented to clients in a manual or bibliotherapy form, at a cost saving over the more intensive, but expensive, groups usually employed. Since that time, the approach has been tried with varying degrees of therapist contact. It appears that some degree of therapist involvement is needed for good results.

Several efforts to promote weight loss through correspondence have not had noteworthy success. Fernan's study (cited in Stunkard, 1975) used Hagen's materials with no therapist contact and achieved a weight loss less than half that of Hagen's study. Brownell et al. (1978a)

found that the subjects who received a weight control manual in the mail with minimal therapist contact had only lost 2.2 pounds at the six-month followup. In a study by Pezzot-Pearce et al. (1982), subjects receiving a mail-only contact achieved a modest weight loss compared to the 11-pound weight loss seen in those who saw a therapist weekly for 15 minutes.

More promising results with correspondence-based materials have been reported by other investigators. Marston et al. (1977) developed a correspondence course of 13 weekly lessons and achieved a weight loss of 13 pounds during treatment and a further loss of two pounds during followup. Telephone contact during the first month of followup did not affect the amount of weight lost compared to weekly or monthly mail-only contact. In 1982(a), Jeffrey et al. compared a mail-only contact with a mail and telephone contact and found all forms of correspondence over the eight-week period to be equally beneficial and equivalent to results found for typical face-to-face programs. Baanders-Van Halewijn et al. (1984) conducted a ten-week weight reduction correspondence course among women being screened for breast cancer and found a loss of seven pounds as compared to an 11.5-pound loss in a similar group of women who met weekly with a therapist. In 1984, Walgrave achieved a one-pound-a-week loss in participants enrolled in an eight-week Cooperative Extension correspondence course.

Some researchers have discovered that "active" correspondence participants achieve a better weight loss over the course of a year. In 1976, Hanson et al. achieved an 8.22% decrease in pretreatment weight by having subjects meet for three sessions spread out over the treatment

period and receive programmed materials in the mail. These subjects were the only ones in the study who continued weight loss after termination of treatment. In 1982(b), Jeffrey and Gerber used male subjects enrolled in the Multiple Risk Factor Intervention Trial to compare the effects of a correspondence-based weight reduction program with typical group therapy. At the end of the nine-week session, weight loss for the active group (>50% attendance) participants and the active correspondence (>50% homework assignments) participants were similar. However, at the one-year followup, only those actively participating in the correspondence program had achieved a significant weight loss; the other subjects had regained their weight. Those who were inactive correspondence participants gained weight significantly during treatment and throughout the year.

The use of correspondence appears beneficial in followup efforts. Perri et al. (1984a,b) utilized telephone and mail contacts during followup with good results compared to no contact during followup.

Attrition rates appear to be higher with this type of approach, 19-23% (Hanson et al., 1976; Baanders-Van Halewijn et al., 1984; Marston et al., 1977; Perri et al., 1984b) as compared to the 9.5% dropout rate in the more traditional face-to-face programs. A dropout in a correspondence course is somewhat different from one in a traditional program because the subjects who fail to return the materials are still possibly benefitting from the information they continue to receive in the mail. Other participants may only be modestly inclined to change in the first place and see value in doing something at a low level of personal cost but may fail to follow through.

Those studies utilizing the media and minimal therapist contact as a communication strategy in the treatment of obesity show promise of providing a low-cost alternative to more traditional communication strategies. They also indicate that this approach could be useful in various areas where more traditional programs are not available.

Conclusions

The seriousness, prevalence, and resistance of obesity to treatment was best summarized by Stunkard in 1959: "Most obese people will not remain in treatment. Of those that remain in treatment, most will not lose weight, and of those who do lose weight, most will regain it." There have been improvements in the amount of weight lost and the attrition rate, but maintenance still remains difficult today.

The various approaches to the treatment of obesity -- dietary, exercise, and behavior modification -- offer diverse strategies to employ in working with obese individuals. Incorporating this information into a multicomponent program that can be delivered via both interpersonal and media communication channels may give promising results for a low cost, effective alternative in the treatment of obesity.

CHAPTER 3

RESEARCH DESIGN.

The design of this study was quasi-experimental. All subjects attended a three-day workshop and then were divided randomly by clusters into the treatment and control conditions. All subjects were given a pre- and post-questionnaire, and pre- and post-anthropometric measurements were taken.

Subjects

For recruitment purposes, a description of the "Losing Weight Sensibly" course was included in a brochure that described the 1985 Montana State University "Woman's Week" courses. The brochure was mailed to all of the 1984 "Woman's Week" participants and was made available from all local county extension offices. The course description screened for applicants that were willing to pay a refundable \$15 deposit contingent upon performance of specific assignments. Subjects were a purposive sample consisting of all women who sent in applications.

Written permission to use human subjects was obtained from the Montana State University Committee on the Use of Human Subjects in Research. Each subject was informed about the research project and asked to sign a consent form.

The assignment of subjects to the treatment and control groups was made after they had completed the three-day workshop. Because of the close geographical proximity of some subjects, the treatment could not be assigned on a purely random basis. Naturally occurring geographic clusters of subjects (matched on the basis of age and degree of overweight) were randomly assigned to the treatment and control conditions (Figure 1). In addition, some subjects had foreknowledge of the previous 1984 "Losing Weight Sensibly" course, which necessitated assigning them to the treatment group.

Experimental Design

The study was quasi-experimental and used a purposive sample. Design 10 in Campbell and Stanley (1966) was used for this study. The treatment was administered randomly to geographic clusters of subjects.

Treatment

Workshop

The information and materials presented to all subjects during the three (1.5 hour) sessions of the 1985 "Losing Weight Sensibly" extension workshop were developed to meet all of the therapeutic guidelines recommended for professional weight control programs by the International Congress on Obesity, except for the length of personal contact (Weinsier et al., 1984). The workshop emphasized nutrition, exercise, behavior modification principles, self-esteem enhancement, social support, and goal-setting. An outline of the topics presented at the workshop is shown in Table 1.

MONTANA



● = Treatment Group Subjects

x = Control Group Subjects

Figure 1. Geographical distribution of subjects.

Table 1. The "Losing Weight Sensibly" workshop topics.

Number	Topic
1.	Physiological Theories of Weight Control (a) Malfunctioning Hypothalamus (b) Set Point Theory (c) Lowered Basal Metabolic Rate (d) Fat Cell Theory
2.	Yo-Yo Dieting Pattern (a) Consequences (b) Relationship to Fad Diets
3.	Exercise (a) Benefits of Exercise (b) Choosing the Right Activity (c) Intensity, Duration, and Frequency of Activity
4.	Nutrition (a) Quality and Quantity of Diet (b) Dietary Goals (c) Special Nutrient Needs, i.e., Calcium (d) Exchange Diet Guidelines
5.	Behavior Change (a) Self-Awareness and Self-Monitoring (b) Cue Elimination (c) Relaxation and Stress Management (d) Self-Rewards and Goal Setting
6.	Self-Esteem (a) Enhancing Self-Esteem (b) Self-Efficacy

The workshop materials included: physical measurement and weight forms, a calculation worksheet for target heart rate, and a bibliography of reliable sources of information related to weight control topics. A

copy of Winning at Losing Forever! (Gagliardi and Pagenkopf, 1984) was also given to each participant.

Deposit

Each subject had her deposit refunded contingent upon completion of three quarterly, self-report forms and a final evaluation. This amount was prorated for each report and the final evaluation. The money that accrued from unreturned reports was divided among subjects according to each individual's participation in the study.

Treatment

Subjects assigned to the newsletter treatment group received the monthly newsletter, "Weight Control," from July 1985 through May 1986. Each newsletter consisted of a supportive cover letter, provided information and suggested activities on various topics related to weight control. A sample monthly newsletter appears in Appendix A. An outline of the main topics covered in each newsletter is shown in Table 2. Subjects were encouraged to respond with suggestions or concerns that could be addressed in the newsletters, by phone or by mail contact.

Control

Subjects in the control condition did not receive the monthly newsletter.

Data Collection

Instrumentation

The instrument used as a pre-questionnaire included: demographics, weight loss history, medical history, perceived social support,

motivation for losing weight, and current lifestyle habits (diet and exercise) (Appendix B). The post-questionnaire was similar to the pre-questionnaire but also included a program evaluation component. The post-questionnaire given to both groups was the same except for the last page which included a newsletter evaluation for subjects in the treatment group (Appendix B). The following panel of professionals in the nutrition and education fields assessed the instrument's content

Table 2. "Weight Control" newsletter topics.

Month	Topics
July	Practice with Exchanges Cool Drink Recipes
August	Osteoporosis
September	Location of Body Fat and Health Sandwich Ideas
October	Motivation and Goal Setting Walking and Depression
November	Regulation of Hunger and Satiety Controlling Binge Eating
December	Food Symbolism Tips for Holiday Eating Physical Activity and Metabolism
January	Evaluating Diet Claims
February	U.S. Dietary Guidelines Vitamin and Mineral Supplementation
March	Decreasing Fats in the Diet
April	Challenge of Eating Out
May	Making Changes Work "Cutting the String" (Yo-Yo Dieting)

validity: Douglas Bishop, Pamela Harris, Rosemary Newman, Jacquelynn O'Palka, Andrea Pagenkopf, Anne Shovic, and Eric Strohmeyer. The instrument was then field-tested by a group of overweight women who applied for a weight reduction program at a private clinic.

Measurements

Individual body fat percentages were measured, using a Lange caliper. Individual body weights were taken on a calibrated balance-beam scale. As a means of reinforcement, each subject was instructed on how to take personal measurements of six specific body sites: mid-arm, bust, waist, hips, mid-thigh, and mid-calf. These body site measurements were not included in the experimental data.

Self-Reports

A postcard with spaces for self-reported weight and physical measurements was mailed quarterly to each participant.

Final Evaluation

All subjects were asked by letter to attend the special interest session on "Body Fat Measurement" during the 1986 "Woman's Week."

Nonrespondents

Those subjects who attended the 1986 "Woman's Week" but were unable to come to the special session were contacted by phone and an individual appointment was arranged to collect the final data. Those subjects who did not return to the 1986 "Woman's Week" were also contacted by phone and an individual appointment was made to interview and collect data in each subject's home.

Data Analysis

The results were analyzed using the Student's T-test and the Mann-Whitney U-test from the SPSSX computer package (SPSSX, Inc., 1983).

CHAPTER 4

RESULTS

Subjects

Of the 37 subjects who enrolled in the program, four were excluded from program evaluation. Subjects were excluded for the following reasons: because of death (1), pregnancy (2), and unusual weight loss due to medication (1).

Subject 17 in the treatment group moved during the year but was not in contact with any subjects in either group. None of the other subjects reported contact with someone who had not been assigned to the same group.

There were nonsignificant pretreatment differences between the treatment and control groups with regard to age, weight, percent overweight, percent body fat, height, and length of time at pretreatment weight (Table 3).

Only one subject in the control group was smoking at the time of the study. However, 7 subjects (41.2%) in the treatment group and 2 subjects (12.5%) in the control group reported having previously smoked.

In the treatment group, 14 subjects (82.4%) were homemakers or retired, whereas only 9 subjects (56.5%) in the control group were homemakers or retired. More control subjects (n=7) worked outside the home than did subjects in the treatment group (n=3).

Table 3. Demographic characteristics of subjects.

Measurement	Treatment Group			Control Group			p-Value
	S.D. [§]	No.		S.D. [§]	No.		
Age (years)	51.65	12.32	17	52.13	11.67	16	p=.91
Pretreatment wt.	176.94	30.46	17	184.19	54.40	16	p=.64
Pretreatment % overweight	33.00	19.19	17	40.25	36.75	16	p=.48
Pretreatment % body fat	32.12	4.47	17	31.35	5.12	16	p=.65
Height (inches)	64.75	2.56	17	63.80	2.15	16	p=.26
Time at pretreatment wt. (years)	2.83	5.26	13	4.40	4.68	14	p=.42
Number in household	3.12	1.80	17	3.13	1.75	16	p=.99
Weekly cups of coffee/tea	22.29	17.36	16	16.88	21.08	12	p=.43
Weekly servings of carbonated beverages	6.18	5.93	15	5.31	6.12	12	p=.68
No. of wt. loss methods used	2.24	1.64	17	2.33	1.63	15	p=.87

[§]S.D. = Standard Deviation

The majority of subjects in both groups were married, 82.4% (n=14) in the treatment group and 68.8% (n=11) in the control group. The remainder of subjects were widowed. No change in marital status occurred except for subject 21 in the control group whose spouse died. The average number of people in the household was similar for both groups (Table 3).

There were nonsignificant differences between the treatment and control groups in the mean amount of coffee, tea, and carbonated beverages consumed (Table 3). Both groups reported limited or nonconsumption of alcoholic beverages, 13 (76.5%) of the treatment group subjects and 14 (87.5%) of the control group subjects. (It is realized that consumption of alcohol is generally under-reported by most individuals.)

The number of weight loss methods used by subjects was nonsignificant for both groups (Table 3). The most widely used weight loss methods were "unsupervised diet" and "Weight Watchers" (Table 4). The weight loss method used for the longest length of time was "unsupervised diet" by the treatment group subjects and "Weight Watchers" by the control group subjects (Table 5).

Subjects in both groups reported that they usually quit their weight loss efforts when they became "hungry" and/or "deprived" and then "overate" and/or "binged." "Giving up" and/or "lack of motivation" were also common reasons for quitting. Subjects in the treatment group reported "eating more in social situations" and "using food as a reward" as additional reasons for ending weight loss efforts (Table 6).

"Appearance" and "health" were chosen as the main motivations for losing weight prior to the study. This was true for subjects of all ages. "Family opinion" was mainly selected by subjects age 30 to 39 years, and "sex appeal" was chosen mostly by subjects over the age of 60 (Table 7).

Table 4. Weight loss methods^a used by subjects.

Weight Loss Method	<u>Treatment Group</u>		<u>Control Group</u>	
	N=17	%	N=16	%
Tops	4	23.5	2	12.5
Weight Watchers	7	41.2	6	37.5
Diet Center	2	11.8	1	6.3
Nutrisystems	3	17.6	3	18.8
Herbal Life	1	5.9	3	18.8
Unsupervised Diet	10	58.8	10	62.5
Starvation	2	11.8	1	6.3
Pills	3	17.6	2	12.5
Supervised Diet	3	17.6	2	12.5
Behavior Modification	0	--	2	12.5
Hypnosis	1	5.9	2	12.5
Liquid Diets	1	5.9	1	6.3
Bypass Surgery	1	5.9	0	--

^aSubjects were allowed to select more than one method.

Table 5. Weight control method used for the longest time by subjects.

Weight Loss Method	<u>Treatment Group</u>		<u>Control Group</u>	
	N=17	%	N=16	%
Tops	2	11.8	0	--
Weight Watchers	2	11.8	4	25.0
Diet Center	1	5.9	0	--
Nutrisystems	0	--	2	12.5
Herbal Life	0	--	1	6.3
Unsupervised Diet	5	29.4	3	18.8
Supervised Diet	1	5.9	0	--
Behavior Modification	0	--	1	6.3

Table 6. Reasons given by subjects for failure at weight loss efforts.

Reason	Treatment Group (N=15)	Control Group (N=12)
"Start to eat more" or "binge"	3	3
"Feel hungry" and/or "deprived"	2	2
"Give up" and/or "lack motivation"	3	5
"Eat more on vacation and/or social situations"	3	-
"Food is an important reward"	2	-
"Boredom"	1	1
"No time to fix special foods"	1	1

Table 7. Reasons* chosen by subjects (by age) for wanting to lose weight.

Reason	Age				Total
	30-39	40-49	50-59	>60	
"Appearance"	6	8	6	9	29
"Health"	5	9	3	7	24
"Physician's orders"	1	2	2	1	6
"Family opinion"	3	-	1	-	4
"Sex appeal"	-	1	-	3	4
"Special event"	1	1	1	2	5

*Subjects were allowed to choose more than one reason.

Overall, the treatment and control groups were very similar for most characteristics. However, the control group subjects were more likely to work outside the home and fewer had previously smoked.

Anthropometrics

Body Weight

Both the T-test and the Mann-Whitney U-test showed nonsignificant changes between the treatment and control groups for body weight ($p=.40$, $p=.43$, respectively). The treatment group subjects tended to gain weight over the year, while the control group subjects showed almost no change in weight (Table 8). Subject 12 in the treatment group refused to weigh at the final evaluation and was not used for weight change analysis. She did have a 5.8% body fat loss and a self-reported weight loss of 8 pounds, which might have lessened the mean weight gain that occurred in the treatment group. Ten subjects in both groups achieved a weight loss during the year. There were 4 subjects in the treatment group who gained more than 10 pounds and only 1 subject in the control group who gained that amount, which may account for the greater standard deviation seen in the treatment group (Table 8).

Body Fat

There was a nonsignificant change in body fat between the treatment and control groups with a p value of .83 for the T-test and a p value of .59 for the Mann-Whitney U-test. Overall, both groups showed a mean loss of body fat (Table 8). The closer similarity of these results may be due to the inclusion of subject 12 in the treatment group.

Table 8. Summary of means for body weight (lbs), body fat, and body mass index.^a

Measurement	Treatment Group				Control Group				p-Value
	Pre	S.D.*	Post	S.D.*	Pre	S.D.*	Post	S.D.*	
Body Weight (lbs)	176.94	30.46	180.56	36.43	184.19	54.40	184.06	57.49	p=.40
% Body Fat	32.12	4.47	31.01	5.60	31.35	5.12	30.03	5.91	p=.83
Body Mass Index	29.78	5.25	30.52	6.78	31.84	9.20	31.84	9.85	p=.39

^aBody Mass Index = [Body Weight (kg)] ÷ [Height (m)²]

*S.D. = Standard Deviation

Body Mass Index

Both the Mann-Whitney U-test and the T-test showed nonsignificant changes in the body mass index ($p=.39$, $p=.45$, respectively) (Table 8). Except for 2 subjects in the control group with a body mass index (BMI) > 40.0 , the two groups were evenly distributed for BMI.

Self-Reports

Pre- and Post-Treatment Self-Reports

The data were analyzed by weight for all subjects. Before treatment, 48.5% of all subjects in both groups reported their weight within ± 3 pounds. It was apparent that as measured weight increased, the tendency to underestimate weight increased. At the final evaluation a higher percentage of subjects (72.7%) reported their weights within the ± 3 -pound range when they knew their weights would be immediately taken. The majority of subjects in both the treatment and control groups underestimated their pretreatment and post-treatment weights. However, each subject, regardless of her weight, gave a more accurate self-report when she knew her weight would be measured (Table 9).

A comparison of degree of overweight showed a correlative tendency, i.e., as percent overweight increased so did the tendency to underestimate weight. However, subjects who were more than 46% overweight underestimated their weight less than subjects who were between 30 to 45% overweight. The difference at the final evaluation was lessened by 2 subjects who had recently had their weights taken at a physician's office (Table 10).

Table 9. Mean and standard deviation of the difference^a between reported and measured weight for all subjects by weight.

Measured Weight (lbs)	Pretreatment			Post-treatment		
	Mean	S.D. [§]	N	Mean	S.D. [§]	N
≤ 150	3.00	2.29	9	2.83	2.71	6
151-170	2.86	2.61	7	2.86	2.61	7
171-190	5.50	3.94	6	2.00	2.83	2
≥ 191	5.89	7.94	9	2.22	5.59	9

^aA positive difference indicates that the self-reported weight was less than the measured weight.

[§]S.D. = Standard Deviation.

Table 10. Mean and standard deviation of the difference^a between reported and measured weight for all subjects by percent overweight.

% Overweight	Pretreatment			Post-treatment		
	Mean	S.D. [§]	N	Mean	S.D. [§]	N
< 14	2.29	2.06	7	2.20	2.49	5
15-29	3.30	2.31	10	4.00	3.58	6
30-45	7.33	4.63	6	6.33	7.10	3
> 46	5.00	8.00	8	2.22	5.59	9

^aA positive difference indicates that the self-reported weight was less than the measured weight.

[§]S.D. = Standard Deviation.

Mailed Quarterly Self-Reports

There was a nonsignificant difference between the treatment and control groups in the number of quarterly self-reports mailed back to the researcher (Chi-square 3.32, $p=.35$). An equal number of subjects in both groups were nonrespondents, i.e., they failed to mail back any reports. Although there were a greater number of control group subjects who mailed back one report, there were more treatment group subjects who were active correspondents and mailed back all three reports (Table 11).

Table 11. Comparison of weight change (lbs) by number of quarterly self-reports mailed by subjects.

No. of Self-Reports Mailed	Treatment Group	Control Group	Weight Change (lbs)	S.D. ^a	p-Value
0	3	3	6.17	17.44	$p=.06$
1	2	6	4.88	14.67	$p=.06$
2	3	2	4.50	5.75	$p=.01$
3	9	5	-3.14	3.59	--

^aS.D. = Standard Deviation

The data were analyzed to compare weight change with the number of reports mailed. There were nonsignificant differences in weight change between subjects who mailed back all three reports and subjects who either mailed back none or one report ($p=.06$, $p=.06$, respectively). There was a significant difference between subjects who mailed back all three reports and subjects who mailed back two reports ($p=.01$). Those subjects who were active correspondents (mailed three reports) achieved

a mean weight loss, whereas less active correspondents (mailed 0-2 reports) achieved a mean weight gain (Table 11).

Food Habits

Weekly Food Budget

Initially, the treatment group had a significantly greater weekly food budget ($p < .05$). At the 12-month evaluation, there was a nonsignificant difference between the treatment and control groups for weekly food budget ($p = .57$) (Table 12). Before treatment, 6 subjects in the treatment group spent more than \$25.00 per person per week for food, and only 3 subjects in the control group spent the same amount. Conversely, 10 subjects in the control group reported spending less than \$19.00 per person on food. The amount of money spent on food may have been affected by the fact that families used their own resources, i.e., beef, eggs, or produce, to supplement their food budgets.

Meal Number

On the pre- and post-questionnaires, there were nonsignificant differences in the number of meals eaten daily by subjects in the treatment and control groups. Overall, there was an increase in the mean number of meals consumed (Table 12). On the post-questionnaire, more subjects in both groups reported eating more than 2 meals per day.

Meals Eaten Out

There were nonsignificant differences between the treatment and control groups for number of meals eaten way from home, both before and after treatment. The treatment group increased the mean number of meals

