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Behavioral control of overeating

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THE BEHAVIORAL CONTROL OF OVEREATING

by

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CHAPTER I

INTRODUCTION

In the last decade, the American public has been confronted with an enormous amount of literature concerning obesity and weight control. Obesity (fat in excess of normal; i.e., ten to twenty percent over normal weight) has become recognized as a major health hazard, being associated with a number of causes of death. A strong relationship exists between obesity and various diseases of the circulatory and endocrine systems (Mayer, 1969). Extra fat strains the heart, blocks the arteries and raises blood pressure (Mayer, 1968). Among the obese there is a greater mortality rate due to diabetes, liver diseases and kidney diseases (Mayer, 1968). Excessive overweight can spur foot, leg and back ills, such as severe osteoarthritis of the pelvis, knee and ankle joints (Stillman and Baker, 1969). Pregnancy and surgery are also more hazardous for persons carrying excess fat (Mayer, 1968). Problems of chronic fatigue and lethargy in overweight individuals interfere with normal sex life as well as other aspects of daily living.

Obesity has also been shown to be psychologically unhealthy, as fat people tend to have greater insecurity, depression, and unhealthy negative self concepts. The psychological consequences of obesity are such that they draw cultural condemnation. Obese people are frequently the subject of jokes, comments, excessive stares and ridicule. Often they are discriminated against when seeking jobs or other competitive positions, and consequently develop hostile attitudes which spark off

overeating behavior (Mayer, 1968). Reproachment rather than warm understanding by family, friends and doctors brings about emotional frustration which is also soothed by overeating. Such individuals often become loners, avoiding participation in athletics and other physical exercise (Mayer, 1968). The U. S. Public Health Service in a pamphlet, Obesity and Health, indicates that the tendency to overeat and the tendency to underexercise are the most common characteristics of obese individuals. Though these characteristics are easily identifiable, no clear causal relationships have been substantially detailed (Harris, 1969). Some of the postulated causes of overeating include depression (Simon, 1963), anxiety (Cauffman and Pauley, as reported by Harris, 1969), night eating syndrome (Stunkard, 1959), obesity of parents (Cappon, 1958), insufficient exercise (Mayer, 1969), and dependence on external stimuli (Schacter, 1969, as reported by Harris, 1969).

The bulk of the literature on obesity focuses more on the treatment side than the causal aspect of this major health hazard. An estimated thirty-four million overweight Americans have been exposed to diet ideas ranging from clinical-medical diets to fad diets and dietary products from low calorie foods to appetite depressants and other drugs (Stillman and Baker, 1969). Such organizations as Weight Watchers, Incorporated, which rely on a combination of high protein diets and inspirational confessional weekly meetings for weight loss, have gained increasing popularity during the last decade. Psychologically oriented treatments have included clinical hypnosis (Erickson, 1960), psychoanalysis (Bruch, 1957), group therapy (Thorpe, Schmidt, Brown, and Castell, 1964; Wollersheim, 1970), and aversive counter conditioning or aversion therapy (Wolpe, 1958; Meyer and Crisp, 1964; Stollak, 1966, as reported by

Harris, 1969; and Cautela, 1966). Other approaches involving behavior modification have become popular in treating obesity. Behavior approaches which involve developing self control have been reported by Ferster, Nurnberger, and Levitt (1962), Goldiamond (1964), Stuart (1967), Harris (1969), and Tighe and Elliott (1968).

The behavioral techniques have reported success not only in helping individuals lose weight but also effecting long range weight reduction, i.e., helping individuals maintain weight loss. However, few of these studies cite the actual long-term results. Maintaining a lower weight involves a permanent change in the previous overeating habits responsible for the obesity. Few programs of weight loss or diets help an individual develop these permanent changes in eating behavior necessary for maintenance. A close look at the contingencies governing overeating shows why this behavior is so resistant to change. The act of putting food in one's mouth is positively reinforced and strongly maintained by its immediate consequences, while the reinforcement for refraining from overeating is usually extremely delayed. The ultimate aversive consequences of overeating, the UAC (Ferster, Nurnberger, and Levitt, 1962), are delayed for weeks, months, etc., such that they are ineffective compared with the immediate reinforcement of overeating. The fact that the stimulus for overeating is not normally food (Ferster, Nurnberger, and Levitt, 1962) also makes this behavior more resistant to change. Goldiamond (1965) points out that eating behavior occurs in a wide range of situations as in bed, watching T.V., while reading or studying, etc., and that eating is under the control of many stimuli other than those physiological ones causing hunger, i.e., advertisements, places where food is kept, etc. Furthermore, since food must be

eaten by everyone, generally two or three times a day, it is impossible to avoid the situations and the behavior associated with eating. In short, a program for control of eating behavior must take into account these variables which make eating habits so resistant to change or modification.

"A technique for controlling behavior in natural life settings," a study by Tighe and Elliott, 1968, presents a behavioral control technique consisting primarily of having an individual give up some portion of his reinforcers (usually money) with the understanding that he must behave in "therapeutically prescribed ways in his natural environment" to re-earn the reinforcers. Application of this program to weight reduction may prove to be successful for weight loss if money or other reinforcers are stronger reinforcers for the individual than food. However, this technique does not provide for a long-term maintenance program once the weight is lost. Tighe and Elliott merely suggest an individual stick to the technique until he had developed enough self control to maintain the desired behaviors, as appropriate eating habits.

Goldiamond (1964) applied stimulus control, chaining and withdrawal of reinforcement for his single patient study. The strategy for slimming his patient primarily involved helping the patient bring his own behavior under control of food alone, since food is normally not available as a stimulus. This approach was effective in weight loss for Goldiamond's patient, but for most people it is difficult to perform and also continue after losses, if any, occur. A popular and busy obese college student or working person would find it nearly impossible avoiding other activities during meal times and focus activity on the food alone.

Three studies in developing programs for long-term weight reduction through change of eating habits have all demonstrated considerable success. Ferster, Nurnberger, and Levitt (1962) analyzed the eating behavior and self-control of eating in overweight individuals. They defined self-control as "some specific performances which will lower the disposition to emit the behavior to be controlled." According to the study, developing self-control involves four steps:

1. Determining what variables influence eating.
2. Determining how these variables can be manipulated.
3. Identifying the unwanted effects of overeating.
4. Arranging a method of developing required self-control.

Ferster, Nurnberger, and Levitt consider eating a "rough designation for a chain of behavioral sequences culminating in swallowing and the subsequent gastro-intestinal reflexes." For example, buying groceries leads to storing food; stored food is the occasion for cooking; prepared food is the occasion for setting the table and sitting down; the sight of the food sets the occasion for cutting with silverware; the pieces of food lead to placing them in the mouth, which is followed by chewing, which is followed by swallowing. The final act of the chain depends upon the nature of earlier acts. In order to make it possible for the subject to stop eating at any point and reduce the eating rate, the investigators designed simple exercises to break individuals' chains. These exercises were carried out towards the end of meals, where hunger is not as potent a force as at the beginning. In periods of eating when the individual was less deprived, foods which were maximally reinforcing (i.e., more appetizing or caloric), were eaten, while minimally reinforcing foods were eaten under stronger conditions of

deprivation. In other words, according to Ferster, Nurnberger, and Levitt, the effect of highly reinforcing foodstuffs on the disposition to eat would be minimized by a lower level of deprivation so that the subject could stop eating more easily.

Ferster, Nurnberger, and Levitt point out that self-control is a "very complex repertoire of performance which cannot be developed all at once." Self-control must be developed in slow steps beginning with some performance already in the person's repertoire and proceeding in successive steps to more complex performances. A new degree of complex behavior may develop from the repertoires gained through self-control. Self-control does not develop merely by telling an individual the nature of desired performances. "The actual disposition to emit the self-control behavior builds up because it was emitted successfully to reduce the long-term aversive effects of the behavior to be controlled." In developing the control the individual must begin with some performance very close to his repertoire and must arrange circumstances so that those performances have at least some effect on the disposition to eat. Reinforcement of this initial repertoire, i.e., a noticeable move toward self-control, provides the foundation for building up and maintaining the self-control program. In other words, each small increment in the ability of the individual to control himself will reinforce further participation in the program.

In duscussing their pilot study of obese women, Ferster, Nurnberger, and Levitt clearly indicate they were not concerned whether or not they could develop a program that could effect weight loss, since many medical and group therapy programs lead to temporary loss of weight. They were much more interested in developing self-control in eating "which

would endure and become an available part of the individual's future eating behavior and maintaining weight loss by bringing the eating behavior under self control." The authors provided no figures or results on their pilot program, rather the rationale behind the approach.

Stuart (1969) used a behavioral treatment on eight patients utilizing operant and respondent conditioning techniques similar to Ferster, Nurnberger, and Levitt's approach. In this study the treatment was aimed at helping the patient become his own contingency manager. Reinforcement was the patient's success in controlling his own behavior, the reduction of the aversive consequences of a lack of self-control and considerable reassurance by the therapist. Reassurance was given to each new step and praise was given for success. This interaction between the therapist and patient, though effective in weight loss, may be less effective in establishing a maintenance program. Stuart does note that "more tightly controlled research is needed in order to isolate the contribution of the nonspecific interaction effect to total therapeutic outcome."

Stuart's study involved voluntary patients who were referred for private treatment. All eight subjects were obese women initially weighing from a low of 172 to a high of 224 pounds. Treatment sessions were scheduled individually three times per week, usually lasting for approximately thirty minutes, and extending over a four to five week period. For the next twelve weeks, sessions were every two weeks, while maintenance sessions were scheduled as needed and follow-up sessions were held monthly. Initially Stuart held sessions more frequently to capitalize on learning via massed trials. The earlier sessions also helped in monitoring the patient performance, which made success more likely.

Immediate success in treatment was important, for extinction would have occurred if the "self contingency manager" did not get reinforced for self management. Stuart had his patients keep accurate records of food intake and weight changes.

The experimenter developed a detailed behavioral curriculum for his patients to follow. The steps included:

1. The patient was to interrupt his meal for pre-determined periods of time gradually to break the chain of behaviors terminating in eating.
2. The patient was instructed to keep all food in the kitchen, only buy food that has to be prepared and prepare one portion at a time to cut down on automatic compulsive eating.
3. The patient was to make eating a "pure experience", i.e., he was instructed to pair eating with no other activity.
4. To slow down the rapid ingestion characteristic of the obese, the patient was instructed to put a small amount of food in his mouth and replace his silverware on the table until he had swallowed.
5. The patient was instructed to engage in some other high probability behavior at times when he would normally eat.
6. Covert sensitization in the manner of Cautela (1966) was used in the therapeutic procedure.

The data for Stuart's study covered a twelve-month period in which individual weight loss varied from as little as six ounces to as much as five pounds per week. An average overall weight loss of somewhat less than one pound per week was accomplished, i.e., 37.8 pounds overall average per twelve-month period. This weight loss was regarded as

a reasonable expectation.

Harris (1969) performed a pilot study designed to enable subjects to lose weight through the use of self-monitored techniques for changing their eating behavior. The subjects for this study were both men and women who were at least fifteen pounds overweight. Two experimental groups of three men and five women, who were available for meetings at the same time, were selected, along with a random group of three men and five women who served as a control group. The control group was simply asked to lose weight on their own, and if they would consent to be reweighed at the conclusion of the experiment. The group was then weighed, given calorie charts and reminded that the only way to lose weight was to change their eating habits permanently. Initially, the experimenter met with the two treatment groups twice a week. Subjects were weighed at the beginning of every meeting. The first week subjects were given calorie charts and asked to keep a record of their normal eating habits for one week, their daily intake, and place and time of eating, for the next few months.

During the first two months of the study three general types of techniques were used in helping individuals establish new eating patterns:

1. Lists of aversive consequences causing the desire to lose weight were compiled and discussed, as well as various non food reinforcers for losing and maintaining weight. The concepts of positive reinforcement were fully explained.
2. In explaining stimulus control, the experimenter gave the subjects suggestions in limiting the number of situations in which they eat and of stimuli associated with eating.

3. Suggestions were presented on slowing down eating behavior by breaking up the chain of eating.

After the subjects had learned the principles of reinforcement and self-control of eating behaviors during the initial meetings, they were given written summaries of the techniques and also lists of low calorie foods and methods for preparing them. After a two and one-half month period, Harris split the treatment group into two subgroups. One group continued with the same program. For the other group, procedures using aversive imagery similar to those used by Cautela (1966) were administered.

At the end of four months, a final meeting was held for experimental and control groups when all subjects weighed in. Fourteen members of the treatment groups, as well as two who had dropped out, lost weight with the difference between pretest and posttest weights being highly significant ($t = 5.19$, $p < .001$). Total weight losses ranged from a low of two pounds to a high of twenty-six pounds and a percentage of weight loss ranged from two percent to thirteen percent. The mean weight loss for the treatment groups was 10.5 pounds and a percentage loss of six percent. For the control group, greatest weight loss was twelve pounds and greatest weight gain was 16.5 pounds. The mean weight change was a gain of 3.6 pounds and a percentage gain of two percent. Only three of the control subjects lost any weight. The effect of the experimental treatment was highly significant using both pound loss and percentage weight loss ($p < .001$), and the effect of sex was significant at the $p < .05$ level for pounds lost and at the $.05 < p < .10$ level for percentage weight loss, men losing more than women. Harris does point out that the sample is too small to make conclusions about sex differences. No

significant differences were found between the continuation subgroup and the aversive conditioning subgroup (t = .201).

In general, the Harris (1969) study presents a program for weight control which has many desirable attributes, as production of weight loss with minimal time (10-20 hours in meetings) and minimal expenses. The subjects considered their new eating habits satisfying, and admitted no longer being constantly troubled by desires to eat. All subjects lost weight, a loss significantly greater than zero, as compared to a slight gain in control subjects.

Although this study was designed to help subjects develop self control in eating and to establish better permanent eating habits by teaching Ss principles of contingency management, predictions about behavior beyond the four-month duration are open to question. Harris' control group was not really a treatment control in her study. A group which was weighed in weekly would have been a closer approximation to a control group, considering the weekly meetings of the experimental groups. Addition of this group would be helpful in determining the effects of group interactions on the weight loss. Much of the experimental group's weight loss may have been due to social reinforcement (group pressure) present at the weekly group meetings. Individual sessions may have eliminated the effects of competition, etc., between many obese people meeting together. The group effect may be important for a program of weight loss, but after the termination of the study, this reinforcement no longer exists and is not part of one's permanent behaviors. The complexity of this study, i.e., the many facets, may discourage individuals from using all the techniques presented. This study as well as previous self-control studies in eating do not isolate

specific techniques, trying to discover the most potent ones; rather they group many procedures together. If a few procedures or techniques in developing behavioral control of eating could be isolated, fewer obese individuals would be discouraged in trying to permanently change their present aversive behaviors.

The Present Study

The present study proposed to isolate some of the specific procedures and use some methods of analysis which can be useful in controlling overeating and making permanent changes in this undesirable behavior. Some of the techniques have been influenced by the findings of the cited studies (Ferster, Nurnberger, and Levitt, 1962; Stuart, 1969; Harris, 1969), and other techniques have been developed from studies of the experimenter's own behavior. Many of the controls absent in earlier studies were applied to aid in isolating the significant variables which contribute to the behavioral control of overeating. The main goal of the present study was the development of self-control in eating which would endure and become an available part of the individual's future repertoire. The concept of self-control refers to specific performances by an individual which will lower his disposition to emit overeating behavior. Self-control is a very complex repertoire of performance which must be developed in slow steps. The present study offered several techniques to assist an individual in attaining control of his own eating behavior by gradually approximating the eating pattern he eventually wants to maintain. Each small increment in the ability of the individual to control himself should reinforce further participation in this self-control program.

Hypotheses and Variables

It was hypothesized that both short-term weight loss and long-term maintenance of weight loss would be more significant for the treatment group than for the control group. The essential variables manipulated in the treatment group focused directly on overeating behavior. Specifically, these variables were: (1) lengthening meal time by slower eating of each meal, and (2) decreasing the quantity of food intake; less mouthfuls per meal. The effect of these variables on weight loss was determined by measuring total individual weight loss in pounds and in percent of weight loss.

CHAPTER II

METHOD AND PROCEDURE

Method

Subjects. The subjects were eighteen male and eighteen female college students between the ages of 18 and 48 years. Subjects were at least 15 to 20 percent overweight according to Metropolitan Life Insurance Company (1959) height-weight charts. Weights were recorded from a Borg Warner bathroom scale; each subject weighing without shoes, without coats and in similar clothes (from week to week). Subjects were recruited through members of the introductory psychology course and screened by the experimenter, an undergraduate student of slight build. (The investigator did not have contact with the subjects to minimize experimental bias and control for therapeutic and modelling effects). Subjects presently under medical treatment for being overweight or for having any serious illness were eliminated, as well as students on athletic teams (who had to go on crash diets), and graduate students in psychology familiar with the details of the study. All subjects had previously taken introductory psychology and were familiar with the principles of learning, e.g., reinforcement. Each subject indicated he or she exercised little or moderately. (See Appendix A.)

Procedure

Treatment group. Twelve Ss matched for sex with the control groups were used. Ss weights were recorded at the start of the experiment at

individual meetings. At the first meeting Ss were given calorie charts. Weekly meetings were individual sessions lasting approximately fifteen minutes. Between the first and second meeting Ss were asked to record to the nearest half minute the actual amount of time spent eating at each meal, snacks, etc., and also to record the number of mouthfuls of food per each meal during the one week span. Charts were given to Ss to assist in recording these data. (See Appendix B.)

At the second individual weekly meeting, the major goals of the program were explained. These were:

1. To develop permanent, healthy eating habits which would become an available part of the individual's future repertoire.

2. To become fully aware of and to fully enjoy what one is eating --developing greater interest in greater quality of food rather than greater quantity.

3. To make gradual changes in both weight loss and in eating behaviors--changes which could be maintained by self-control.

The techniques of controlling eating behavior employed in this study were presented to Ss along with frequency charts. These were:

1. The first important technique used involved lengthening meal time by slower eating of each meal. Considering that obese people tend to eat more rapidly than normal people, particularly those on diets (Harris, 1969), and also considering that it take at least 15-20 minutes after beginning to eat before one begins to feel the effects of food, one of the aims of this program was to help the individual slow his eating behavior down. Every week for ten weeks, each S was to record the actual time spent at each meal on his frequency chart. At each individual session S's frequency charts were studied by the experimenter

and S, and average lengths of meals were calculated for each day. A goal of more time per meal for the ensuing week was set on the basis of the previous week's daily averages. Depending on the individual's habits, progress, etc., a graduated goal was set, i.e., 5 percent more time to be spent at each meal per week. To help individuals break up the chain of eating and to lengthen their meal times, several exercises were suggested. One exercise was to replace the silverware on the table after placing food in the mouth. Food was then to be chewed slowly with the individual giving great attention to the gustatory qualities of the food. Upon swallowing, the silverware could once again be used to take another mouthful. Another exercise involved taking a two to five minute break during the latter part of the meal when hunger is not as potent as in the earlier parts. The subject was to merely sit with the silverware on the table and wait out the self-designated length of time before resuming eating behavior. Other individual methods of slowing eating were discussed and attempted in helping the S meet the goal set at the weekly meetings.

2. The second important technique used involved decreasing the quantity of food intake; less mouthfuls per meal. Overeating is one of the prime characteristics of obesity. Each week for ten weeks S recorded the actual number of mouthfuls of food per meal on his frequency chart. At each individual session S's frequency charts were studied by experimenter and S, and the average number of mouthfuls were calculated. A goal of less mouthfuls per meal for the ensuing week was set on the basis of the previous week's daily averages. Depending on the individual's habits, progress, etc., a graduated goal was set, i.e., 5 percent less mouthfuls at each meal per week. To help individuals reduce their

food intake, several exercises were suggested. Some exercises were to prepare single portions at a time for each meal or to completely avoid second helpings, snacks, and rich foods. Ss were not told what specific foods to eat or not eat, but it was suggested that they refer to their calorie charts frequently. Wise choice of foods was up to the individual who would be developing a new set of eating habits to include in his future repertoire.

Control Groups

1. No treatment control:

Twelve Ss matched for sex with the treatment group were used. Ss' weights were recorded at the start of the experiment at individual meetings. At the first meeting, Ss were given a calorie chart and asked to attempt to lose weight on their own. During a ten-week period Ss continued to attend individual weekly sessions, in which Ss were weighed, encouraged to use their calorie charts and to lose weight on their own.

2. Placebo control:

Twelve Ss matched for sex with the treatment group were used. Ss' weights were recorded at the start of the experiment at individual meetings. At the first meeting, Ss were given a calorie chart and asked to attempt to lose weight on their own. At the third meeting Ss were given charts (see Appendix C) to record for each meal or snack, and at the end of the day, whether or not they felt their eating habits were satisfactory. During the remainder of the ten-week period Ss continued to attend individual weekly sessions, in which the experimenter weighed them, discussed their weekly charts, their own goals, encouraged Ss to use their calorie charts, and to lose weight on their own.

Final Weighing and Follow-up

Final meetings were held ten weeks after the beginning of the study in June before the school year ended. Both Control and Treatment Ss were weighed. All Ss were encouraged to continue their respective programs if they wished. Approximately four months later (six months from the beginning of the study), all treatment and control Ss were asked to return for checks on weight and discussion of their progress. Those Ss unable to return were mailed stamped cards to return, specifying their weight loss and progress in developing self-control. (Four subjects, who were no longer students, responded by mail.) At the end of the six month period all Ss were given or mailed a short explanation of this study and instructions on how to begin or continue the treatment procedure.

CHAPTER III

RESULTS

The ages, marital status, and weights for individual experimental and control Ss are reported in Table 1, Appendix D.

A three-factor experimental design, with repeated measures on one factor was used, where the factors were the treatment, sex, and times of measurement. Tables 2 and 3, Appendix D, show the results of analyses of variance for pounds lost and percentage weight loss, respectively, for all experimental Ss versus the control Ss. The variation between subjects for the treatment factor was highly significant for actual weight change ($F = 15.52$, $p < .01$) and for percent body weight change ($F = 8.32$, $p < .01$). No significant differences were found between sexes.

Contrasts between the three subject groups for percent body weight change at ten weeks and six months, are presented in Tables 4 and 5, Appendix D. Table 4 shows that the effect of the experimental treatment was highly significant ($F = 16.54$, $p < .01$) as contrasted with the control groups at the end of the ten-week period. The control groups did not show significant differences between them. Contrasts at the end of the six-month period (Table 5) show no significant differences between the three subject groups.

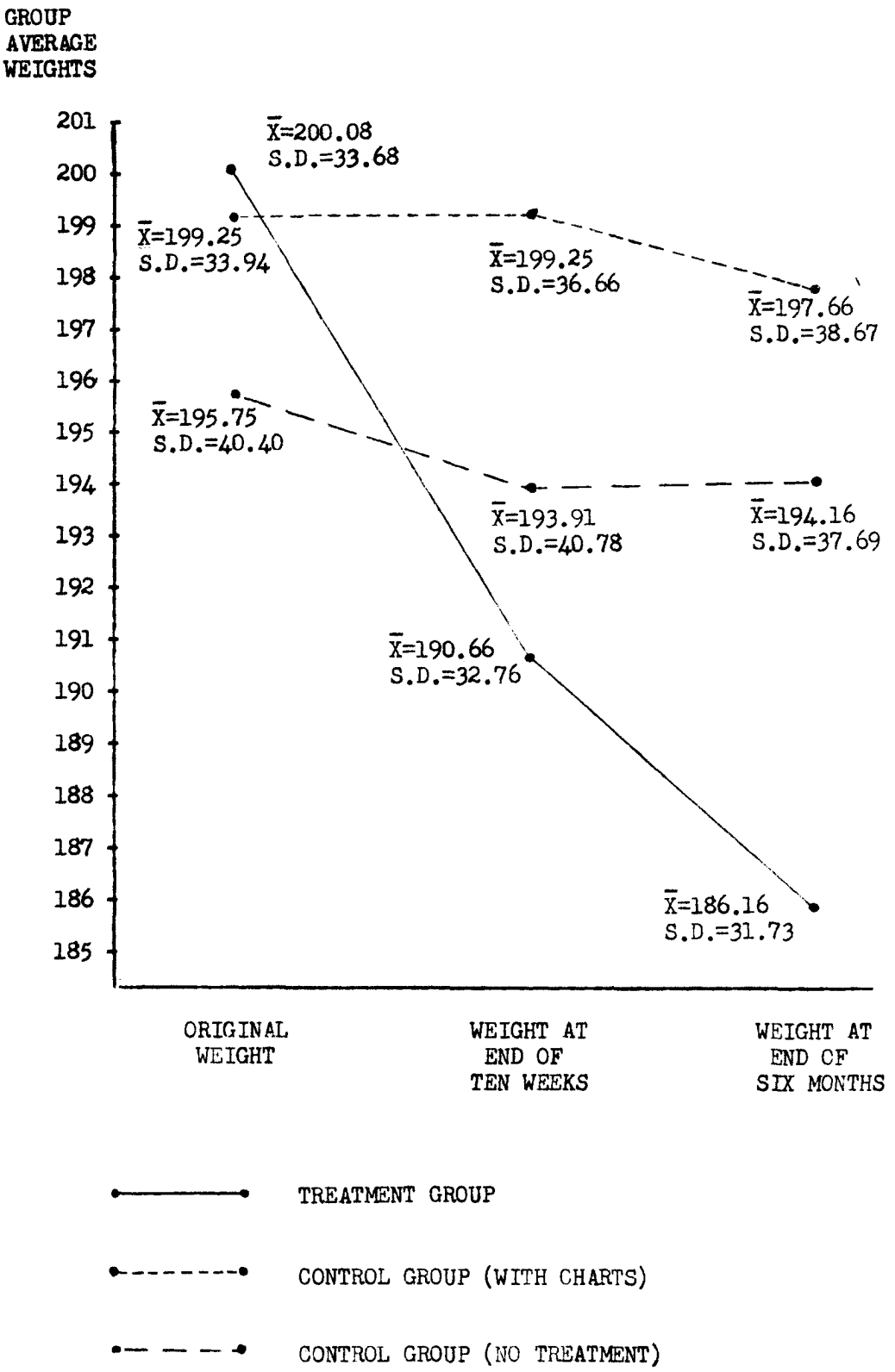
Contrasts were made within groups between the ten-week and six-month measures. (Tables 6 and 7, Appendix D, present the F ratios.) No significant differences were found between the measures of time in any groups, indicating relative stability of weight at the end of ten weeks

to the end of six months. Figure 1 graphically compares all three groups in terms of mean weights and standard deviations, at the beginning of the study, at the ten-week period and at the six-month follow-up period.

For each of the twelve treatment subjects for each of the ten weeks in the study, (1) changes in weight, (2) changes in time (length) of eating (daily averages), and (3) changes in mouthfuls (daily averages) are presented in Appendix E. All treatment subjects lost considerable weight and cut down on their food intake in the ten-week period. All but two subjects increased their time (length) of eating.

Figure 1

MEAN WEIGHTS AND STANDARD DEVIATIONS FOR ALL GROUPS



CHAPTER IV

DISCUSSION

The results indicate that the proposed hypotheses were confirmed by the study. Both short-term weight loss and long-term maintenance of the weight loss was more significant for the treatment group than either of the control groups. In fact, seven of the twelve treatment Ss continued to lose weight, whereas four Ss gained no more than two pounds each, and the fifth, five pounds. No significant differences between the placebo control and no treatment control groups lend further support to the effectiveness of the treatment.

Obese individuals who are often in a "perpetual state of dieting" try numerous diet programs and frequently find some success at weight loss. However, when the diet program has terminated and the individual is back to his old "notorious" habits, frequently the weight loss piles back on. Many dieters become easily discouraged by complicated methods at weight loss, especially where endless procedures and techniques are used which help "take off pounds quickly," but guarantee little success at long-term maintenance. The program presented in this study offers a no cost, minimal time involved, safe and sane approach to losing weight where the dieter does not have to change his food likes (as in the traditional diet programs) to lose weight and keep it off. In this study all treatment subjects reported eating the foods they normally would, but then cut down on the portions, ate slower, and appreciated the food more. All subjects expressed satisfaction with the program, finding it

helpful in developing self control in eating and in losing weight. Several were surprised they lost weight without feeling hungry as in previous diets. Verbal reports at the follow-up suggest that most of the treatment subjects have continued to eat slower and/or eat less at each meal and snack. Maintenance of the original weight loss is reflective of these behaviors.

A desirable feature found in this program of weight loss was the low dropout rate. By the third week, four Ss dropped out: a treatment female who had lost two and one-half pounds, a treatment male who had gained one pound, and a male and female control, both of whom failed to return after the first session. This low dropout rate of 10 percent (four out of the original forty) compares most favorably with the 12.5 percent to 66 percent range reported in the literature as reviewed by Harris (1969). Considering that the no treatment control basically had no treatment other than weekly weigh-in and encouragement to use their calorie charts, their attendance and continuation in the study is noteworthy. The loss of four subjects (leaving thirty-six) left three groups with equal numbers of subjects of both sexes.

In general, there were few problems in conducting this program. During the ten-week period, several subjects repeatedly missed appointments and had to be called in a number of times. Many Ss were receiving credit for introductory psychology and thus kept their appointments. Early in the study, the problem of Ss overlapping meeting times was encountered but was soon ameliorated. A problem in recruiting for a weight study via an introductory psychology course lies in the lack of motivation to lose weight by some of those who volunteer. A more effective recruitment approach might be newspaper or bulletin board

advertisements without any incentives offered (i.e., psychology credits) other than a weight loss program. In the latter weeks of the study, few appointments were missed and the program ran smoothly. Only one of the four Ss mailing in their data in the follow-up study had to be contacted a second time before responding.

One of the goals of this program was to narrow down a number of techniques and variables to find the most potent ones in helping an individual lose weight, maintain the loss and develop healthy eating habits. To achieve this goal, several controls absent in previous studies were applied.

(1) Individual meetings were set up to eliminate the effects of group pressure and reinforcements which are usually unavailable after a person has lost weight by a group method.

(2) Meetings were with an undergraduate student of slight build aware of the procedures used, but not the rationale of the study. This control minimizes the possibility of experimental bias, therapeutic effects and modelling effects if the investigator (who was using the same techniques in the study on himself) ran the study.

(3) The placebo control group given sheets to fill in and set goals was designed to control for a Hawthorne Effect.

(4) Athletes, psychology graduate students, students with medical or psychological treatment, and students on special diets were screened from the study. Also, all students had taken introductory psychology (i.e., studied the principles of reinforcement) and also reported low to moderate exercising. (See Appendix A for questionnaire.)

(5) Subjects' names were coded and Ss were randomly assigned to groups. A fairly successful attempt was made to balance for age,

initial weights, heights, and marital status, as well as sex, in forming the three groups.

Many Ss in all groups expressed the idea that partaking in a research study increased their motivation to lose weight, as their data would be "scientifically valuable." Increased motivation by the treatment group resulted from observable changes in eating habits as well as weight. Ss reported that greater enjoyment of food and the changes in weight, provided much incentive to stick with the program.

The success of this program depends on the permanence of the weight change as well as the new eating habits developed by the participant. The follow-up data, four months after the initial losses, show that subjects maintained these losses. A longer study (i.e., longer than ten weeks) and follow-up (i.e., one year later) would be of increased value in determining the permanency of change. A future study should also use a broader subject pool than students to determine the program's effectiveness on the general population. The present study did not have a follow-up on the eating habits, amount of food intake and length of time eating. To determine the permanency in change of eating habits, a re-measure for at least one week should be included during the follow-up in a future study. In short, the present study was designed to see if changing eating habits would be instrumental in developing self control in eating and long-term weight reduction. Further studies will be important in replicating the findings, analyzing the variables examined, measuring the permanence of weight loss and change in eating habits, and also applying this type of program to treatment of other habit forming behaviors.

CHAPTER V

SUMMARY

A treatment program was designed and conducted to enable obese Ss to develop self control in changing their eating habits and in losing weight and maintaining these losses. Three groups (one treatment and two controls) with six males and six females, each 15 to 20 percent overweight, took part in the ten-week program and follow-up, six months from the start of the study. The treatment focused on two major variables affecting overeating and obesity. These variables, amount of food intake and length of time involved in eating, were gradually lessened and lengthened, respectively, by treatment Ss. The treatment group achieved a significantly greater loss in the ten-week period (all Ss losing weight) than both control groups, and also maintained and even strengthened this loss through the follow-up period. Ss reported satisfaction with the program, their change in eating habits and weight losses, as well as a decreased temptation to overeat. It was suggested that future research focus on the same variables studying further the permanency of change and how to apply this type of program to treatment of other habit forming behaviors, which are very refractory to change.

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APPENDICES

APPENDIX A

SUBJECT INFORMATION QUESTIONNAIRE

DATA FOR WEIGHT CONTROL STUDY GROUP _____

1. NAME: _____
2. HOME ADDRESS: _____

   _____

   _____
3. Age: _____
4. Major: _____
5. Have you had Psychology 110? _____
6. Describe your weekly physical activity: i.e., Phys. Ed., Sports, etc.

7. Why do you want to lose weight?

	SUNDAY Weight	MONDAY Weight	TUESDAY Weight	WEDNESDAY Weight	THURSDAY Weight	FRIDAY Weight	SATURDAY Weight
BREAKFAST	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls
(OTHER)	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls
LUNCH	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls
(OTHER)	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls
SUPPER	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls
(OTHER)	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls
DAILY TOTAL	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls
DAILY GOAL	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls	Time Mouthfuls

SUBJECT #

NAME: DATE: WEEK #

WEIGHT GOAL FOR WEEK	DAY: DATE:	DAY: DATE:	DAY: DATE:	DAY: DATE:	DAY: DATE:	DAY: DATE:	DAY: DATE:
BREAKFAST	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:
OTHER	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:
LUNCH	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:
OTHER	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:
SUPPER	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:
OTHER	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:
TOTAL							
DAILY	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:	I think I did well:

SUBJECT #

APPENDIX D

TABLE 1

Group	Age	Marital Status	Height	Orig. Weight	Weight Change 10 wks.	% Change 10 wks.	Weight End 10 wks.	Weight End 6 mos.
Treatment								
Male	26	S	6'	221	-13	-6	208	202
Male	24	M	6'1"	234	-8	-3	226	218
Male	21	S	5'10"	195	-14	-7	181	183
Male	25	S	5'4"	224	-14	-6	210	204
Male	18	S	6'	239	-10	-4	229	230
Male	18	S	6'	242	-10	-4	232	215
Female	48	M	5'5"	166	-10	-6	156	158
Female	18	S	5'7"	178	-7	-4	171	173
Female	20	S	5'11"	210	-8	-4	202	190
Female	18	S	5'2"	194	-4	-2	190	195
Female	19	S	5'8"	152	-5	-3	147	136
Female	20	S	5'5"	146	-10	-7	136	130
Mean-Males	22		5'10"	225.83	-11.50	-5	214.33	208.66
Mean-Females	23.8		5'6"	174.33	-7.33	-4.3	167.00	163.66
Mean-Group	22.9		5'8"	200.08	-9.42	-4.7	190.66	186.16
Control (With Charts)								
Male	28	M	5'10"	199	-1	-1	198	187
Male	22	S	6'2"	234	-8	-3	226	222
Male	20	S	5'8"	222	+3	+1	225	230
Male	30	M	6'5"	221	+8	+4	229	224
Male	19	S	6'1"	226	-2	-1	224	225
Male	22	S	6'3"	255	+8	+3	263	275
Female	18	S	5'5"	157	0	0	157	160
Female	20	S	5'9"	190	+1	+1	191	189
Female	19	S	5'4"	163	0	0	163	156
Female	41	M	5'9"	186	-3	-2	183	172
Female	21	S	5'	142	-4	-3	133	140
Female	29	M	5'3"	196	-2	-1	194	192
Mean-Males	23.5		6'	226.16	+1.33	+.5	227.49	227.16
Mean-Females	24.5		5'5"	172.33	-1.33	-.8	171.00	168.16
Mean-Group	24		5'8½"	199.25	0	-.05	199.25	197.66
Control (No Treatment)								
Male	21	S	5'11"	215	-1	-1	214	221
Male	21	S	5'11"	188	+8	+4	196	185
Male	20	S	6'3"	251	-1	0	250	254
Male	20	S	5'8"	227	-2	-1	225	212

(Continued)

TABLE 1 (Continued)

Group	Age	Marital Status	Height	Orig. Weight	Weight Change 10 wks.	% Change 10 wks.	Weight End 10 wks.	Weight End 6 mos.
Male	23	S	5'10"	205	0	0	205	195
Male	22	S	6'	209	-2	-0	207	215
Female	30	M (W)	5'4"	143	-2	-1	141	137
Female	19	S	5'7"	162	-8	-5	154	166
Female	19	S	5'2"	150	+5	+3	155	158
Female	18	S	5'6"	192	-4	-2	188	187
Female	19	S	5'2"	144	-4	-3	140	150
Female	18	S	5'5"	263	-1	0	262	250
Mean-Males	21.1		5'11"	215.83	+ .33	+ .33	216.16	213.66
Mean-Females	20.5		5'4"	175.66	-2.00	-1.33	173.66	174.66
Mean-Group	20.8		5'7½"	195.75	- .84	-1.00	193.91	194.16

APPENDIX D (Continued)

TABLE 2

SUMMARY OF ANALYSIS OF VARIANCE FOR POUNDS LOST

Source of Variation	SS	df	MS	F
Between Subjects	1301.82	35		
A (Weight Group)	608.45	2	304.23	15.52*
B (Sex)	3.13	1	3.13	.16
AB	102.32	2	51.16	2.63
Subj. w. groups	587.92	30	19.60	
Within Subjects	1917.50	36		
C (Times Measured)	23.35	1	23.35	.42
AC	136.77	2	68.39	1.22
BC	15.12	1	15.12	.27
ABC	67.01	2	33.51	.60
C x Subj. w. groups	1675.25	30	55.84	

* $p < .01$

TABLE 3

SUMMARY OF ANALYSIS OF VARIANCE FOR PERCENT BODY WEIGHT CHANGE

Source of Variation	SS	df	MS	F
Between Subjects	436.37	35		
A (Weight Group)	151.08	2	75.54	8.32*
B (Sex)	.01	1	.01	0
AB	12.86	2	6.43	.71
Subj. w. groups	272.42	30	9.08	
Within Subjects	419.50	36		
C (Times Measured)	7.34	1	7.34	.63
AC	30.53	2	15.27	1.31
BC	11.69	1	11.69	1.00
ABC	18.86	2	9.43	.81
C x Subj. w. groups	351.08	30	11.70	

* $p < .01$

APPENDIX D (Continued)

TABLE 4

CONTRAST BETWEEN GROUPS AT 10-WEEK PERIOD
(Percent Weight Change)

C_1 = placebo control with no treatment control

C_2 = placebo control and no treatment control with treatment group

$F = \frac{SSC_1}{M\ S\ error} = .0738$ N = 12 K = 3 M S error = 9.08

$F = \frac{SSC_2}{M\ S\ error} = 16.5443*$

* $p < .01$

TABLE 5

CONTRAST BETWEEN GROUPS AT 6-MONTH PERIOD
(MEASURED FROM END OF 10-WEEK PERIOD)
(Percent Weight Change)

C_1 = placebo control with no treatment control

C_2 = placebo control and no treatment control with treatment group

$F = \frac{SSC_1}{M\ S\ error} = .5553$ N = 12 K = 3 M S error = 9.08

$F = \frac{SSC_2}{M\ S\ error} = 2.8282$

APPENDIX D (Continued)

TABLE 6

CONTRAST WITHIN TREATMENT GROUP BETWEEN 10-WEEK AND 6-MONTH PERIODS
(Percent Weight Change)

$$F = \frac{SSC}{M\ S\ error} = 2.792 \qquad M\ S\ error = 11.70$$

TABLE 7

CONTRAST WITHIN PLACEBO CONTROL AND NO TREATMENT CONTROL GROUPS BETWEEN 10-WEEK AND 6-MONTH PERIODS

$$F = \frac{SSC}{M\ S\ error} = .0223 \qquad M\ S\ error = 11.70$$

APPENDIX E

TREATMENT SUBJECT #1
Sex: Male Age: 26 Height: 6'

Week	Weight (lbs.)	Mouthfuls	Time (mins.)
1	221	126	26
2	218	118	28.5
3	216	112	29.5
4	214	108	30
5	214	99	31
6	211	94	32
7	210	91	29.5
8	210	89	32
9	208	88	33
10	208	84	33.5

TREATMENT SUBJECT #2
Sex: Male Age: 24 Height: 6'1"

Week	Weight	Mouthfuls	Time
1	234	108	21
2	234	101	25
3	233	100	23
4	232	100	25
5	233	96	26
6	232	95	26.5
7	230	93	28
8	229	91	30.5
9	227	88	31
10	226	86	31.5

TREATMENT SUBJECT #3
Sex: Male Age: 21 Height: 5'10"

Week	Weight	Mouthfuls	Time
1	195	98	20
2	193	96	21
3	195	95	22.5
4	190	92	24
5	187	92	23
6	186½	94	26
7	185	90	26.5
8	181	87	26
9	183	85	28
10	181	84	30

APPENDIX E (Continued)

TREATMENT SUBJECT #4
Sex: Male Age: 25 Height: 5'4"

Week	Weight	Mouthfuls	Time
1	224	97	27
2	221	91	29
3	219	88	33.5
4	218	84	35
5	216	80	36
6	215	77	38
7	213	75	40
8	212	72	41.5
9	211	70	43
10	210	70	43.5

TREATMENT SUBJECT #5
Sex: Male Age: 18 Height: 6'

Week	Weight	Mouthfuls	Time
1	239	122	28
2	239	112	29.5
3	237	105	30
4	233	101	31
5	233½	98	33
6	232	94	29
7	230	92	34
8	229	90	34.5
9	230	87	35
10	229	86	36

TREATMENT SUBJECT #6
Sex: Male Age: 18 Height: 6'

Week	Weight	Mouthfuls	Time
1	242	118	34.5
2	239	112	37
3	237	107	36
4	233½	89	36.5
5	234	73	37
6	233	64	36
7	233½	55	38
8	233½	52	35.5
9	232	45	40
10	232	39	37

APPENDIX E (Continued)

TREATMENT SUBJECT #7
Sex: Female Age: 48 Height: 5'5½"

Week	Weight	Mouthfuls	Time
1	166	117	48
2	163	107	53.5
3	162	103	53
4	164	98	52
5	157	92	43
6	156	87	45
7	156	84	42
8	157	80	44
9	157	79	34
10	156	79	39

TREATMENT SUBJECT #8
Sex: Female Age: 18 Height: 5'7½"

Week	Weight	Mouthfuls	Time
1	178	92	42
2	176	78	44.5
3	180	72	43
4	182	49	35
5	174	43	33
6	174	34	32
7	174	36	27
8	172	34	31
9	172	25	26
10	171	31	28

TREATMENT SUBJECT #9
Sex: Female Age: 20 Height: 5'11½"

Week	Weight	Mouthfuls	Time
1	210	54	36
2	208	52	38
3	206	50	38.5
4	206	47	41
5	207	44	43
6	204½	42	43
7	203	41	46
8	202	41	49
9	203	40	52
10	202	38	54

APPENDIX E (Continued)

TREATMENT SUBJECT #10
Sex: Female Age: 18 Height: 5'2"

Week	Weight	Mouthfuls	Time
1	194	88	24
2	194	85	26
3	191	79	31
4	192	82	29
5	190	79	34
6	191	82	38
7	191	85	42
8	190	77	39
9	191	76	39
10	190	76	39.5

TREATMENT SUBJECT #11
Sex: Female Age: 19 Height: 5'8"

Week	Weight	Mouthfuls	Time
1	152	76	25
2	156	68	28
3	151	68	29
4	149	67	33.5
5	149	62	28.5
6	150	57	30
7	149	53	25.5
8	147	51	26
9	147	48	26
10	147	43	27

TREATMENT SUBJECT #12
Sex: Female Age: 20 Height: 5'5"

Week	Weight	Mouthfuls	Time
1	146	48	28
2	144	45	29.5
3	141	44	31
4	139	39	33
5	138½	37	32
6	140	40	31
7	142	36	30.5
8	140	35	33
9	139	35	33
10	136	35	34