

A COMPARISON OF THE EFFECTIVENESS OF A, COMBINED
HEALTH EDUCATION AND ADAPTIVE, PHYSICAL
EDUCATION PROGRAM WITH A REGULAR,
PHYSICAL EDUCATION PROGRAM,
IN REDUCING OBESITY

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CHAPTER I

THE PROBLEM, DEFINITION OF TERMS USED, DESIGN OF THE STUDY, AND LIMITATIONS OF THE STUDY

The hazard of being overweight is universally recognized. Obesity is a serious problem to the individual for social, emotional and economic reasons as well as for health reasons. Obese persons are unable to join with others in many ordinary activities or to win complete acceptance from their peers.

Obesity is the most common cause of early death, and is one of the most difficult illnesses to cure. Overweight is a serious problem in the United States. In 1964, conservative estimates indicated about twenty million persons in this country were ten per cent or more overweight, and some five million were at least twenty per cent overweight.¹

The researcher has had girls in her classes each year that have tipped the scales at two-hundred pounds or more. Some years there have been two or three girls in this category and through the year of 1967-1968 four girls tipped the scales at over two-hundred pounds. Of the complete sophomore class of 1967-1968, nearly twenty-two per cent of the girls were ten per cent or more overweight.

¹Warren R. Guild, M.D., How To Keep Fit and Enjoy It. A Step-by-Step Approach to Fitness After 30 (New York: Cornerstone Library, 1967), p. 78.

I. THE PROBLEM

Statement of the problem. It was the purpose of this study to compare the effectiveness of a combined health education and adaptive physical education program with a regular physical education program in reducing obesity of high school females.

Hypothesis. The adaptive program will accomplish more in reducing obesity than the regular physical education program.

Assumptions. The assumption was made that subjects from different socio-economic groups would show the same general results.

The assumption was made that obesity in all subjects was due to factors which could be aided by the adaptive program.

Importance of the study. Most of the research developed in reducing obesity has been limited mainly to a therapeutic type of program. These studies deal with dieting and not with the exercise factor.

Jolliffe described the social handicap of obesity. This handicap is pronounced, particularly in adolescence, when "Fatty" is seldom chosen first for games. Later he is chosen last and finally not at all. Recent studies have

shown from fifteen to forty per cent of our children are obese.²

More recent research showed the obese child moves only one-third as much as his lean counterpart. Past research also indicated most adolescents who are obese remain obese throughout life.

There have been many research projects on weight lifting and weight training for different purposes. There are research projects of weight training for muscle growth, conditioning for football, basketball, speed, strength, track, shot put, javelin, explosive power, jumping ability, swimming, and baseball but none on weight control specifically.

II. DEFINITION OF TERMS

Adaptive Physical Education. This was a program in physical education which specifically provided a place for specialized instruction in weight training and jogging.

Health Education. A special program of health education was used to point out and impress on the subjects the problem of obesity.

Jogging. Jogging means a steady or an easy paced run with breath catching periods of walking. Jogging

²Norman Jolliffe, Reduce and Stay Reduced (New York: Simon and Schuster, 1952), p. 3.

means a kind of running, or a slow trot, just a step above walking.

Obesity. In this paper obesity is defined as any deviation over twenty per cent or more above the desired weight for a person as listed in the Metropolitan Insurance Company Chart of Desirable Weights.

Overweight. Weight between ten and twenty per cent above what is recommended as listed in the Metropolitan Insurance Company Chart of Desirable Weights. The terms obesity and overweight will be used interchangeably throughout this paper.

Regular Physical Education. This was a program designed to develop the individual physically, socially, emotionally, and mentally through physical activities. The investigator tried to obtain these objectives through calisthenics, and activities such as speedball, modern dance, folk dance, rhythmic gymnastics, volleyball, basketball, gymnastics, track, tennis and archery.

Weight Training. Weight training was sets of exercises with weights. Barbells with weights on either end and dumbbells were used for this program.

III. DESIGN OF THE STUDY

The subjects included sixty-three sophomore students enrolled in two regularly scheduled physical education classes at Ottawa High School. The first class of the day was designated as the control group. This class met from 8:30 until 9:25 in the morning and was taught as the regular physical education program. The second class was designated as the experimental group and met from 9:30 until 10:25 in the morning and was taught two and one-half days by the adaptive physical education program. Two and one-half days of the adaptive program were taught the same as the regular physical education program.

An attempt was made to equate the groups as to the number of obese girls in each class through the enrollment office. In the control group there were seven obese girls. The experimental group started with nine obese girls and two were dropped because they did not finish the program.

The control group consisted of twenty-nine students and were taught calisthenics that were used throughout the year as warm-up, strength producing and stretch exercises. The year was set up in units allowing approximately six weeks per unit. During the first three weeks skills, rules, and officiating were taught and practiced with short games intermingled. Fourth and fifth weeks were used to work skills into game situations. The sixth week tournaments

were played and rule tests were given. At the beginning of each six weeks the President's National Council on Youth Fitness physical fitness test was given with rope jumping and squat jumps added by the instructor.

The experimental group consisted of thirty-four girls. In the first three weeks approximately one day of the week was used as an introductory course on the problems of obesity. For this introduction films, lectures and discussions were used. Correct forms of weight lifting and jogging were taught at first, then practiced throughout the year. The adaptive program proceeded for two and one-half days per week with the other two and one-half days being used for the regular physical education program. The President's physical fitness test with two tests added by the instructor were administered the first of each six weeks.

Parents of the obese girls were invited to a conference at the first of the second semester. The program was explained to them and the researcher asked for their cooperation in providing proper nutrition and calories for their children.

Height, weight and measurements were taken at the beginning of the school season. The Metropolitan Insurance Chart of Desirable Weights was used to figure the amount of overweight and the percentage of overweight for the obese

girls. Weight and measurements were taken each month throughout the school year to see if there were any changes. If changes were made the subjects would be conscious of this change and might make an added effort to improve. The end of the year height, weight and measurements were again taken and the amount of overweight and percentage of overweight was again figured. The Mann-Whitney U test was then applied to the difference of percentage loss or gain of the subjects to see if there were a significant difference between the control and the experimental group. Conclusions and recommendations were then written for this study.

IV. LIMITATIONS OF THE STUDY

The study was limited to fourteen female students ranging from fifteen to sixteen years of age in the sophomore class in Ottawa High School, Ottawa, Kansas.

The students selected were at least ten per cent overweight according to the Metropolitan Insurance Company Chart of Desirable Weight.

The number of class periods were five periods per week with two and one-half of these periods being used for the adaptive and health education program.

The study was limited to data taken over a period of nine months.

CHAPTER II

REVIEW OF THE LITERATURE

I. LITERATURE ON OBESITY

The current American attitude toward excessive weight is presently so derogatory that even mild degrees are frowned upon. Being fat is considered ugly, unhealthy, a sign of greed and self-indulgence.

Obesity is the most common cause of early death. However, few over-weight persons lose weight because they are scared into doing so. There are statistically valid reasons to be concerned about obesity. Not only does obesity have the most significant correlation with early death, but it is one of the most difficult ills to cure. Unbelievable as it may seem, the cure rate of obesity is less than two per cent. The cure rate for cancer is far higher.³

If a middle-aged person is ten pounds above the normal weight for his height, the danger of death is increased eight per cent; if he is twenty pounds overweight, the mortality rate is eighteen per cent greater; for thirty pounds overweight, the percentage is twenty-eight per cent; fifty pounds overweight, the death rate is fifty-six per cent above average.

Dr. Dublin and Dr. Marks found mortality from coronary artery disease in the overweight male was over forty per cent greater than for individuals of normal weight.⁴

³Guild, loc. cit.

⁴Ibid.

How prevalent is obesity? The average American is twenty pounds overweight. Thus, the incidence of obesity and the meager results of therapy impressively demonstrate the enormity of the problem. Overweight has become a serious problem in the United States. In 1964, conservative estimates indicated about twenty million persons in this country were ten per cent or more overweight, and some five million were at least twenty per cent overweight.⁵

Various factors contribute to overeating and thus to the overweight problem of today. Our relative affluence has enabled people to spend more money on food than in the past. Introduction of modern methods of production in industry and labor-saving devices in the home has meant most of us do not work as hard physically as in the past. We also have a shorter working day and more leisure time. We drive automobiles instead of walking; we watch games instead of participating. Also, we rarely change our eating habits as we grow older. A child will naturally copy the eating habits of his parents. If parents eat too much, the child will also have a tendency to do so.⁶

Economic and cultural factors may determine diet. Low-income families have found carbohydrates, such as potatoes or macaroni, are less expensive than many meats and other high protein foods. They are filling and are easier to prepare. Such food eaten in large quantities can quickly lead to obesity.

⁵Dr. H. K. Michael Irwin, Overweight--A Problem for Millions (Public Affairs Pamphlet No. 364), p. 1.

⁶Ibid.

Many persons have found eating can relieve feelings of tension, anxiety, or frustration, and use eating as a safety valve. Others eat when depressed or lonely, using food as a form of compensation. Still others, as a result of attitudes developed in their childhood, eat large amounts of food such as candy and ice cream as a substitute to replace security and love needs.

Many laymen have the fond impression of the roly-poly person chuckling through life and radiating good cheer. Medical opinion, however, associates obesity with depression. Government research cites a study by L. F. Monello and Jean Mayer found personality traits among obese adolescents were " . . . strikingly similar to the traits sociologists have shown to be typical of youngsters in oppressed minority groups who were victims of intense prejudice."⁷

Obese people usually are very sensitive. They detect the destructive and unkind reactions of others almost by instinct and without a spoken word. When someone looks at them for the first time, they see what the person is thinking.⁸

Dr. Frederick Werkman of George Washington University School of Medicine and the Division of Adolescent Psychiatry

⁷Ellen W. Buzbee, "Future in the Scale," New York Times Magazine (New York Times Co., March 12, 1967), p. 96.

⁸Ibid.

at the Children's Hospital in Washington D.C., told the International Congress of Child Psychiatry in Edinburgh in 1966 that he had found statistical support for linking depression with obesity. He reported:

Our studies were done at a medically oriented summer camp We found that there is more general psychic discomfort and anxiety and social uneasiness in this group (and) evidence that depression is a regular accompaniment of obesity.

Dr. Werkman was most concerned with his findings that show "a life style that is seriously distorted" among obese adolescents.

I feel that this is the most important aspect of obesity and the one that needs stressing--its social consequences, the way it affects these individuals.⁹

Usually these adolescents are quite close to mother. They have not accepted the challenges of life, and mothers have fostered this through over-protection. Dr. Werkman said that obese youngsters miss out on adolescent experiences, lose independence and a chance to learn about life. They avoid challenges and tend to settle for the humdrum. This affects the youngsters future course of life.

Dr. Leroy Engel, a pediatrician in White Plains, observed a girl who was very good in school and at home. She was always practical and seemed to do things beyond her years. Dr. Werkman pointed out that this maturity was

⁹Ibid.

a sign of an unhealthy emotional and social development, and would probably aggravate her obesity problem.¹⁰

Dr. Bruch, a psychiatrist and an expert on obesity said that many fat people could not differentiate between bodily sensational and emotional states. They never know when to stop eating. He said that they were not hungry and did not experience pleasure from their eating. This kind of eating is the result of incorrect learning. Most parents have resorted to offering cookies or a lollipop when their little darling acted out his curiosity, such as chewing the electric wires in the doctor's office or his anger by dumping a display in the supermarket. Trying to distract him with food is "an inappropriate response." In many families, every unpleasant encounter with life is smoothed over with food. Parents are wrong on two counts: they are preventing the child from learning to cope with life; and they are instilling the idea that food is the answer to stress and frustration.¹¹

Everyone inherits a basic structure. This structure can be modified, altered, and improved, but not redone. Gross abnormalities of the chassis are more the fault of an individual's habits than those of his genes. Obesity

¹⁰Ibid.

¹¹Ibid.

and flabby muscles are the reason for dumpy physiques. The grotesqueness of most amorphous citizens is acquired, not inherited. Fitness and weight control are curative.¹²

Fatness is a sickness. Perhaps like no other, it is terribly destructive to one's psychic and social life. Fatness is also a sickness in that a person's metabolism may be disrupted from its normal function. The fat person has a miserable image of himself, and this affects him socially, sexually and economically. This individual functions as a cripple. Chronically fat people really feel hopeless of the possibility of change. In addition to being uncomfortable, causing emotional problems, and social uneasiness, overweight is a health hazard.¹³

Man's eating is influenced by both hunger and appetite. Hunger is a craving for food--sometimes occurring as a sensation of emptiness or even cramp-like pains in the stomach--that can be satisfied by eating. Even when hunger ceases to exist, an appetite can remain. For instance, one can still have an appetite for a sweet dessert although one's stomach may be nearly full.

Food provides the energy our bodies need for physical and mental work, as well as for automatic activities

¹²Ibid.

¹³Theodore Isaac Rubin, "A Thin Book," McCalls, 93:55, January, 1966.

like breathing and maintaining muscle tone. In children this energy also is used in growth. If the body is supplied with too much food, this excess material is stored in the body in the form of fat, and the body gains weight. One pound of body weight is equal to the storage of 3,500 calories. Eating one hundred calories less each day and using up one hundred calories more will mean approximately 6,000 calories a month--nearly two pounds of weight. A person under a doctor's care might be able to cut down as many as 1,000 calories per day and lose two pounds per week. More than this is not recommended for there might be a loss of nutrition.

The person most likely to have success in losing weight is the one who is so miserable, embarrassed, insecure, and humiliated that he insists on a doctor's appointment for this purpose and not because it would be better for him. Married or single, the thinking, alert individual wants to look sexy. It is also universal, moral, legal, socially acceptable, and profitable in dollars and cents.¹⁴

Motion pictures taken of obese adolescents indicated a lack of activity was the reason for their obesity. The obese child spent only one-third as much time in physical activity as his more slender counterparts. Of activities recorded, swimming showed the greatest disparity. The non-obese were inactive twenty per cent of the time, while the obese were inactive 80.9 per cent of the time.¹⁵

¹⁴Guild, op. cit., p. 74.

¹⁵Jean Mayer, "Adolescent Obesity Laid to Idleness Rather Than Diet," Medical Tribune, January, 1965.

Bruch has come to the conclusion that all fat children are physically less active than lean children and that inactivity is the chief cause of obesity. The lack of exercise expresses a disturbance in these children's total approach to life, a real lack of enjoyment of physical activity due to a deep-seated mistrust about being able to master any athletic skills. Fat boys and girls save energy in every movement though because of the heavier bodymass they actually use more energy than lean children. Their inhibition of activity represents a more fundamental disturbance than overeating.¹⁶

One of the benefits of physical activity is that it can be good for health as well as pleasure in its affect on obesity. Not enough people realize activity of any kind can help prevent obesity or help take off excess weight. If the physician can help a patient understand weight control is a matter of balancing caloric intake and caloric output, half the battle is won. The other half is getting the patient to act on this knowledge.¹⁷

The overweight individual has deposits of fat, or unused food energy, stored in his body. The basic principle

¹⁶John B. Wells, Dr. Jana Pariskova, and Dr. Ernst Jokl, "Fitness and Fatness," Journal of the Association Physical and Mental Rehabilitation, April, 1962, p. 5.

¹⁷Guild, op. cit., p. 80.

of weight-reduction is to make the body begin consuming these deposits in meeting its daily needs. This can be accomplished by lowering the caloric intake and by increasing the amount of energy the body uses through exercise. Sporadic exercise is of little use. Exercise should be taken daily. The effort to persuade overweight people to start moving is a problem. They cannot compete with just any one. They must compete with people who are also overweight.¹⁸

Exercise, not diet, is the easiest and most predictable way to lose weight. Medical evidence shows optimum weight loss proceeds at approximately two pounds per week. At this rate the dangers of depression and the chances of long range success achieve a balance which tilts in favor of the patient. Contrary to popular belief, exercise destroys appetite. No athlete I know can sit down after a vigorous workout and eat. Sports and exercise can remove fat and increase muscle tone--safely and predictably.¹⁹

This and other evidence has dispelled the popular canard that one cannot lose weight with exercise alone. Various types of exercise consume varying numbers of calories. Through exercise and with regular diet, one can lose a definite and anticipated amount of weight.

In 1945 evidence was presented showing physical inactivity as an essential feature of the behavior of obese children. An intensive exercise regime caused far reaching changes of physique and character of fat boys and girls. In

¹⁸Wells, and others, loc. cit.

¹⁹Mayer, loc. cit.

a grossly overweight boy with major developmental and behavioral abnormalities, physical training caused a great loss of weight as well as the disappearance of the physical and personality disturbances originally associated with obesity.²⁰

Another medical study confirmed that even when consuming a varying number of calories, through exercise one can hold or lose a definite and anticipated amount of weight. College men were offered generous sums of money provided they kept their weight constant. They were neither to gain nor lose weight. The caloric content of the diet was then altered. First, the students were placed on a low calorie diet. On this diet the students discovered they had to limit activity to keep from losing weight. Then the diet was increased to 6,000 calories and the students had to exercise frantically to keep from gaining weight. Exercise and weight are inseparably related.²¹

In adolescence obesity is frequently accompanied by marked delay in puberty. Exercise exerts a remedial influence upon the developmental retardation. Under the influence of exercise structural, behavioral, metabolic and

²⁰Wells, and others, op. cit., p. 3.

²¹June K. Lloyd, O. H. Wolff, and W. S. Whelen, "Childhood Obesity--A Long-Term Study of Height and Weight," British Medical Journal, July, 1961, p. 145.

functional characteristics of fat children undergo decisive changes. The extent and effectiveness of morphological maladjustments to training of obese individuals depend upon the intensity of physical activity.²²

Until recently medical science ascribed obesity solely to be an excessive intake of food. Studies were performed on well-proportioned adolescent girls and their chubby classmates. The plump girls universally denied over-eating--in fact they all claimed to be eating just enough to keep a fly alive. The study consisted of a careful analysis of diets of the trim girls and the chubbies. It also made careful measurements of their daily activity by means of a pedometer attached to the waist. The fat girls ate no more than their more slender classmates. The explanation for their excessive weight was their daily activity was only one-third as much.²³

Through a life span, from nine years of age on, fat accounts for a higher percentage of total weight in females than in males. In adult life fatness increases faster for men than for women, yet women above age nine are on the average fatter than men.²⁴

²²Ibid.

²³Guild, op. cit., p. 83.

²⁴U.S. Department of Health, Education and Welfare, Obesity and Health (Washington, D.C., 1966), p. 20.

There are few studies of the natural history of childhood obesity. Dr. Mullins found about one-third of his adult patients were obese and that at least one-third of these had been obese since childhood. The only long-term prospective study of childhood obesity appears to be that of Haase and Hosenfeld (1956). It was based on three hundred thirty-five overweight children examined between 1936 and 1940. Fifty of these patients were re-examined after the war, when the majority were between twenty and thirty-six years of age. Four-fifths of the patients were still grossly overweight. At the first examination no patient had been more than eighty per cent overweight, but at the follow-up examination three were more than eighty per cent overweight. The prognosis tended to be worse for the girls than for the boys.²⁵

While it is true that obesity can be the result of organic causes, such cases are relatively rare. Overweight is a problem that affects only civilized man and a few tame animals.

Life insurance statistics and clinical studies have demonstrated that obesity is one of the chief threats to longevity and to continued good health in later years. The need for weight control programs is evident.²⁶

²⁵Lloyd, and others, loc. cit.

²⁶Ruth C. MacIntosh, and others, "A Study of Methods Used in a Reducing Program for Excessively Overweight Women," American Journal of Clinical Nutrition, 7:132, March, April, 1959.

Energetic treatment of obesity in childhood followed by prolonged supervision to prevent relapse is important in the prevention of obesity in the adult with its well-recognized influence on morbidity and mortality.²⁷

II. RESEARCH ON WEIGHT TRAINING AND JOGGING

Weight training. Boucek did a study in 1966 on the effects of weight training on bodyweight and speed. In this study there was usually a gain in weight and an increase in speed but with a loss of inches of the waist.²⁸

Parker's study used both men and women subjects. Parker's study was on the relationship between reaction time and progressive resistive exercise, 1960. Measurements were taken prior and subsequent to the study. Reaction times for men were shorter, and women showed a greater mean decrease. Throughout the study size decreased except in the chest, but weight stayed constant.²⁹

Jogging. Cooper claims that diseases aggravated by obesity such as heart disease, diabetes, lung disease,

²⁷Ibid.

²⁸Bill Boucek, "The Effects of Weight Training on Bodyweight and Speed," Strength and Health, 34:16-18, May, 1966.

²⁹Arthur B. Parker, "A Study of the Relationship Between Reaction Time and Resistive Exercise," Completed Research in Health, Physical Education, and Recreation, 4:69, 1962.

CHAPTER III

DESIGN OF THE STUDY

It was the purpose of this study to compare the effectiveness of a combined health education and adaptive physical education program with a regular physical education program in reducing obesity.

I. SUBJECTS

Sixty-three sophomore girls were enrolled in two regular physical education classes. One class, composed of twenty-nine sophomore girls, was designated as the control group. Seven girls in this class were classified as obese and were subjects for this study. The control group was taught by the regular physical education program. The second class consisted of thirty-four sophomore girls and was designated as the experimental group. Nine girls of the experimental group were classified as obese and started as subjects. Two were removed from the study because of withdrawal from school.

The girls used as subjects were ten per cent or more overweight. To determine the per cent of overweight the Metropolitan Life Insurance Chart of Desirable Weights (Appendix A, page 49) was used. In the more recent chart it is suggested that one pound of weight be subtracted for

each year of age under twenty-five from the pounds given on the chart. The investigator added two inches to the subjects height as the subjects were not measured in two inch heels as designated by the Metropolitan Insurance Company Chart of Desirable Weights. Using the school nurse as a consultant, the investigator noticed the subjects' bone structure and classified them as middle or large frame. In the researcher's and school nurse's opinion, none of the girls fell in the small frame category. For calculating the overweight of the subjects after adding two inches of height, the heavier weight in the frame size was chosen, then one pound subtracted for each year of age under the age of twenty-five. The investigator then subtracted the desirable weight from the actual weight of the subject. To find the per cent of overweight, the desirable weight was divided into the number of pounds overweight.

Equation of groups. The instructor worked with the counselor to enroll approximately the equal number of obese girls in each section. In the control group there were seven girls classified as being obese and in the experimental group there were nine girls classified as being obese at the beginning of the study. Two of the nine girls were removed from the study because of withdrawal from school, leaving seven girls in the experimental group.

Weighing of the subjects. Height and weight was taken the first class meeting of the year for both groups. The chart for the control group is found in Appendix C, page 52, and for the experimental group in Appendix E, page 55. The first of each month, the girls were again weighed, in normal physical education attire which consisted of a short sleeved blouse, shorts, socks and tennis shoes. The weighing was done by the physical education instructor or her trained assistant on a set of physician scales. The scales were kept in the instructor's office and were not allowed to be used except by her or her trained assistant; this was to eliminate the chance of disturbing the balance of the scales and thus create an error in measurement.

Measurements were taken at the same time as height and weight were taken. The investigator wished to see if there would be a change in measurements even though there might not be a change in weight.

Normal weight girls in experimental class. Since the experiment was in a regularly scheduled physical education class set aside for the purpose of the experiment, the normal weight girls appear to be excluded. The investigator might have conducted a dual experiment, with the second phase to see if there were differences in physical fitness and performance of the experimental group from the control group. The investigator had in mind help for the obese, but

did a comparison as to whether the physical fitness performance was improved more in the experimental group than in the regular physical education group. It was felt the weight training in one class did not detract from the overall physical education program. In fact, this gave the experimental group another activity in physical education not normally included in the girls' program.

II. INSTRUMENTS OF MEASURE

Health blanks. Health blanks were given to all obese subjects (Appendix B, page 50), to be taken to the subject's personal medical doctor to be completed and returned. The information gained from the health blank provided approval or permission for enrolling the subjects in a physical education program. If the health blank was not returned, the researcher assumed the subject had permission to follow the prescribed program.

Scales. A set of physician scales was used to measure height and weight of students. The scale was used by the instructor or an assistant trained to use the instrument. If the student measured less than one-half inch at a certain height, the fraction was dropped. If one-half inch or more was measured at a certain height, the next inch of measurement was used, since there were no designations on the Metropolitan Insurance Company Chart of Desirable

Weights for fractions of an inch. The same procedure was used in taking weight.

Tape measure. A tape measure was used for measurements of bust, waist, hip and thigh of all subjects. Control group measurements are found in Appendix D, page 54. Experimental group measurements are found in Appendix F, page 57.

III. ADAPTIVE PHYSICAL EDUCATION

The adaptive program (Appendix J, page 63) consisted of three phases. This program met from 9:30 until 10:25 in the morning, five days a week. There were a total of thirty-four girls in this program with nine of the students classified as obese. Two of these obese girls were removed from the study since they withdrew from school.

Phase one. Phase one of the adaptive program was a health education program which was used as an introduction. Only three days were used for this phase. The first Monday of the school year the county nurse gave a thirty minute lecture on obesity and showed films concerning social activities of an obese person compared to a normal weight person, and improving posture. All films are listed in Appendix G, page 58.

The second Monday of the school year the county nurse lectured on the importance of proper nutrition, showed

films, and explained the number of calories a normal active girl should consume each day. She then taught the complete class how to count calories. The class was shown how food of low calorie content could be substituted for more favorite high calorie foods. Pamphlets were distributed explaining proper foods for good nutrition; also, pamphlets listing amounts of food and calorie content were given each girl to make calorie counting easier. All pamphlets given to girls are listed in Appendix G, page 58.

The investigator gave cards (Appendix H, page 59) to each girl for recording the total calories consumed each day. Obese girls were advised to reduce their calorie intake 1,000 to 1,500 calories a day.

The third Monday of the school year another film was featured giving statistics of diseases which are aggravated by obesity. The incidence of heart disease of obese persons over normal weight persons was stressed. Life expectancy of an obese person was considered much less than that of a normal weight person.

Throughout the year short discussions were held on the problem of obesity, what the girls thought might be the underlying reason and what progress, if any, was being made.

Second semester a conference was arranged with the parents of the obese girls. About one-third of the parents appeared for this conference. The school nurse explained to

the parents the problems associated with obesity such as depression, disease and lack of self-confidence. The investigator explained the experimental program being used in the physical education class. Pamphlets (Appendix G, page 58) were given to the parents and their cooperation as far as diet was concerned was requested.

Phase two. Phase two of the adaptive program was the weight training and jogging program. This phase was used two and one-half days a week on Tuesday, Thursday, and one-half day Friday for the complete year. Weight training was chosen for two reasons: one, to see if a resistance exercise might do more to reduce obesity, and two, the program might increase upper body strength which most girls lack. Jogging was also used for two reasons. Most girls do not move enough and this program, according to Bowerman and Cooper, is the best for physical conditioning, or getting oxygen to all parts of the body. Also, jogging uses more energy than most exercises, therefore, should burn more calories.

In the outdoor fall and spring program the subjects started with one-quarter mile jogging around the track and finished the period with weight training. Outside distance was increased to one mile around the track. For the indoor program jogging consisted of six laps at the beginning and was increased to twelve laps around the gym. Weight

training consisted of lifting weights in several basic lifts (Appendix K, page 65) such as curls, press, supine press, and rowing. Different exercises were used on alternating (weight lifting) days so the program would not be quite so boring. Other lifts or weight exercises were prone arch back, sit-up, lateral and front raise. The subjects started with ten to twenty pounds depending on what they could lift. They then lifted this weight in a set of six repetitions at one station before advancing to another station. When this work was controlled easily they increased to a repetition of ten or more lifts at each station. When the increased set could be lifted with ease and control, the weight was increased to fifteen or twenty-five pounds.

The total weight at any one exercise position was never more than twenty-five pounds. Each individual did as many repetitions at each station that she could control.

Phase three. The third phase of this program included the same activities as the regular physical education program. This program was administered two and one-half days a week on Monday, Wednesday, and one-half day Friday for the complete year. The President's Youth Council of Physical Fitness tests with the two added tests were administered the first of each six weeks.

IV. REGULAR PHYSICAL EDUCATION PROGRAM

This program was the control group (Appendix I, page 60) and met from 8:30 until 9:25 in the morning, five days a week. There were a total of twenty-nine girls in the class with seven of them classified as overweight. The regular physical education program consisted of calisthenics, learning the rules, skills and playing of such activities as speedball, modern dance, folk dance, rhythmic gymnastics, archery, tennis, track and softball. The President's Youth Council of Physical Fitness test with two tests of the instructors were administered the first of each six weeks. The instructor's tests were jump rope, with two feet at once, for one minute and the number of squat jumps a person could do not using over five minutes.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

To find if the experiment was significant, the investigator chose the Mann-Whitney U test (Appendix M, page 70). This test was applied to the percentage of loss or gain of weight taken over a period of nine months of both the control and experimental group.

I. ANALYSIS OF DATA

The Mann-Whitney U test is said to be one of the more powerful of the non-parametric tests when the measurement is weaker than interval scaling. There are three merits to non-parametric testing. They do not assume that the scores under analysis were drawn from a population distributed in a certain way, they are ranking tests--scores need not be exact in a numerical sense--and their computation is simple.³²

In the Mann Whitney U test one would accept or reject the null hypothesis. If, in rejecting the null hypothesis, this would indicate that you accept H_1 . The investigator stated her hypothesis in Chapter I as H_1 .

³²Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Company, Inc., 1956), p. preface vii.

Since H_1 indicated the direction of the predicted difference, the region of rejection is one-tailed. It consists of all values of U which are so small that the probability associated with the occurrence under H_0 is equal to or smaller than $\alpha = .05$.

If the Mann-Whitney test is applied to data which might properly be analyzed by the most powerful parametric test, the t test, its power-efficiency approaches $3/\pi = 95.5$ per cent as N increases and is close to 95 per cent even for moderate-sized samples. It is therefore an excellent alternative to the t test, and of course it does not have the restrictive assumptions and requirements associated with the t test.³³

Table I and Table II indicate all beginning weights for both control group and experimental group, amount of overweight and percentage of overweight. The tables indicate weight at end of experiment, how many pounds of overweight and percentage of overweight. As a final figure, the tables show if there is a gain or loss in percentage of overweight.

Table III then ranks the percentage of loss and gain in overweight of both groups from the highest to lowest. These figures were used to determine U . When U is determined, the table taken from Siegal (Appendix M, page 70) is used to find α . To be significant, α is designated at .05.

³³Ibid., p. 126.

TABLE I

CONTROL GROUP

INITIAL HEIGHT, WEIGHT, DESIRED WEIGHT, OVERWEIGHT, AND PERCENTAGE OF OVERWEIGHT;
 FINAL HEIGHT, WEIGHT, DESIRED WEIGHT, POUNDS OVERWEIGHT,
 PERCENT OVERWEIGHT AND LOSS OR GAIN IN OVERWEIGHT

Subjects	I N I T I A L						F I N A L					
	Height	Weight	Should Weigh	Pounds Over Weight	% Over Weight	Height	Weight	Should Weigh	Pounds Over Weight	% Over Weight	Gain or Loss in % Over Weight	
1	5'6"	220	143	77	54	5'7"	207	147	60	41	-13	
2	5'7"	226	137	89	65	5'7"	227	138	89	64	-1	
3	5'3"	139	120	19	16	5'3"	136	121	15	12	-4	
4	5'3"	137	120	17	14	5'3"	136	121	15	12	-2	
5	5'2"	133	116	17	15	5'2"	137	118	19	17	+2	
6	5'7"	155	137	18	13	5'9"	167	150	17	11	-2	
7	5'4"	141	124	17	14	5'5"	145	130	15	12	-2	

TABLE II

EXPERIMENTAL GROUP

INITIAL HEIGHT, WEIGHT, DESIRED WEIGHT, OVERWEIGHT, AND PERCENTAGE OF OVERWEIGHT
 FINAL HEIGHT, WEIGHT, DESIRED WEIGHT, POUNDS OVERWEIGHT,
 PERCENT OVERWEIGHT AND LOSS OR GAIN IN OVERWEIGHT

Subjects	I N I T I A L					F I N A L						
	Height	Weight	Should Weigh	Pounds Over Weight	% Over Weight	Height	Weight	Should Weigh	Pounds Over Weight	% Over Weight	Gain or Loss in % Over Weight	
1	5'4"	157	125	32	26	5'4"	151	125	26	21	-5	
2	5'1"	137	122	15	12	5'3"	147	130	17	13	+1	
3	5'3"	200	132	68	52	5'5"	219	141	78	55	+3	
4	5'1"	145	112	33	29	5'3"	141	122	19	16	-13	
5	5'4"	167	125	42	34	5'5"	170	129	41	32	-2	
6	5'6"	246	133	113	85	5'7"	231	136	95	70	-15	
7	5'2"	162	128	34	27	5'3"	155	122	33	26	-1	

TABLE III
 RANK IN PERCENTAGE OF LOSS TO PERCENTAGE
 OF GAIN OF OVERWEIGHT

-15	-13	-13	-5	-4	-2	-2	-2	-1	-1	+1	+2	+3
E	E	C	E	C	C	C	C	E	E	C	E	C
E	E	C	E	C	C	C	C	E	E	C	E	C

2 + 3 + 5 + 6 = 16 U is 16 alpha = .159

- = the amount of loss in percentage
- + = the amount of gain in percentage
- E = Experimental Group
- C = Control Group

II. INTERPRETATION OF DATA

In this study there were no controls of the subjects outside of the classroom. Recommendations were given as to diet but no follow-up was done to see if these recommendations were followed. From the calorie charts that were returned to the investigator, the obese girls consumed many more calories than the normal weight girls. So few cards were returned that the investigator could not say this was true for all subjects.

In taking measurements and weight each month the investigator felt if there had been a loss in either area, this would be conducive for the subject to keep working toward more progress. Muscles are usually considered as heavier in weight than in fat and the investigator thought there might be a change in measurements even though there might not be a change in weight. The measurements could not be used for any conclusions because all of the measuring was not done by the researcher, and there was such a variance it was assumed mistakes had been made in the taking of some of the measurements. The measurements which seemed to be correct showed loss of inches with loss of weight, or if weight was gained, measurements in most cases increased. In checking the beginning and final measurements of subjects and normal weight girls there seemed to be an increase in bust size in both classes unless there was a large difference in

weight. The investigator would presume this was more a chance of both maturity and development through use of upper body exercise in both classes.

It was interesting to note when Table I and Table II were completed (page 33 and 34) that there were two girls in each class that weighed two-hundred pounds or more. This was most unusual and it was also unusual that there were seven girls in each class.

The tables point out the fact that in the control group all girls but the two that were two hundred pounds or more were less than twenty per cent overweight. In the experimental group there was only one girl that was less than twenty per cent overweight.

In both classes and both groups there was an increase of physical fitness scores. The investigator feels that this increase was due partially to a learning process. This program was comparatively new to the girls and as they learned the procedures of doing the exercise, improvement was shown. There was a large increase in the number of all girls able to do the flexed-arm hang. At the beginning of the year, in the control group, seven girls out of twenty-nine were able to do a complete over-hand pull up and hold for time. By the end of the year nineteen girls were able to accomplish this exercise. At the beginning of the year, in the experimental group, there were seven girls out of

thirty-four able to do an over-hand pull-up and hold for time. By the end of the year twenty girls in the experimental group were able to accomplish this exercise. None of the excessively heavy girls were capable of doing a pull-up.

The girls had mixed feelings about the weight training program as in most any program. All girls were very interested at the beginning. As the year progressed they would say, "Oh! no!, not weights again!" However, they also heard the boys use this expression and some of these same girls worked the hardest. Several of the very obese girls seemed to enjoy this phase of physical education more than other aspects of the program. The girls did not like to jog or run outside on the track, however, they enjoyed this aspect in the gym and would ask to jog instead of some other form of exercise. The investigator felt there was a better reception to the overall adaptive program than of many other activities.

In the control group two girls who did not start in the overweight category had gained enough weight during the nine month period to put them in the ten per cent overweight category. They were not used in the experiment because they did not start as overweight subjects.

In the control group, by checking Tables I and II (page 33 and 34), there was a loss of weight of twenty-four

per cent among six girls while one girl gained weight of two per cent. This made a total loss of weight of twenty-two per cent for the seven girls. One of the more obese girls in this group did check with her doctor and he put her on a diet. By the end of the year she had lost a total of thirteen per cent. At one time she had dropped below the two hundred pound mark, but ended the year with two hundred seven pounds. At the point where she quit losing and began gaining, the investigator did not know if she had hit a plateau or whether she had gone off the diet.

In the experimental group a total of thirty-six per cent weight loss for five girls was made during the year. Two girls gained a total of four per cent which gave the group, as a whole, a total loss of thirty-two per cent. The experimental group had a loss of ten per cent more than the control group.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS FOR FURTHER STUDY

I. SUMMARY

The purpose of this study was to determine the effectiveness of two different methods of teaching to reduce obesity.

Group I, designated as the control group, consisted of twenty-nine girls, seven of them as subjects since they were overweight by ten per cent or more by the Metropolitan Insurance Company Chart of Desirable Weight. This group was taught by the regular physical education program.

Group II, designated as the experimental group, consisted of thirty-four girls, seven of them subjects because they were overweight by ten per cent or more by the Metropolitan Insurance Company Chart of Desirable Weight. This group was taught by the adaptive physical education program.

Height, weight and measurements were tallied at the beginning and end of the school year; weight and measurements also were recorded each month. Amount of overweight was computed for each subject and then the percentage of overweight was computed for each subject at the beginning of the program, and at the end of the program. To determine the results of the experiment, the percentage of loss and

gain of the overweight subjects in the control and experimental groups was computed at the end of the year and ranked. The Mann-Whitney U test was then applied to determine if a significant difference existed between the control and the experimental group. Since alpha of .159 was greater than the acceptable level of .05, the investigator rejected the H_0 and concluded the experiment as conducted was significant.

II. CONCLUSIONS

Within the limitations of this study the findings are as follows: The subjects in the control group lost weight during the year. Subjects in the experimental group lost a greater amount of weight and therefore showed a significant loss during the year.

The following general conclusions are justified: With the addition of health instruction directed toward making female high school students aware of the physical disadvantages of obesity and an adaptive physical education program, a greater weight loss was noted for the experimental group.

This program, as conducted, did not show that an adaptive program would cure obesity, or return a girl to her desirable weight.

The investigator feels the program of physical education at the present time is inadequate in helping the

overweight adolescent girl. Because of the prevalence of the problem of overweight adolescent individuals in the United States, there should be more extensive research and some kind of a special program for these individuals.

III. RECOMMENDATIONS

Find the underlying cause or causes for the individual's being overweight before treating. This would involve psychological testing. After finding the underlying cause for the subjects being overweight there must be cooperation between psychologist or psychiatrist, doctor and parents in treating the subject.

Counties or cities might operate their own camping program for the overweight individuals. A two or two and one-half month program of diet and exercise planned completely for the overweight individual on a twenty-four hour basis might show definite results. With good results, the incentive to follow up this program of diet and exercise might be instilled in the individual.

With school health officials as consultants, a special or adaptive program might be set up within the school system for the overweight individual. Because of excess weight an individual is not capable of competing with others his own age of normal weight. In a special program he would be competing with others of his own kind, and the program would be more stimulating and interesting.

Studies or research to find a way of preventing obesity should be done. There is such a small percentage of cure after the problem has developed it seems a way should be found to prevent the problem. An intense program of education covering the matter of obesity might be included in the health program of schools.

If in some program or under a doctor's care weight reduction does result, a way must be found for the individual to maintain his ideal weight.

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APPENDICES

APPENDIX A

METROPOLITAN INSURANCE COMPANY

CHART OF DESIRABLE WEIGHTS*

Women: 25 years of age or over
 (in pounds according to height and frame)
 (in indoor clothing and 2 in. heels)

	small frame	medium frame	large frame
4 ft. 10 in.....	91- 98 lbs.....	96-107 lbs.....	104-119 lbs
4 ft. 11 in.....	94-101 lbs.....	98-110 lbs.....	106-122 lbs
5 ft. 0 in.....	96-104 lbs.....	100-113 lbs.....	109-125 lbs
5 ft. 1 in.....	99-107 lbs.....	104-116 lbs.....	112-128 lbs
5 ft. 2 in.....	102-110 lbs.....	107-119 lbs.....	115-131 lbs
5 ft. 3 in.....	105-113 lbs.....	110-122 lbs.....	118-134 lbs
5 ft. 4 in.....	108-116 lbs.....	113-126 lbs.....	121-138 lbs
5 ft. 5 in.....	111-119 lbs.....	116-130 lbs.....	125-142 lbs
5 ft. 6 in.....	114-123 lbs.....	120-135 lbs.....	129-146 lbs
5 ft. 7 in.....	118-127 lbs.....	124-139 lbs.....	133-150 lbs
5 ft. 8 in.....	122-131 lbs.....	128-143 lbs.....	137-154 lbs
5 ft. 9 in.....	126-135 lbs.....	132-147 lbs.....	141-158 lbs
5 ft. 10 in.....	130-140 lbs.....	136-151 lbs.....	145-163 lbs
5 ft. 11 in.....	134-148 lbs.....	140-155 lbs.....	149-168 lbs
6 ft. 0 in.....	138-148 lbs.....	144-159 lbs.....	153-173 lbs

*Dr. H. K. Michael Irwin, "Overweight--A Problem for Millions,"
Public Affairs Pamphlet No. 364.

APPENDIX B

SCHOOL HEALTH EXAMINATION RECORD
(To be used for periodic and preschool examinations)

Name of Child _____ Birthdate _____

Name and Address of Parents _____

School _____

This was an	
Examination	<input type="checkbox"/>
Inspection	<input type="checkbox"/>

A parent was	
present	<input type="checkbox"/>
not present	<input type="checkbox"/>

TO BE FILLED OUT BY PHYSICIAN

Physician's findings
(from history and physical):

Date of Examination _____
Height _____
Weight _____

- Eyes
- Ears
- Lymph nodes
- Thyroid
- Nose
- Throat
- Gums
- Heart
- Lungs
- Orthopedic
- Nervous System
- Hernia
- Skin
- Nutrition
- Speech
- Other
- Secondary Sex Development
- Menstrual History

Does the child need medical care?

Is further examination or a laboratory test recommended?

Are courses of immunization, "booster" doses, or re-vaccination indicated?

Does any irremediable defect exist? (If so, describe the disability it produces.)

Are there problems of behavior, growth and development, or nutrition.... in the past or at present, with which teachers and parents should be acquainted?

Significant findings and physician's recommendations to parents and teachers: (Including note on necessary limitation of activity, if any, and if he is receiving continuous medication or therapy.)

(Reverse side may be used for additional data)

Date _____ Signature _____ M.D.

It is asked that this form be returned to the school principal by the parent, or mailed by the physician to the school principal.

SEE REVERSE SIDE FOR RECORDING HEALTH DATA

HEALTH DATA

PAST MEDICAL HISTORY

Name of Child _____

Family History: Are there speech, visual or hearing handicaps, tuberculosis, diabetes, mental illness, epilepsy, or other illnesses in the family? Give relationship.

PREVIOUS ILLNESSES	Age		Age		Age
Whooping cough		Frequent colds		Asthma	
Chickenpox		Earaches		Hay fever	
Measles		Draining ears		Eczema	
German Measles		Frequent sore throats		Poliomyelitis	
Mumps		Pneumonia		Meningitis	
Diphtheria		Rheumatic fever		Convulsions	
Scarlet fever		Nephritis		Other	

Significant Health Data: (Include other serious illnesses, hospitalization, major injuries or operations, drug or serum reactions, medications, known defects, menstrual history, nutritional history, etc.)

IMMUNIZATION (Mark Original Course X, Booster as B

Age in Years

	0-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Diphtheria																	
Tetanus																	
Whooping Cough																	
Smallpox																	
Polio																	
Measles																	
Other																	

Vision

Is there a family history of visual defects?
 Does the child wear glasses?
 Does the child pass a standard vision test with 20/30 or better in poorest eye, with correction?

Hearing

Is there a family history of hearing loss?
 Does the child pass a standard audiometer check or test with less than 10 decibels loss in worst ear?

NOTES by physician or nurse

Kansas Congress of Parents and Teachers
 Kansas School Health Advisory Council

Kansas State Department of Health
 Kansas State Department of Public Instruction

APPENDIX C

CONTROL GROUP
AGE, HEIGHT, AND MONTHLY WEIGHT CHART

Girl	Age	Ht.	Weight by Month									Ht.
			1	2	3	4	5	6	7	8	9	
1	16	5'5"	129	130	132	130	128	131	131	128	128	5'5"
2	15	5'3"	121	121	120	122	121	123	122	120	121	5'3"
3	15	5'5"	97	99	100	100	103	103	103	104	103	5'6"
4	15	5'6"	144	143	144	143	141	143	143	139	138	5'6"
5*	15	5'6"	220	210	199	199	197	199	201	207	207	5'7"
6	14	5'4"	105	108	109	110	110	110	111	111	112	5'4"
7	15	4'11"	101	103	102	101	101	101	103	102	104	4'11"
8*	15	5'7"	226	229	227	229	233	226	226		227	5'7"
9	14	5'4"	95	95	98	97	99	103	105	106	107	5'4"
10	15	5'3"	122	126	124	129	127	126	124	126	126	5'5"
11*	14	5'3"	138	138	137	135	135	137	135	136	133	5'3"
12	15	5'9"	126	126	129	129	128	129	126	127	127	5'9"
13*	16	5'3"	138	137	136	138	139	141	138	137	137	5'3"
14*	15	5'2"	133	133	135	133	135	138	139	136	137	5'2"
15	15	5'7"	143	143	141	141	140	142	138	140	140	5'7"
16	15	5'2"	112	112		109	108	110	110		107	5'3"
17*	14	5'6"	155	155	155	158	157	163	162	164	167	5'9"
18	15	5'3"	96	97	97	95	92	98	93	94	97	5'3"
19	15	5'8"	120	122		123	127	126	129	125	121	5'8"
20	15	5'3"	121	120	119	120	124	123	126	126	127	5'4"
21	15	5'2"	121	122	120		125	126	127	---	---	---
22	15	5'4"	129	130	130	133	137	137	135	136	137	5'4"
23	15	5'4"	123	126	126	127	128	132	132	133	136	5'4"
24*	16	5'4"	141	141	141	137	135	140	143	146	145	5'5"
25	15	5'1"	108	109	111	110	112	114	115	114	113	5'2"
26	15	5'7"	130	129	129	128	133	132	134	135	132	5'7"
27	15	5'1"	95	95	97	98	96	100	100	100	101	5'1"
28	14	5'4"	122	122	125	124	124	123	122	123	123	5'4"

NOTE: One girl that started the year dropped after the third month, she was not overweight. About the fifth month we had another enrollee. She was not overweight. These two kept the class count at twenty-nine. Their weights were not included.

*overweight girls

APPENDIX D

CONTROL GROUP
RECORD OF MEASUREMENT

Subjects	1				2				3				4			
	bust	waist	hip	thigh	bust	waist	hip	thigh	bust	waist	hip	thigh	bust	waist	hip	thigh
1	43	37	47½	29	44	38	49	26	37½	30	39	22	35¾	28	39½	21
2	47	37	47½	29	42	36½	46½	22	41	31	39	22	35	28	39½	23
3	41	36	44½	26½	42	36	46½	23	38	29	38	21	36	29	40	23
4	39	33½	44	24	42	35	47	23	37½	28½	38	21½	35	28	40	24
5	39	33½	44	22	43	36	48	25	37	30	37	21½	36	28	39	23
6	39	34	42	23	45	36	47	24	36	27½	38	21	36	29	39	21
7	39	35	41	25	44	36	47	24	38	30	37	21	36	29	40	22
8	40	35	44	25½	43	39	49	24½	38	30½	37½	21	36	27	39	22
9	39½	34	46	24	42	38	48	23	38	29½	38	20	36	27½	39	21

APPENDIX D

CONTROL GROUP
OF MEASUREMENTS

		4			5				6				7			
thigh	bust	waist	hip	thigh	bust	waist	hip	thigh	bust	waist	hip	thigh	bust	waist	hip	thigh
22	35 $\frac{3}{4}$	28	39 $\frac{1}{2}$	21	36 $\frac{1}{4}$	29	37	22	38 $\frac{1}{2}$	29 $\frac{3}{4}$	40	22 $\frac{1}{2}$	34	28 $\frac{1}{2}$	39	22
22	35	28	39 $\frac{1}{2}$	23	34 $\frac{1}{2}$	30 $\frac{1}{2}$	40	20 $\frac{1}{2}$	38	30	39 $\frac{1}{2}$	24	37	32	38	22
21	36	29	40	23	34	29	39	19	39 $\frac{1}{2}$	29	41	21	36	29	40	22
21 $\frac{1}{2}$	35	28	40	24	34	28	36	20	38	29	38		39	28	40	16
21 $\frac{1}{2}$	36	28	39	23	34	27	32	22	38	29	38	28	38	28	38	21
21	36	29	39	21	34	29	39	23	39 $\frac{1}{2}$	29	39 $\frac{1}{2}$	28	38	27	40	22
21	36	29	40	22	35	28 $\frac{1}{2}$	40	22	38	32	42	22	38	30	40	22
21	36	27	39	22	33 $\frac{1}{2}$	29	39 $\frac{1}{4}$	22 $\frac{1}{4}$	38	30	39 $\frac{1}{2}$	24	36 $\frac{1}{2}$	30	37 $\frac{1}{2}$	22
20	36	27 $\frac{1}{2}$	39	21	36	29	40	22 $\frac{1}{2}$					36	29 $\frac{1}{2}$	39	21 $\frac{1}{2}$

APPENDIX E

EXPERIMENTAL GROUP
AGE, HEIGHT, AND MONTHLY WEIGHT CHART

Girl	Age	Ht.	Weight by Month									Ht.
			1	2	3	4	5	6	7	8	9	
1	15	5'8"	126	128	128	130	131	131	129	131	131	5'9"
2	15	5'4"	109	108	112	120	112	109	108	112	120	5'5"
3*	14	5'3"	157	158	152	153	150	148	148		151	5'4"
4*	14	5'1"	137	139	139	140		142	143	146	147	5'5"
5*	15	5'1"	145	145	143	143	140	139	140	141	141	5'3"
6	15	5'3"	118	123	124	125	121	123	123	121	123	5'2"
7*	14	5'4"	168	167	173	171	168	170	168	167	170	5'4"
8	14	5'4"	131	129	129	129	131	132	133	132	133	5'4"
9	15	5'6"	155	156	152	152	152	155	152	146	143	5'6"
10	15	5'1"	92	92	94	93	93	92	90	92	92	5'2"
11	14	5'3"	111	114	117	120	118	119	123	122	121	5'4"
12	15	5'4"	121	123	125	122	124	122	126	126	126	5'4"
13	15	5'7"	148	151	150	152	150	152	153	152	152	5'8"
14	15	5'3"	111	113	116		118	118	118	117	121	5'4"
15	15	5'1"	117	118	120	116	117	118	116	118	118	5'2"
16	15	5'7"	137	141	138	141	142	143	138	139	134	5'8"
17	15	5'2"	96	93	96	96	99	98	98	99	98	5'2"
18	15	5'2"	117	115	114	112	114	114	117	117	117	5'2"
19	15	5'2"	104	106	108	108	108	108	109	107		
20	14	5'3"	84	85	86	87	87	88	89	89	90	5'4"
21	15	5'3"	109	109	108	109	109	108	111	108	108	5'3"
22*	15	5'6"	246	244	242	242	240	233	231	228	231	5'7"
23	15	5'3"	116	116	118	118	118	119	119	121	122	5'3"
24	15	5'2"	95	95	95	94	94	94	95	91	95	5'3"
25	15	5'4"	117	120	120	120	120	120	122	121	120	5'5"
26	15	5'8"	103	104	119	109	109	110	108	110	110	5'8"
27	15	5'2"	120	121	124	121	124	119	117	120	120	5'2"
28	14	5'3"	113	116	117	117	116	118	117	114	114	5'4"
29*	15	5'2"	162	159	159	160	158	155	157	155		
30	15	5'2"	94	92	96	95	98	99	102	101	100	5'4"
31*	15	5'3"	200	201	201	202	204	205	206	207	207	5'5"
32	15	5'1"	106	106	106	105	106	110	106	107	107	5'2"
33	15	5'1"	110	112	114	118	118	117	118	116	116	5'2"
34*	15	5'8"	168	167	165	164	160	158				

NOTE: Girl 34 was dropped from school after 6 months and, therefore, was not used in the study. The other girl that was overweight in this class was here for only 2 months so her figures were not included at all.

*overweight girls

A P P E N D I X F

EXPERIMENTAL G
RECORD OF MEASUR

Subjects	1				2				3				4		
	bust	waist	hip	thigh	bust	waist	hip	thigh	bust	waist	hip	thigh	bust	waist	hip
1	37 $\frac{1}{4}$	31	42 $\frac{1}{2}$	21 $\frac{1}{2}$	35 $\frac{1}{2}$	29	39	20	43	36	46	21 $\frac{1}{2}$	36	27	39
2	39 $\frac{1}{2}$	33 $\frac{1}{4}$	43	22 $\frac{1}{2}$	37	31	40 $\frac{1}{2}$	21	46	40	48	21	38	28	39 $\frac{1}{2}$
3	37	31	41	22	37	31	40 $\frac{1}{2}$	21	46	40	48	21	38	28	40
4	35	35	39	18 $\frac{1}{2}$	36	29	40	21	44	38	47		36	27 $\frac{1}{2}$	39
5	38	30	41	16 $\frac{1}{2}$	35 $\frac{1}{2}$	28	39 $\frac{1}{2}$	20					37	27	39
6	37 $\frac{1}{2}$	32	41	21 $\frac{1}{2}$	36 $\frac{1}{2}$	29	40	21 $\frac{1}{2}$	48	31	41 $\frac{1}{2}$	25	34	27 $\frac{1}{2}$	38
7	30 $\frac{1}{2}$	31	40	21 $\frac{1}{2}$	36 $\frac{1}{2}$	29	38	21	38	32	43	26	36	28	39
8					36	28	38	21	38	31	41 $\frac{1}{2}$	25	37	30	39
9	38 $\frac{1}{2}$	31 $\frac{1}{2}$	40	23	38	29	38	23					34	27	35 $\frac{1}{2}$

ENDIX F

MENTAL GROUP
MEASUREMENTS

	4			5				6				7			
bust	waist	hip	thigh	bust	waist	hip	thigh	bust	waist	hip	thigh	bust	waist	hip	thigh
6	27	39	21½	38	28½	43½	23	45	39	50	29	38	31	43½	24½
8	28	39½	22	38	28½	42	22	46	38	50½	29	40	33	44	24
8	28	40	22	36	28	40	21	46	38	50½	29	40	33	44	24
6	27½	39	22	38	27	40	22½	44	38	50	27½				
7	27	39	22	39	32	43		45	37	50	26	37	30	41	23
4	27½	38	21½	39	27	40	20	44	38	49½	29½	37	29	39	23¼
6	28	39	21	38	29	40	24	44	37	49	27½				
7	30	39	21	37	30	39	21	44	35½	49	26	38	30	41	25
4	27	35½	21					43	35	47	24				

APPENDIX G

FILMS SHOWN TO ADAPTIVE CLASS

- 1st films: Song of Arthur
 Improving Your Posture
- 2nd films: Foods and Nutrition
 Four Food Groups
- 3rd film: Losing to Win

PAMPHLETS GIVEN TO ADAPTIVE CLASS

- Dairy Council Of Kansas City. "The Food Way to Weight Reduction," 1967.
- Kellogg Company. "Foods For Growing Boys and Girls."
- Public Health Service Publication 537. "The Food You Eat and Heart Disease," 1963.

PAMPHLETS GIVEN TO PARENTS

- American Institute of Baking. "Eat and Grow Slim," 1959.
- Strassenburgh Laboratories. "How to Get Rid of the Calories You'll Never Miss," 1967.
- Corn Products Company. "Calorie Diet Guide."

APPENDIX H

INDIVIDUAL CALORIE COUNT RECORD

						Date: _____
Name: _____						
	Break	Snack	Lunch	Snack	Dinner	Total
Sun.						
Mon.						
Tues.						
Wed.						
Thurs.						
Fri.						
Sat.						
Sun.						
Mon.						
Tues.						
Wed.						
Thurs.						
Fri.						
Sat.						

APPENDIX I

CONTROL GROUP

REGULAR PHYSICAL EDUCATION PROGRAM

UNIT

1st Six Weeks

- I
- A. Three days. President's Physical Fitness Test, plus two other tests.
1. sit-ups
 2. shuttle run
 3. standing broad jump
 4. flexed-arm hang
 5. ball throw
 6. 50 yard dash
 7. 660 walk run
 - *8. jump rope--1 minute
 - *9. squat jumps--not more than 5 minutes.
- B. Calisthenics
- M. W. - stretch exercises
- T. Th. Fri. - alternate push-ups--total of 30
pull-ups--total of 15
- C. Speedball
1. skills
 2. rules
 3. officiating
 4. scoring
- D. Game situations
- E. Tournaments and Rules Test

II

2nd Six Weeks

- A. President's Physical Fitness Test
- B. Calisthenics
- M. W. - stretch exercises
- T. Th. Fri. - alternate push-ups--total of 30
pull-ups--total of 15

UNIT

C. Modern Dance Techniques

1. dance steps
 - a. waltz
 - b. polka
 - c. two-step
 - d. mazurka
 - e. schottish

D. Folk Dance

E. Rhythmic Gymnastics

1. ball skills and routine
2. Indian club skills and routine

III

3rd Six Weeks

A. President's Physical Fitness Test

B. Volleyball

1. skills
2. rules
3. officiating
4. score keeping

C. Game situations

D. Tournaments and Rules Test

IV

4th Six Weeks

A. President's Physical Fitness Test

B. Basketball

1. skills
2. rules
3. officiating
4. score keeping

C. Game situations

D. Tournaments and Rules Test

UNIT

5th Six Weeks

- V
 - A. President's Physical Fitness Test
 - B. Tumbling
 - C. Apparatus
 - 1. balance beam
 - 2. uneven parallel bars
 - 3. horse (vaulting)
 - 4. free exercise
 - D. Everyone does some routine

VI

6th Six Weeks

- A. Physical Fitness Test
- B. Tennis and Softball (alternate days)
 - 1. skills and rules
- C. Archery and Softball (alternate days)
 - 1. skills and rules
- B. and C. are used four days of the week
- D. Track

APPENDIX J

EXPERIMENTAL GROUP

ADAPTIVE PHYSICAL EDUCATION PROGRAM

UNIT

1st Six Weeks

- I
- A. First three days President's Youth Council Physical Fitness Test plus two tests of instructor.
1. These are the same as in Regular Physical Education Program.
- B. First three Monday's of the school year health lectures and films on obesity.
- C. Adaptive Program. Two and one-half days: Tuesday, Thursday and one-half of Friday.
1. jogging one-fourth mile
 2. weight training--two days to teach correct procedure
 3. after procedure is learned:
 - a. Tuesday barbells are used
 - b. Thursday's both barbells and dumbbells
 - c. Friday's dumbbells are used for one-half of period, then regular physical education.
- D. Regular Physical Education Program
1. Monday, Wednesday and one-half day Friday

II

2nd Six Weeks

- A. Physical Fitness Test
- B. Adaptive Program
1. same days throughout year
- C. Regular Physical Education
1. same days throughout year
 2. more limited than regular physical education

APPENDIX K

WEIGHT TRAINING EXERCISES

Two-Arm Curl. Starting position: normal standing position. Barbell held with an underhand grip, arms extended downward in front of the thighs.

Movement: Curl (flex the forearm) until the barbell touches the chest at about the top of the sternum. (This movement should not be aided by moving the elbows backward or with a sway or a jerk of the body.)

Lower the barbell to the starting position and repeat.

Clean and Jerk. Barbell on floor. Overhand grip, feet slightly apart, hands shoulder width apart. Lift barbell to chest with one clean movement as you come to a stand. Press or push the weight up to the position of arms extended overhead. Lower weight to chest, then to floor.

Supine Press. Supine position on a bench. (Training partner puts the barbell on the chest of performer.) Barbell, on the chest, grasped with overhand grip with hands about shoulder width apart.

Movement: Press barbell upward to the position of arms extended. Lower barbell to starting position, repeat.

Prone Arch Back. The performer lies facedown on bench with upper half of body over end of bench and holds dumbbell

behind head. A partner securely holds the ankles.

Movement: Arch back slowly and hold arched position for eight to ten seconds. Slowly lower, relax, then repeat.

Sit-Up. Starting position: supine position with feet inclined and held by partner. Barbell held behind the head.

Movement: Sit up till elbow touches knee, lower, then repeat.

Deep Knee Bend. Standing position, have partners lift barbell behind head to shoulders.

Movement: Lower the body to a full squat position, and return to starting position, repeat.

Squat Jump. Normal standing position. One dumbbell in each hand, with arms extended at the sides of the thighs.

Movement: Lower the body into the squat position. Upon springing to the erect position, make a shift in the positions of the feet by putting one foot forward and the other backward. On the next squat jump, reverse the positions of the feet.

Supine Pull-Over. Supine position on the bench, head resting at end of bench. One large dumbbell or a swing bar held in the hands, arms extended overhead and slightly below shoulder level.

Movement: Keeping elbows nearly straight, raise the dumbbell

to a position directly over the chest. Return the dumbbell to the starting position and repeat.

Supine Lateral Raise. Supine position. One dumbbell in each hand with the arms extended directly over the chest.

Movement: Lower the dumbbells sideward as far as possible and then raise them back to the starting position and repeat.

Front Raise. Normal standing position. Dumbbells grasped with an overhand grip and held beside the thighs.

Movement: Raise the dumbbells forward and upward, with the arms straight, until the arms are extended above shoulder height. Lower the dumbbells to the starting position and repeat.

Lateral Raise. Normal standing position. Dumbbells grasped with an overhand grip and held beside the thighs.

Movement: Raise the dumbbells sideward and upward, with the arms straight, until the arms are extended slightly above shoulder height. Lower the dumbbells to the starting position and repeat.

Lateral Raise. The body is bent forward at waist, back straight, arms hanging downward in a line perpendicular with the upper part of the body. A dumbbell should be grasped in each hand, with the palms facing each other.

Movement: Raise the dumbbells sideward and upward simultaneously until they are approximately at the height of the shoulders. Return to starting position and repeat.

APPENDIX L

SUMMARY OF PROCEDURE OF MANN-WHITNEY U TEST*

"Determine values of n_1 and n_2 . N_1 = the number of cases in the smaller group; n_2 = the number of cases in the larger group.

Take together the score of both groups, assigning the rank of 1 to the score which is algebraically lowest. Ranks range from 1 to $N - n_1 + n_2$. Assign tied observations the average of the tied ranks.

Determine the value of U either by the counting method or by applying formula (6.7a) or (6.7b).

The method for determining the significance of the observed value of U depends on the size of n_2 :

a. If n_2 is 8 or less, the exact probability associated with a value as small as the observed value of U is shown in Table J (Appendix M, page 70).

b. c. are for and n_2 above number 8.

If the observed value of U has an associated probability equal to or less than alpha, reject H_0 in favor of H_1 ."

*Siegel, op. cit., p. 126.

APPENDIX M

TABLE J*
 TABLE OF PROBABILITIES ASSOCIATED WITH VALUES AS SMALL AS
 OBSERVED VALUES OF U IN THE MANN-WHITNEY TEST
 $n_2 = 7$

U	1	2	3	4	5	6	7
0	.125	.028	.008	.003	.001	.001	.000
1	.250	.056	.017	.006	.003	.001	.001
2	.375	.111	.033	.012	.005	.002	.001
3	.500	.167	.058	.021	.009	.004	.002
4	.625	.250	.092	.036	.015	.007	.003
5		.333	.133	.055	.024	.011	.006
6		.444	.192	.082	.037	.017	.009
7		.556	.258	.115	.053	.026	.013
8			.333	.158	.074	.037	.019
9			.417	.206	.101	.051	.027
10			.500	.264	.134	.069	.036
11			.583	.324	.172	.090	.049
12				.394	.216	.117	.064
13				.464	.265	.147	.082
14				.538	.319	.183	.104
15					.378	.223	.130
16					.438	.267	.159
17					.500	.314	.191
18					.562	.365	.228
19						.418	.267
20						.473	.310
21						.527	.355
22							.402
23							.451
24							.500
25							.549

*Ibid., p. 272.