A COMPARATIVE STUDY OF CERTAIN FACTORS RELATED TO OBESITY AND LEANNESS IN SEVERAL PREADOLESCENT GIRLS

by

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CHAPTER I

INTRODUCTION

Overnutrition in terms of positive caloric balance constitutes one of the principal health problems of western societies (1). In general, its presence apparently is in opposition to a state of optimum nutrition as described by Krehl (2):

> Optimum nutrition might be described. . . .as that which provides all dietary nutrients in respect to kind and amount, and in a proper state of combination or balance so that the organism may always meet the varied exogeneous and endogeneous stresses of life, whether in health or disease with a minimal demand or strain on the body's natural homeostatic mechanisms.

The state of overfatness or obesity (obesities) is precursed by a multiple etiology comprised of a number of constantly interacting, often shifting factors: physiologic, sociologic, and psychologic (3, 5, 50). These factors operate with varying degrees of emphasis to trigger the relative hyperphagia which inevitably leads to the laying down of fat in ratios which become excessive according to the disparity between energy intake and expenditure (4, 5).

There is a growing body of evidence that the natural history of overfatness in adult man most commonly evolves from childhood patterns, representing a teleological complex of familial and cultural influences (6, 7, 8). Modern technology and culture have made possible, even encouraged, those factors which ultimately precipitate obesities: diminished energy expenditure and relative hyperphagia. Modern man is further contributing to the problem by fostering the concept of general indulgence of their youth (6).

The singular ineffectiveness of diet therapy, especially in the widely demonstrated inability to sustain lost fat (9), has certainly not entirely obviated its usefulness, but has provoked a greater emphasis on prevention as the surest solution to the problem, with diet therapy being more profitably focused on emotionally stable persons in the early stages of obesity (7).

The documentation of physical inactivity as an especially pertinent and long neglected aspect of increased fatness has encouraged a revival and extension of the practice of appropriate physical activities, especially in the youth (10, 11).

Psychological phenomena such as feelings of anxiety, fear, and lack of personal worth seem to be importantly associated with obesity and are viewed as usually being mutually precipitative with it (10, 11, 32, 64).

Physiological factors as caustive aspects of obesities including genetic influences, hypothalamic-centered appetite control, and endocrinopathy continue to be investigated. There is yet no final proof that the first two are controlling factors in causing obesity in man (5, 12). Endocrinopathy has been causally associated with certain obesities, but it affects a minute segment of the population compared to that affected by acquired obesities (13). The popular theory that low basal metabolic rates are characteristic in obesities has been almost completely disproven (14, 15, 16, 32). Wilson has said that obesity is not commonly the result of some profound endocrine disturbance in children,

but simply results from too great caloric intake for the child's metabolism (17). He feels that the most important causes of obesities are emotion and an unknown factor.

Purpose

In the majority of cases, obesity is an acquired nutritional state arising from lifetime patterns of energy intake and expenditure which have developed within the ubiquitous influence of life experiences. It follows that the childhood and adolescent years are clearly the times for acquisition of habits which promise to sustain proper energy balance throughout adult life.

Little work has been done in which obesity and leanness, in an otherwise healthy group of children of similar family background, have been investigated with respect to: anthropometry, caloric intake, physical activity, psychological tests, eating practices, and parental child-feeding attitudes. This study was planned with these factors in mind.

The purpose of this study was to explore and compare certain factors related to obesity or leanness in several healthy preadolescent girls supposedly representing prototypes of these physical characteristics. It was further proposed that comparisons of these factors be made in several preadolescent girls of "average" body weights. Subjects selected for the study were to be from similar family backgrounds and of above-average intelligence.

Specifically, this study was designed to investigate:

1. Anthropometric data collected from the subjects: weight, sitting and standing heights; arm, chest, and calf circumferences; bicristal and biacromial diameters; and skinfold thicknesses.

2. Heights and weights of the parents of the subjects.

3. Appraisals of the body weight of the subjects from birth to the present time and of the parents from birth through the fourth decade.

4. Differences in the caloric intakes of the subjects and in the proportional share of total caloric intake contributed by certain food groups.

5. Activity patterns of the subjects and their parents.

6. Food preferences, practices, and attitudes of the subjects and their parents.

7. Some personality components and activity-interests of the subjects as determined by the results of certain standardized tests.

CHAPTER II

REVIEW OF LITERATURE

In attempting to establish a balance sheet of the principal problems in the science of human nutrition existing in 1960, Gounelle (1) has said that they are oriented around two poles, undereating and overeating. He noted that, while undereating is probably the more disastrous of the two, it is rarely disputed that obesity predisposes man to a series of mechanical, metabolic, and vascular complications that have the effect of shortening life.

Garn (6), speaking at the 1960 White House Conference on Children and Youth, has asked:

> Exactly what are the effects of overnutrition? Some we know. The fatter the child is the faster he grows, the earlier he matures, and the sooner he achieves final stature. The fat child, therefore, particularly the fat girl, not only has the temporal disadvantage of being fat (with all of its psychological sequences) but the further disadvantage of being sexually mature in a peer-group of the sexually immature.

Fatness in childhood is of more than transitory importance (6). An increasing proportion of our juvenile population is becoming fat, establishing patterns of overnutrition in their formative years which make them less susceptible to caloric control as adults, thus rendering them potential subjects for cardio-vascular and renal diseases, and a reduced life expectancy (6, 18).

Haas (19) has indicated the impact of early learning and how it is importantly, but not exclusively, influenced by parents:

> Psychological theory points to early childhood as a formative period in the development of personality and behavior, with parental attitudes and practices playing a significant role in this process.

Widdowson and McCance (20) recently reviewed some effects of accelerated growth and general somatic development and made the following comment:

> It seems generally agreed that children are growing faster in height and weight now than they did 50 years ago, and reaching puberty at an earlier age. This is believed to be due in part to better nutrition, and the majority of people have acclaimed this acceleration of growth as one of the outstanding achievements of our social services. There have, however, been whispers of doubt, and there is no proof as yet that we have conferred a permanent benefit on children by making them grow faster than they used to do. It is by no means certain, for example, that children's mental attainments have advanced in parallel with this more rapid physical and sexual development. Nor has the relationship between the rate of growth and the length of life ever been satisfactorily established.

Studies Which Relate to Obesity

In 1956, Johnson, Burke, and Mayer (21) reported that no systematic study on the prevalence of obesity in school children had ever been done. They attempted such a study by a cross-sectional investigation of the problem in 6000 Boston, Massachusetts elementary and secondary school children, recognizing such serious limitations as lack of maturational data, inability to make personal observations, and lack of standardization of clothing in collecting heights and weights of subjects. Using Wetzel's channels for obesity, their findings showed obesity prevalent in 12.5 ± 2.5 per cent of the girls and in 9 ± 2.5 per cent of the boys. Retrospective records showed persistent obesity in one third and in about one half of the overweight

girls and boys, respectively. Late obesity was found in about 12 per cent and about 33 per cent in the overweight girls and boys, respectively.

In 1959 Abraham and Nordsieck (22) completed a study of 2000 Maryland school children who were 10 to 13 years of age in 1937 to 1939 and who had attained a mean age of 31 years in 1958. They were able to retrospectively study 87 per cent of 50 each of the initially heaviest boys and girls, paired with an equal number of "average" boys and girls. Using the Baldwin and Wood tables as criteria, their subjects were classed as "heavy" when relative weights exceeded 110 per cent, and "average" when relative weights were between 95 and 104 per cent of their standard. Results revealed that 86 per cent of the "heavy" boys and 42 per cent of the "average" boys became overweight adults, showing twice the susceptability to obesity in the "heavy" boys. Eighty per cent of the "heavy" girls and 18 per cent of the "average" girls were overweight as adults.

In 1959 Mullin (23) reported a retrospective study of 373 consecutive out patients in an English clinic of whom 33 per cent were 20 per cent or more overweight; of this group 26 per cent were men and 44 per cent were women. One third of the total showed persistent obesity from childhood, a high incidence of psychological abnormalities, and were singularly unsuccessful in their weight reduction attempts. He suggested that two to five times as many overweight children became overweight adults as do normal or underweight children and concluded that persistent juvenile obesity is an important cause of adult obesity and is therefore potentially dangerous.

In 1959 the United States Department of Agriculture (18) published the results of the largest research program ever attempted for the purpose of evaluating the nutritional status of people. This elaborate 10 year study (1948 through 1958), a cooperative effort among the Agricultural Experiment Stations of 39 states and involving 12,000 subjects, revealed the overall nutritional status of United States citizens to be good. The incidence of relative overweight at all ages, becoming progressively higher through middle age, is apparent in the following (18):

1. Adults 20 to over 80 years of age:

   Twenty five to 50 per cent of all the women from widely separate parts of the country were 10 per cent or more overweight, while more than half of these were more than 20 per cent overweight. The sampling of men was smaller, but percentages of overweight were about the same.

2. Adolescents 13 through 19 years of age:

   About 20 per cent of the adolescent girls were more than 10 per cent overweight, while about 18 per cent of the boys were similarly overweight. There were, incidentally, more overweight than underweight girls in this age group and more underweight than overweight boys.

3. Children five through 12 years of age (mainly eight or nine through 11 years of age):

   Fourteen per cent of these children were 10 per cent or more overweight. There were more underweight than overweight children in this age group.

Gschneider and Roderuck (24) in 1960 reported a comparative, three year, study of 54, ten to 13 year old girls equally distributed between medium and very heavy or obese physiques, according to their continuance in appropriate Wetzel channels during the first year of the

study. No significant differences were found in characteristics which might be related to nutriture: blood hemoglobin concentration, serum carotenoid and serum ascorbic acid concentrations, amount or type of activity, weight increments and caloric intakes. Mean caloric intakes, incidentally, were calculated from 2-day dietary records kept by the subjects twice during the first spring, and six and five times, respectively, during the two succeeding school years. Nutrition histories were used during the fall of the last year of the study. The calculated mean energy intake of the heavier girls was 100 calories lower than for the girls of medium physique. As was expected, nutrition history values were higher than those from dietary records (18). Statistically significant differences were found in height increments and in alkaline phosphatase concentration, an enzyme which is related to extent and normality of bone growth and maintenance. Attainment of menarche at an earlier mean age by the heavier girls suggested that they were physiologically more mature. The nutriture of the girls was apparently not related to body build unless obesity or stockiness is regarded as undesirable in itself, since the heavy or the medium sized girls were neither consuming widely different amounts of food nor expending obviously different amounts of energy (24).

Garn and Haskell (66), in 1960, studied the relationship between fat thickness and developmental status in 259 subjects unselected with respect to obesity; they found that fat thickness and length were positively correlated from infancy through early adolescence. These investigators found that the children of 1.5 to 12.5 years of age who

were one standard deviation above average in fat thickness were advanced by approximately one-half year's developmental status.

In a study of high school girls of similar age and height, conducted by Johnson, Burke, and Mayer (25) in 1956, caloric intakes were significantly lower in the 28 obese than in the 28 non-obese subjects who were studied. Positive energy balance was attributed to diminished physical activity. These researchers reported total activity to have been relatively low in both groups but found the obese group to be significantly less active. The obese group showed earlier deceleration of growth and earlier menarche, indicating their earlier physiological maturity.

Stone (26) has succintly summarized the result of caloric imbalance in man when he said, "... human beings do not contradict the first law of thermodynamics."

Mayer (27) has generalized that all obesity is the result of hyperphagia when energy intake is not balanced by a corresponding energy expenditure. He seems to caution those who would present the obvious as a fresh or penetrating observation and hints at the subtle complexities underlying a positive energy balance when he says:

> To say that obesity is due to overeating is not much more illuminating than to say that alcoholism is caused by overdrinking. The real question is why do people overeat?

Olson (4) has investigated adult obesity for several years, especially in four studies of 450 twenty-five per cent overweight

subjects, 80 per cent of whom were women of 40 to 59 years of age. He has said that no obesity can develop in the absence of positive caloric balance and that classifying it as endogeneous or exogeneous is meaningless. He has further stated that human obesity is a psychosomatic disorder of multiple etiology featuring a disturbance in the homeostatic mechanism matching food intake to energy expenditure.

Bruch (28), the psychiatrist-pediatrician who has followed a large number of fat children for 20 years, suggests that the problem must be viewed by stepping outside common cultural prejudices. She feels that obesity and its various aspects of overeating, inactivity, and increased fat storage should be seen as manifestations of special adaptive patterns interwoven with a person's whole life experiences. She further feels that is imperative to recognize that obesity has positive functions, and that despite its obvious and multiple handicaps it is endowed with important psychological and symbolic meaning. Bruch regards the public campaigns against obesity as being capable of triggering certain harmful psychological effects in downright obese and overweight persons. She does not question the value of nutrition education but believes that the non-obese are more responsive.

A series of Danish investigations (29 - 31) involving a total of 137 obese Copenhagen school children, and representing all "classes" of children from two to 14 years of age, was reported in 1953. The workers who conducted these studies disagreed with Bruch (28) in

certain instances of her theory that family situations precipitate obesity in certain of the children. They concluded, however, that negative psychogenic qualities were apparent in 25 of the group and, also, that in some of the children, obesity had set in at an early age and was frequently associated with other family members. They added that the practice of lavish eating habits may evolve from national traditions and exaggerated ideas of the value of large quantities of rich food in promoting health and preventing disease.

Young (7), an experienced investigator in obesity and nutrition, in studying 168 adult obese subjects, found weight reduction particularly difficult in those who had been obese since childhood. She concluded that emotional stability seemed to be the determining factor since the least successful subjects were those rated as more tense, anxious and insecure. She feels the only real answer to obesity is in prevention, believing therapy should be limited to emotionally stable persons and given at an early stage.

Sebrell (33) and others (34) have decisively equated obesity control with obesity prevention. It has been suggested that nutrition teaching methods possibly have contributed to overeating by encouraging consumption of essential foods for good health without regard to limiting appetite(34).

Rome (35) has said that overeating is compensatory for anxiety feelings relating to others, and for fears of accepting a masculine or feminine role with its attendant responsibility and self image reflecting

competence, ability, and capacity. Rome suggests that physicians may more profitably spend their time in therapy by seeking underlying factors, being concerned with motivation, general adjustment, and quality of interpersonal relationships.

Calorie Allowances

Food energy is required by the body to meet the needs of basal metabolism, physical activity, building and replacement of body tissues, the specific dynamic acticity of food, and excretory losses (36).

The Food and Nutrition Board of the National Research Council (36), is recommending daily calorie allowances for healthy persons living in the United States, has always had as its objective the provision of energy in sufficient amounts, when consumed over an extended period, to maintain body weight or rates of growth at levels most conducive to health and well being.

Many dietary studies, estimating the caloric intakes for children of different ages, have demonstrated that wide individual variations exist, depending upon age, weight, and activity (37). The Food and Nutrition Board (36) in reviewing the calorie needs for children has concluded that there is wide variation in the physical activity in infants and children, and that inactive children become obese even when their caloric intake is well below recommended allowances.

In 1958, as in other years, allowances of the Board for infants and children were proposed as average or approximate for groups. The Board suggested that more appropriate allowances for individual children could be derived by observation of growth, appetite,

and body fatness as determined by the extent of subcutaneous fat deposits.

The 1958 daily recommended caloric allowances of the National Research Council (36) for children from birth through nineteen years of age are shown below. This particular array of allowances is shown so that its comparative aspects can be appreciated:

1. Infants from birth through one month of age: no recommended allowance since breast feeding is the desired procedure.
2. Infants from two through six and from seven through 12 months of age, respectively: 120 and 100 calories per kilogram of body weight, respectively.
3. Children from one year through three years of age: 1300 calories.
4. Children from four through six years of age: 1700 calories.
5. Children from seven through nine years of age: 2100 calories.
6. Children from 10 through 12 years of age: 2500 calories.
7. Boys from 13 through 15 and 16 through 19 years of age, respectively: 3100 and 3600 calories.
8. Girls from 13 through 15 and 16 through 19 years of age, respectively: 2600 and 2400 calories.

These allowances represent an increase of 100 calories over the 1953 allowances (38) for children of one through nine years of age. The 1958 allowances for girls of 10 through 12 years of age were increased from the 2300 calories in 1953 allowances to 2500 calories, which is an allowance equal to that of boys in the same age group. The 1958 allowances for girls of 13 through 15 years of age were increased by 100 calories over 1953 figures (38), while boys' allowances were decreased by 100 and 200 calories, respectively, for those who are 13 through 15 years and 16 through 19 years of age.

Appraisal of Growth and Nutritional Status

The Committee on Nutritional Anthropometry of the Food and Nutrition Board of the National Research Council (39) has indicated that evaluation of the nutritional status of man with regard to emaciation, obesity, growth, and skeletal and muscular development depends primarily on physical measurements obtained by well-defined, uniform methods and comparisons with properly characterized standards. This committee felt that anthropometric data should be appreciated as descriptive data only, while biological significance of individual differences in growth rate and adult body size and composition must be made in reference to such criteria as performance capacity, morbidity, and mortality.

The Committee has outlined the general considerations for anthropometric studies emphasizing the need for impeccable methods in sampling, selection of measurements, recording, and reporting.

In discussing body measurements on children, the Committee emphasized the following: (1) that not only the final stature, but the pattern of development (growth rate, appearance of ossification centers) are under genetic control, the potential achievements of which are in part determined by nutrition; and (2) that during periods of growth, comparison of a child's weight and body dimensions with previously made measurements on the same child is more important than to relate measurements to cross-sectional norms established for a given age.

The informative values of recommended measurements for field use (though not entirely adequate for research) include (39):

Length measurements are concerned with: (1) total body length, and (2) when crown-rump or sitting heights are included, the relative contribution of trunk and legs.

Weight indicates gross body size (bulk) and gives a rough approximation of body volume.

Body circumferences and diameters indicate laterality of build, and (in early infancy) developmental status.

Leg and arm circumferences, as well as the body circumferences indicate the extent of development of the soft tissues, fat and muscle.

"Skin-folds" (i.e. folds of skin plus subcutaneous tissue) indicate the thickness of the subcutaneous fat, and help to differentiate fat from muscle.

The recommended measurements of the Committee for children of seven to 10 + years of age are (39):

1. Standing height, sitting height, and weight.
2. Chest, arm, and calf circumferences.
3. Bicristal (biiliac) and biacromial (shoulder girdle) diameters.
4. Skinfold over the triceps, below the scapula, and on the chest (along the midaxillary line at the level midway between nipples and umbilicus.
5. Postero—anterior X-ray film of the hand and wrist, including terminal phalanges as well as distal ends of the radius and the ulna (this procedure is rarely practicable in the field).

Standards of Heights and Weights Used For Children and Youth In The United States

A child's own height-weight measurements and his own body dimensions compared with his own previously made measurement (39, 40) afford a much more substantial basis for appraising individual growth trends than do judgements made from comparisons with norms or standards. The latter

are for group comparisons and have, even so, a relative value since no single set of standards seems satisfactory for all groups (40, 41). There are marked variations in the average size of groups of children from different geographic areas, due partially to such factors as national background, climate, and socio-economic status (40).

A summary of standards used for children and youth in the United States appears in the Appendix.

Dietary Survey Methods

In 1960 Young and Trulson (42) evaluated the strengths and weaknesses of existing methods of dietary investigation in a comprehensive review of 37 publications. They felt that the validity of any survey method can be judged by the extent to which it measures what the investigator wishes to measure and that more studies on validity and on new approaches are needed. They believed the major defect in collecting and processing dietary survey data for any purpose to be the inability to make precise or even approximate statements concerning the reliability of various procedures in current usage.

Past studies have dealt largely with short term projects and with children or young people (42). The main accomplishment of the past decade, in this area of study, has been a realization of the need for a clear-cut distinction between methods which are appropriate for group means and those suited to specific individual intakes (42).

Young and Trulson (42) concluded that the best method is that which evolves from a clear definition of both the overall objectives of a study and how these objectives are to be tested. This philosophy

was also expressed by the Committee on Nutrition Surveys of the Food and Nutrition Board of the National Research Council (43).

Significant Decisions Involved in Accomplishing Survey Objectives

Significant decisions involve the number and type of respondents, their abilities and cooperativeness, and whether data are recordable by a trained observer or responsible persons. The first mentioned has been said to introduce error in obtaining usual patterns of eating, however, compromise with it may be necessary for the sake of validity (42).

Decisions involving the time period relate to how many and what days would be sufficient to adequately furnish desired information. The question is still debated (42). Some feel that a 7-day record (or 20 consecutive meals) is sufficient and this is probably the most widely used time span (18, 42). Field units of the United States Public Health Service have used 1-day records, believing a large number of this type was as useful as a smaller number of 7-day records (42). Others have chosen 2- and 3-day records (18).

Unduly long periods of recording intakes invite disinterest, lessen cooperation, and decrease accuracy (45). Very long periods have seldom been attempted (42). McHenry and associates (45) in 1945 collected dietary records by observation for the first week of 12 consecutive months on 30 normal adults having scientific training, and found these weekly records varying. Yudkin in 1951 (46) found variations as high as 68 per cent in the nutrient intakes of six young women for four consecutive weeks. In 1953 Young (47) studied 28-day records of 18 adults;

she found considerable individual variation, but concluded that on a group basis there was not sufficient variation to warrant more than a 7-day record. In 1958 Thomson (48) weighed the daily intake of 220 pregnant women and found that the profile from two widely separate weeks maintained its characteristics.

Most of the participating groups in the United States Department of Agriculture cooperative ten-year survey published in 1959 (18) adopted the 7-day dietary record while some chose the 24-hour recall, dietary history, or interview. A few subjects kept 1-, 3-, 14-, or 28-day records. Dietary histories almost invariably revealed more favorable food intakes than actual food diaries or records kept by the same individuals. One-day recall interviews agreed fairly well with 7-day food records. The researchers concluded that for groups a 1-day recall could be used, but that for individuals a 14-day record was needed for a fair intake estimate. The North Central State participants (18), studying school children felt that no rule of the thumb could be adopted, but that the method of choice should be determined by a preliminary survey; they found that 1-day records revealed a greater number of so-called good intakes than 3-day records and these, in turn, more than the 7-day records.

Further considerations involve the availability and training of personnel and the practical aspects of time and expense (42). Decisions also must be made on what dietary information is desired (nutrient; foods), on methods of collection, how nutrient intakes should be analyzed, and on how quantities should be reported (42).

In general the most commonly used methods for determining dietary intake are (42):

1. Intakes of specific meals recorded concurrently by means of:
   (a) Weights
   (b) Household measures or
   (c) Estimates of quantities of specified foods.
2. Intake at specific meals recorded by recall in terms of:
   (a) Estimates of quantity of a specific food or
   (b) Frequency of occurrence of a food item.
3. Current usual intake recorded by recall in terms of:
   (a) Estimates of quantities of specific foods.
   (b) Frequency of occurrence of a food item.
4. Past intake over a specific period recorded by recall in terms of estimates of quantities of specific foods.
5. Past changes in intake recorded by recall in terms of frequency of occurrence of food items.

CHAPTER III

PROCEDURE

The overall purpose of this study was to explore and compare several aspects of obesity and leanness in certain preadolescent girls who supposedly represented prototypes of these physical characteristics and, further, to make comparisons in certain preadolescent girls having physical characteristics associated with those thought to be average or normal. It was the writer's intent to select healthy subjects of similar family backgrounds and of above average intelligence.

The study was begun by a tentative selection of subjects through initial screening of school records in the late summer of 1960. Final selection of subjects was possible at that time when all of the appropriate subjects and parents had fully agreed to cooperate in carrying out all necessary procedures: questionnaires for subjects and parents, 7-day food records on the subjects, collection of certain anthropometric data on the subjects, and the testing of certain personality components and activity interests of the subjects. Further contact with the parents was made in the fall and winter of 1960-61 to ensure their continuing interest in participating in the study, which actually took place in March and April of 1961.

At this time the investigator personally interviewed all mothers of the subjects for the purpose of thoroughly explaining procedures. Questionnaires and food records on the subjects were to be returned by

mail. Appointments were scheduled in April, 1961 for the administration of personality and activity interest tests and for the collection of anthropometric data.

Subjects

Subjects were 12 preadolescent girls whose ages ranged from seven years and 10 months to 10 years and three months. They attended the second through the fourth grades of elementary school in the spring of 1961 in the town of Blacksburg, Virginia.

Subjects were classified into three 4-membered groups according to their body weights: Group A (underweight), Group B (overweight), and Group C (average weight). Subjects were assigned to groups according to their body weight deviation from or conformation to "standards" for height, age, and sex to a sufficient degree to be considered unquestionably underweight, overweight, or of relatively average weight. Comparisons with several standards were made in order to confirm weight status of each subject.

The subjects were further qualified for participation in this study for the following reasons:

1. The presence of a high degree of permissiveness and cooperativeness on the part of parents and subjects.

2. Membership in families in which:

   a. The fathers of the subjects had earned one or more degrees and were generally employed as college faculty members.

   b. The mothers of the subjects were at least high school graduates.

3. The presence of similar parental religious affiliation and similar national background.

4. Presence of good physical health in the subject as evidenced by information from parental questionnaires, school records and gross physical examination by a pediatrician during his collection of anthropometric data.

Questionnaires

Parental questionnaires. A parental questionnaire was prepared to elicit desired information from mothers and fathers of the subjects concerning age, education, occupation, national background, religious affiliation, number of children, general health status, present height and weight, appraisal of past body weights from birth through the fourth decade, appraisal of their own parents' body weight during period of good health, regularity of meals, food preferences and allergies, a typical daily meal pattern, and a weekly activity pattern. Questionnaires for the mothers also included ten questions designed to elicit some information on their practices and attitudes toward child feeding. Mothers were asked to indicate whether their husbands concurred with their answers and, if not, in what way they disagreed. Mothers were also asked to add further information relating to their child's weight which they felt had not been covered by the questionnaire.

Subject questionnaires. Questionnaires for subjects studied were answered by their mothers and were designed to elicit information on age, school grade, health status, regularity of meals, eating habits, food preferences and allergies, whether bottle or breast fed, appraisal

of body weight from birth through the present time, a typical daily meal pattern, and a weekly activity pattern for the present season.

Copies of all questionnaires appear in the Appendix.

Anthropometric Data

Selected anthropometric data were collected by a pediatrician from the Virginia State Department of Health who was assisted by a nutritionist from that department and by the investigator. Measurements were collected in appropriate quarters of the Virginia Polytechnic Institute's infirmary.

Anthropometric data collections recommended by the Committee on Nutritional Anthropometry of the Food and Nutrition Board of the National Research Council (39) for children have been discussed. With the exception of posterior-anterior X-ray films of the hand and wrist, all recommended measurements were made. Subjects, wearing only socks and brief shorts were measured for weight, standing and sitting heights, three circumferences, two diameters, and three skinfold thicknesses.

Standing height: This dimension was measured against a flat vertical surface to which a measuring tape had been secured. The subject's heels and scapulae were in contact with the surface while her head was held so as to permit a horizontal line of sight. A flat rule was used to make firm contact with the scalp. Measurements were read to the nearest quarter of an inch and were converted to centimeters for analysis.

Sitting height: This dimension was measured while the subject was seated on a firm stool (horizontal surface) with her trunk in contact with the wall at both the scapular and sacral regions and with the knees flexed. Measurement was read as described above for standing height with a correction for stool height.

Body weight: Weight was measured on a platform scale with beam construction and was recorded to the nearest one quarter of a pound which was later converted to kilograms for analysis.

Circumferences: All measurements were read to the nearest tenth of a centimeter and measurements were made in triplicate.

1. Chest circumference was measured around the largest part of the chest.

2. Upper arm circumference was measured with arm hanging freely at a right angle to the long axis of the arm and at the level midway between the acromial process of the scapula and the tip of the elbow.

3. Calf circumference was measured around the largest part of the calf.

All circumferences were taken with the tape lightly applied to prevent contour deformity.

Bicristal diameter: The width of the pelvic girdle was obtained by measuring the greatest distance between the lateral margins of the iliac crests. Strong pressure was exerted on the calipers to minimize the soft tissue which would otherwise have been included in the measurement. A steel caliper called a pelvimeter was used.

Biacromial diameter: The width of the shoulder girdle was measured by obtaining the distance between the most lateral margins of the acromion process of the scapulae while the subject stood erect with shoulders relaxed. The pelvimeter was again used.

Both diameters were measured to the nearest tenth of a centimeter.

Skinfold thicknesses: All measurements were read to the nearest tenth of a millimeter.

1. Triceps skinfolds were taken at the back of the right upper arm over the triceps at the level midway between the tip of the acromial process of the scapula and the tip of the elbow. The arm hung freely while the forearm was flexed at a 90° angle. The skinfold was lifted parallel to the long axis of the arm.

2. Scapular skinfolds were measured below the tip of the right scapula. The skinfold was lifted horizontally for measurement. This particular dimension provides a good characterization of an individual's overall fatness. Since thickness of subcutaneous tissue is fairly homogeneous in the area, small differences in locating the site are of less importance than they are in the arm, abdominal region, or chest (39).

3. Chest skinfolds were measured along the midaxillary line at a level midway between the umbilicus and the nipples. The skinfold was horizontally measured.

The skinfold caliper: The instrument used for skinfold measurement was an improved caliper for measuring skinfold thicknesses designed by the Army Medical Nutrition Laboratory and loaned by the office of the Deputy Executive Director of the Interdepartmental Committee on Nutrition for National Defense, Department of Health, Education, and Welfare, Bethesda, Maryland. The caliper is easily manipulated with one hand, maintains a constant tension on the flat parallel faces

regardless of skinfold size, and permits readings which can be made readily and accurately (55). A photograph and directions for operation of the caliper appear in the Appendix.

Physical Examination

At the time anthropometric data were collected the pediatrician performed what he termed a "gross examination" of the subjects. He examined eyes, ears, nose, throat and mouth, and skin and nails and found no defects. No subject had attained menarche.

Dietary Intakes of the Subjects

After careful consideration of the literature relating to kinds of diet records and lengths of time recommended for keeping them, the 7-day food diary was chosen as the best method for obtaining a record of the dietary intake of the subjects selected for this study. It was further known that the parents of the subjects were unusually able and cooperative.

Mothers were given thorough directions for recording, in household measures and quantities, all food consumed by the subjects. They were given a list of directions and diagramatic sketches illustrating food shapes, to aid them in defining serving sizes. The diagramatic material included a ruled edge for measuring certain foods in inches. A copy of these directions and the diagramatic sketches appear in the Appendix.

Calculation of Dietary Intakes

The United States Department of Agriculture Handbook No. 8, Composition of Foods - - Raw, Processed, Prepared (63) was used in calculating total calories, protein, fat and carbohydrate. This particular handbook was chosen simply because it had been the tool which had been used in other nutrition studies involving children of this age group, being carried out by the Department of Foods and Nutrition at the Virginia Polytechnic Institute.

Before calculations were made, all foods were grouped into the following categories: bread - cereal; desserts; sweets; dairy products (milk, ice cream, cheese); meat (also eggs and peanut butter); fruit; vegetable; fat; and miscellaneous items.

Tests Used in This Study

All tests used in this study were administered to the subjects by a faculty member from the School of Home Economics, who was experienced in testing children, except for one interest inventory which was administered to one subject by the writer.

The California Test of Personality: This test, Primary-form AA (51), was chosen as the instrument to be used for gaining some insight into the personal and social adjustment of the subjects. It was appreciated that this test had limitations as do all tests of this type and that it was not designed to supercede clinical psychologists or psychiatrists though it may be and frequently is used by them (52). Since the test is not self-interpreting (51), the results of the test will be presented, but will not be evaluated.

This test is organized around the concept of life adjustment as a balance between personal and social adjustment; accordingly, the bases, respectively, for these adjustments are assumed to be feelings of personal and social security (52).

The test is divided into six components each for testing personal and social adjustment. The six personal adjustment components are: self reliance, sense of personal worth, sense of personal freedom, feeling of belonging, withdrawal tendencies, and nervous symptoms (52).

"Self-reliance" is defined by the test's authors in this way (52):

> An individual may be said to be self-reliant when his overt actions indicate that he can do things independently of others, depend upon himself in various situations, and direct his own activities. The self-reliant person is also characteristically stable emotionally, and responsible in his behavior.

"Sense of personal worth" is defined by the authors as follows (52):

> An individual possesses a sense of being worthy when he feels he is well regarded by others, when he feels that others have faith in his future success, and when he believes that he has average or better than average ability. To feel worthy means to feel capable and reasonably attractive.

"Sense of personal freedom" is defined as follows (52):

> An individual enjoys a sense of freedom when he is permitted to have a reasonable share in the determination of his conduct, and in setting the general policies that shall govern his life. Desirable freedom includes permission to choose one's own friends and to have at least a little spending money.

"Feeling of belonging" is defined by the authors in this way (52):

> An individual feels that he belongs when he enjoys the love of his family, the well-wishes of good friends, and a cordial relationship with people in general. Such a person will as a rule get along well with his teachers or employers and usually feels proud of his school or place of business.

"Withdrawal tendencies" are defined as follows by the authors (52):

> The individual who is said to withdraw is the one who substitutes the joys of a fantasy world for actual successes in real life. Such a person is characteristically sensitive, lonely, and given to self-concern. Normal adjustment is characterized by reasonable freedom from these tendencies.

"Nervous symptoms" are defined in the following way by the authors (52):

> The individual who is classified as having nervous symptoms is the one who suffers from one or more of a variety of physical symptoms such as loss of appetite, frequent eye strain, inability to sleep, or a tendency to be chronically tired. People of this kind may be exhibiting physical expressions of emotional conflicts.

The six components of social adjustment are: social standards, social skills, anti-social tendencies, family relations, school relations, and community relations. Below are shown the test's author's definitions.

"Social standards" are defined in this way (52):

> The individual who recognizes desirable social standards is the one who has come to understand the rights of others and who appreciates the necessity of subordinating certain desires to the needs of the group. Such an individual understands what is regarded as being right or wrong.

"Social skills" are defined as follows (52):

> An individual may be said to be socially skillful or effective when he shows a liking for people, when he inconveniences himself to be of assistance to them, and when he is diplomatic in his dealings with both friends and strangers. The socially skillful person subordinates his or her egotistic tendencies in favor of interest in the problems and activities of his associates.

"Anti-social tendencies" are defined as follows (52):

> An individual would normally be regarded as anti-social when he is given to bullying, frequent quarreling, disobedience, and destructiveness to property. The anti-social person is the one who endeavors to get his satisfactions in ways that are damaging and unfair to others. Normal adjustment is characterized by reasonable freedom from these tendencies.

"Family relations" are defined as follows (52):

> The individual who exhibits desirable family relationships is the one who feels that he is loved and well-treated at home, and who has a sense of security and self-respect in connection with the various members of his family. Superior family relations also include parental control that is neither too strict nor too lenient.

"School relations" are defined in this way (52):

> The student who is satisfactorily adjusted to his school is the one who feels that his teachers like him, who enjoys being with other students, and who finds the school work adapted to his level of interest and maturity. Good school relations involve the feeling on the part of the student that he counts for something in the life of the institution.

"Community relations" are defined as follows (52):

> The individual who may be said to be making good adjustments in his community is the one who mingles happily with his neighbors, who takes pride in community improvements, and who is tolerant in dealing with both strangers and foreigners. Satisfactory community relations include as well the disposition to be respectful of laws and of regulations pertaining to the general welfare.

What I Like To Do, an inventory of children's interests (53): This test is an interest inventory standardized on a nationwide basis for children in grades four through seven. The principal purposes of this test are (54):

> ... to provide a workable means of identifying pupil interests so they may be utilized effectively in guidance and instruction and ... to provide a research instrument for the psychological study of children's interests.

The investigator in using this test hoped to gain some insight into the relative degree of interest possessed by the subjects in active versus quiet play. Even though this test is designed for children enrolled in the fourth through the seventh grades, it was felt that the test would at least show a trend, especially since all of the subjects, except one, showed a reading grade equivalent of from grade 4.4 to grade 9.2 as reported in school records from results of standard tests. The exceptional case mentioned above was a second grader whose reading ability equivalent was grade 2.7.

The test, What I Like to Do, contains a check list of 294 items which provide separate scores for eight interest areas (54): art, music, social studies, active play, quiet play, manual arts, home arts, and science. These interest areas are described below in the words of the test's authors (54):

> ART - This score indicates frequency of preference for active work with various arts and crafts, plus appreciation of the fine arts. Art supervisors will find pupil responses particularly helpful in planning projects with teachers.
>
> MUSIC - Both music supervisors and classroom teachers will wish to give this area particular attention. The score indicates pupil appreciation for various types of music, as well as interest in active musical experiences.
>
> SOCIAL STUDIES - The emphasis on social studies throughout the elementary school curriculum makes this area valuable for identifying social awareness and curiosity. The score indicates the degree of pupil interest in the various fields comprising social studies.
>
> ACTIVE PLAY - Independent activities plus competitive and noncompetitive group sports are included in this area. Scores can provide many clues for improving pupil participation in recess-period activities and physical education programs.

QUIET PLAY - This area measures preferences for both independent and group "things to do" of a less active nature. Scores can be helpful in suggesting leisure-time pursuits that tie in with other interests.

MANUAL ARTS - The items in this area are directed to boys and girls alike. Scores indicate interest in creative activities, as well as the more routine "shop work," and will be helpful to both classroom teachers and manual arts teachers.

HOME ARTS - The items in this area include a variety of "around-the-house" activities that apply to both boys and girls. Scores will be of particular interest to parents and teachers in elementary schools where materials dealing with home economics are included in the curriculum.

SCIENCE - This area measures the child's curiosity about and interest in the natural world. The items can be helpful in planning units in health, safety, and conservation, as well as natural science.

CHAPTER IV

RESULTS

The subjects in this study were assigned to three, 4-membered groups according to the leanness or fatness of their physiques as determined by comparisons of their weights to several criteria. Lean subjects are designated as Group A-1 through A-4; heavy subjects as Group B-5 through B-8; "average" subjects as Group C-9 through C-12.

The fathers and mothers of the subjects are designated by numbers 1-a through 12-a and 1-b through 12-b, respectively. Their group designations correspond to those of their own children.

Family Background

This study proposed that a considerable degree of homogeniety should be thought to exist in the family background of the subjects in order to minimize the possible influences of differing socio-economic factors and national or ancestral backgrounds.

All parents were Protestants and all were, insofar as could be determined, of northwest European stock, except one, whose father and mother were American-Lebanese. Nineteen of the parents were southern-born and reared. The other five were born and reared in either Maine, Ohio, Oklahoma, or Missouri.

The average number of children was 3.25 per family unit. Subject B-4 was an only child and subject C-1 was one of two children; otherwise there were three, four, or five children in each family unit.

Table 1 summarizes the academic and occupational status of the parents. A great deal of homogeniety existed in these areas, particularly among the fathers. While only five of the mothers had earned baccalaureate degrees, all had completed high school and all except three had some additional education. The only working mother was a Group-C parent who was employed as a college faculty member.

The Health Status of Subjects and Parents

A summary of information related to the health status of the subjects and their parents appears in Table 2. All parents considered themselves and their children to be healthy. Regularity of physical examinations was reported for all of the subjects, all of Group-A parents, and three of Group-B parents, only one of Group-C fathers, and three of Group-C mothers. No medicinals were reported as being regularly consumed, except in the case of three Group-C mothers. Regularity of dental examinations were reported for all subjects and all parents.

Group-C parents apparently were less attentive to physical examinations than either Group A or B. Otherwise there seems to have been general agreement among parents and subjects relative to their good health status as defined in this study.

Ages and Grade in School of Subjects

Table 3 is a summary of the ages and grade in school of the subjects at the time of the study. There was a greater similarity of mean ages between Groups A and B than between either of these and

TABLE 1

ACADEMIC AND OCCUPATIONAL STATUS OF PARENTS

Academic Status

Parental Group	High School (only)	High School	Business, Music, or Nursing School	Partial College (2-3 yr)	Bachelor Degree	Masters Degree	Doctor of Philosophy Degree
Fathers	None	12	None	1	11	9	6
Mothers	3	12	4	2	5	2	-

Occupational Status

Parental Group	College Faculty	Insurance	Electronics Supervisor	Housewife
Fathers	10	1	1	
Mothers	1			11

TABLE 2

GENERAL HEALTH STATUS OF PARENTS AND SUBJECTS

Fathers	Group A	Group B	Group C
Regular physical examination	Yes-4	Yes-3	Yes-1
Regular Dental examinations	Yes-4	Yes-4	Yes-4
Do you consider yourself healthy?	Yes-4	Yes-4	Yes-4
Do you regularly take medicines?	No-4	No-4	No-4
Mothers			
Regular physical examinations	Yes-4	Yes-3	Yes-3
Regular dental examinations	Yes-4	Yes-4	Yes-4
Do you consider yourself healthy?	Yes-4	Yes-4	Yes-4
Do you regularly take medicines?	No-4	Yes-3: 1-Thyroxin 1-Butisol 1-Orinase	No-4
Subjects (Parental Answers)			
Regular physical examinations	Yes-4	Yes-4	Yes-3
Regular dental examinations	Yes-4	Yes-4	Yes-4
Do parents consider child healthy?	Yes-4	Yes-4	Yes-4
Are medicines regularly taken?	No-4	No-4	No-4

TABLE 3

AGES AND GRADES IN SCHOOL OF SUBJECTS

Subject No.	Birth Date			Age on April 15, 1961		Grade In School 1960-1961
	Day	Month	Year	Year	Month	
Group A						
1	27	4	1952	9	0	3
2	8	3	1952	9	1	3
3	9	1	1951	10	3	4
4	21	2	1951	10	2	4
Mean				9	9	3.5
Range				9	0	3-4
				-		
				10	3	
Group B						
5	2	2	1953	8	2	2
6	7	2	1952	9	2	3
7	3	1	1951	10	3	4
8	4	10	1951	9	5	4
Mean				9	3	3.2
Range				8	2	2-4
				-		
				10	3	
Group C						
9	7	3	1953	8	1	2
10	4	4	1953	8	0	2
11	13	6	1953	7	10	2
12	24	9	1951	9	6	4
Mean				8	4	2.5
Range				7	10	2-4
				-		
				9	6	

Group C. Groups A and B had a mean age of nine years, nine months, and nine years, three months, respectively. The mean age of Group C was eight years, four months.

Subjects in Group A and B were, on an average, in the third grade in school, while Group-C subjects, on an average, were second graders.

School records revealed that the mean intelligence quotient of the children was 115 to 120.

Anthropometric Data for Subjects

Standing heights and body weights: Table 4 is a summary of the standing heights and the body weights of the subjects.

The mean standing heights of the subjects were: Group A: 132.9 cm; Group B, 139.2 cm; and Group C, 129.4 cm. Group B was 4.7 per cent taller than Group A while Group A was 2.7 per cent taller than Group C. Group B was 7.6 per cent taller than Group C.

The mean weights of the subjects as reported in Table 4 are: Group A, 23.4 kg; Group B, 43.0 kg; and Group C, 27.8 kg.

Deviations of body weights from three standards: Tables 5 and 6 show the body weights of the subjects for their height and age.

Table 5 summarizes standard weights for heights according to Baldwin's tables (40) and shows deviations in kilograms and kilograms per cent. The mean standard weight of Group A was 28.8 kg which was 5.4 kg greater than the mean actual weight for this group. Group A had, therefore, a mean percentage deviation of 18.7 per cent below

TABLE 4

AGE, STANDING HEIGHTS, AND WEIGHTS OF SUBJECTS

Subject No.	Age		Height	Weight
	Year	Month	(cm)	(kg)
Group A				
1	9	0	123.2	19.3
2	9	1	132.1	24.0
3	10	3	136.5	24.4
4	10	2	139.7	25.8
Mean	9	9	132.9	23.4
Range	9	0	123.2	19.3
	-		-	-
	10	3	139.7	25.8
Group B				
5	8	2	123.2	29.7
6	9	2	136.5	38.2
7	10	3	142.2	41.7
8	9	5	154.9	62.4
Mean	9	3	139.2	43.0
Range	8	2	123.2	29.7
	-		-	-
	10	3	154.9	62.4
Group C				
9	8	1	129.5	29.5
10	8	0	125.7	28.1
11	7	10	126.4	24.5
12	9	6	135.9	29.3
Mean	8	4	129.4	27.8
Range	7	10	125.7	24.5
	-		-	-
	9	6	135.9	29.5

TABLE 5

WEIGHT DEVIATION FROM BALDWIN STANDARDS

Subject No.	Baldwin Standard (kg)	Kg Deviation	Percentage Deviation
Group A			
1	23.6	4.3	-18.2
2	28.0	4.0	-14.3
3	30.7	6.4	-20.8
4	32.9	7.1	-21.6
Mean	28.8	5.4	-18.7
Range	23.6-32.9	4.0-7.1	-14.3 - -21.6
Group B			
5	23.5	6.2	+26.4
6	30.7	7.5	+24.4
7	34.4	7.3	+21.2
8	44.2	18.2	+41.2
Mean	33.2	9.8	+29.5
Range	23.5-44.2	6.2-18.2	+21.2 - +41.2
Group C			
9	26.4	3.1	+11.7
10	24.8	3.3	+13.3
11	24.8	0.3	- 1.2
12	30.5	1.2	- 3.9
Mean	26.6	1.3	- 4.9
Range	24.8-30.5	1.2-3.3	- 3.9 - +13.3

TABLE 6

RANKS FOR HEIGHTS AND WEIGHTS OF SUBJECTS

ACCORDING TO STUART-MEREDITH AND BOYD PERCENTILES

Subject No.	Stuart-Meredith Ht.	Stuart-Meredith Wt.	Boyd Ht.	Boyd Wt.
Group A				
1	(1)	(1)	(1)	(1)
2	50-	10+	25-50	10+
3	25-50	(1)	25-	(1)
4	50+	10-	50-	10+
Group B				
5	10-	75+	25	50-75
6	75-	(2)	50+	(2)
7	75-	(2)	50+	90-
8	(2)	(2)	(2)	(2)
Group C				
9	50+	75+	50	50
10	25+	75-	25+	50-
11	25-50	25+	25-50	25-50
12	50	50+	50	50-

(1) For subjects No. one and three, heights and/or weights did not fall on the curves of either standard since they were lighter and/or shorter than individuals reported by Stuart-Meredith or Boyd.

(2) For subjects No. six, seven, and eight, weights did not fall on the Stuart-Meredith curve since they were heavier than any of the individuals reported by them. Subjects six and eight ranked similarly on Boyd's curve relative to weight and/or height.

their mean standard weight. The mean standard weight of Group B was 33.2 kg which was 9.8 kg lower than their mean actual weight. Thus this group had a mean deviation of 29.5 per cent above their mean standard weight. No subject in Group B was less than 21.2 per cent above their standard weight for Baldwin's criteria. Group C had a mean standard weight of 26.6 kg which was 1.3 kg below their mean actual weight. This represented a mean percentage deviation of 4.9 per cent above their mean standard weight. The range in this group was from 3.9 per cent below to 13.3 per cent above their standard weight compared to Baldwin's criteria.

Subject B-8 was actually heavy and tall enough to rank with eleven year old girls in Baldwin's tables. Her standard weight of 44.2 kg as shown in Table 5 is the weight for an eleven year old girl. Thus her standard weight, as reported, is probably much less than it would have been were comparative figures available in Baldwin's tables.

Table 6 summarizes additional data which reflect deviation of the subjects from the Baldwin scale. It is apparent in Table 6 that the Stuart-Meredith and Boyd (40) percentile ranks for the subjects are in general agreement with deviations from the Baldwin tables as shown in Table 5.

Subjects A-1, A-2, B-2, B-3, and B-4 were either too light or too heavy and, in several cases, too short or too tall to be given a percentile rank on either the Stuart-Meredith or the Boyd curve (40).

By these three criteria the subjects in Group A were unquestionably lean, the Group B subjects were unquestionably heavy, and the Group C subjects were of neither extreme.

Additional anthropometric data: Table 7 summarizes the sitting heights; the percentage contribution of sitting heights to standing heights; chest, arm, and calf circumferences; bicristal and biacromial diameters; and three skinfold thicknesses.

The relative contribution of the trunk and legs to total height is reflected in Table 7 in the column devoted to contribution of sitting height to standing height. Group-A and Group-C subjects were slightly longer of trunk and leg, relatively speaking, than Group B.

In Table 8 is summarized the mean percentage differences in the several dimensions reported in Table 7. The Group-B subjects consistently outranked both Group-A and C subjects while Group C consistently outranked Group A. Especially notable are the differences in skinfold thicknesses. The mean scapular skinfold of Group B was 50 per cent and 42 per cent thicker than Group-A and Group-C subjects, respectively. This skinfold is the most significant of the three since it provides a good characterization of an individual's overall fatness. These data quite obviously suggest that Group-B subjects were, indeed, fatter than either of the other groups. The magnitude of the percentage of mean difference in midaxillary skinfolds exhibited by Group B was remarkably higher than Group A, this difference having been 103.7 per cent as reported in Table 8. Somewhat less conspicuous, yet still high, was the greater mean thickness of this skinfold in Group B compared to Group C.

That Group-B subjects had the greatest laterality of skeletal frame is apparent in the percentage of mean difference in diameters and chest circumference shown in Table 8. Also evident is the

TABLE 7

SITTING HEIGHTS, CHEST AND UPPER ARM CIRCUMFERENCES,

BICRISTAL AND BIACROMIAL DIAMETERS,

AND THREE SKINFOLD THICKNESSES OF SUBJECTS

Subject No.	Age Yr	Mo	Sitting Ht. cm	Contribution of Sitting Ht. to Standing Ht. Percentage	Chest Circ. cm	Upper Arm Circ. cm	Calf Circ. cm
Group A							
1	9	0	66.7	54.1	53.0	16.5	23.5
2	9	1	69.8	52.8	59.5	17.0	25.0
3	10	3	69.5	50.9	58.25	17.75	24.0
4	10	2	72.4	51.8	58.0	17.5	25.0
Mean	9	9	69.6	52.4	57.19	17.19	24.38
Range	9	0	66.7	50.9	53.0	16.5	23.5
	-		-	-	-	-	-
	10	3	72.4	54.1	58.0	17.75	25.0
Group B							
5	8	2	66.7	54.1	62.5	23.0	29.0
6	9	2	72.1	52.8	71.5	25.5	30.0
7	10	3	76.8	54.0	71.0	25.25	31.5
8	9	5	84.5	54.6	89.5	30.0	35.5
Mean	9	3	75.0	53.9	73.63	25.94	31.5
Range	8	2	66.7	52.8	62.5	23.0	29.0
	-		-	-	-	-	-
	10	3	84.5	54.6	89.5	30.0	35.5

TABLE 7 (Continued)

Subject No.	Age Yr	Age Mo	Sitting Ht. cm	Contribution of Sitting Ht. to Standing Ht. Percentage	Chest Circ. cm	Upper Arm Circ. cm	Calf Circ. cm
Group C							
9	8	1	68.6	53.0	64.0	20.0	26.5
10	8	0	69.8	55.5	64.5	22.75	28.25
11	7	10	64.8	51.3	58.0	19.0	26.5
12	9	6	69.2	50.9	64.5	20.75	27.0
Mean	8	4	68.1	52.7	62.8	20.6	27.1
Range	7	10	64.8	50.9	58.0	19.0	26.5
	- 9	- 6	- 69.8	- 55.5	- 64.5	- 22.75	- 28.25

Subject No.	Bicristal Diameter cm	Biacromial Diameter cm	Skinfold Thicknesses (mm) Triceps	Scapular	Midaxillary
Group A					
1	19.0	26.0	2.70	1.20	1.0
2	20.0	28.0	1.70	1.10	1.10
3	21.0	28.0	1.50	1.10	1.10
4	21.0	30.0	2.0	1.0	1.10
Mean	20.25	28.0	1.98	1.10	1.08
Range	19.0	26.0	1.50	1.0	1.0
	- 21.0	- 30.0	- 2.70	- 1.20	- 1.10

TABLE 7 (Continued)

Subject No.	Bicristal Diameter cm	Biacromial Diameter cm	Skinfold Thicknesses (mm)		
			Triceps	Scapular	Midaxillary
Group B					
5	22.0	29.0	2.10	1.50	1.50
6	24.0	30.0	3.70	2.80	3.10
7	24.0	31.0	2.10	1.70	1.60
8	26.0	36.0	2.90	2.90	2.80
Mean	24.0	31.5	2.70	2.20	2.20
Range	22.0 - 26.0	29.0 - 36.0	2.10 - 2.90	1.50 - 2.90	1.50 - 2.80
Group C					
9	21.0	30.0	2.60	1.90	2.0
10	19.0	28.25	2.10	1.0	1.20
11	20.0	28.5	2.0	1.30	1.20
12	21.5	29.5	2.3	1.50	1.80
Mean	20.4	29.1	2.2	1.40	1.50
Range	19.0 - 21.5	28.25 - 30.0	2.0 - 2.60	1.0 - 1.90	1.20 - 2.0

TABLE 8

SUMMARY OF THE DIFFERENCES BETWEEN MEAN MEASUREMENTS

OF THE SUBJECTS FOR SEVERAL DIMENSIONS

Group Ranks	Chest Circ.	Upper Arm Circ.	Calf Circ.
Percentage B > A	28.7	50.9	29.0
Percentage B > C	17.2	25.9	16.2
Percentage C > A	9.8	19.8	11.2

Group Ranks	Bicristal Diameter	Biacromial Diameter	Skinfold Thicknesses		
			Triceps	Scapular	Midaxillary
Percentage B > A	18.5	12.5	36.4	50.0	103.7
Percentage B > C	17.6	8.2	22.7	42.8	46.7
Percentage C > A	0.7	3.9	11.0	27.3	38.9

greatest development of soft tissue, fat, and muscle of Group-B subjects as shown by calf, upper arm, and chest circumferences reported in Table 8.

The ranks of all subjects for three of these dimensions in one of five percentiles developed by Stuart and Meredith (56) are shown in Table 9. Again, the greater laterality of skeletal frame in Group B compared to Group A or Group C is illustrated by the hip width percentile ranks. Also shown are percentile ranks for chest and calf circumferences for which Group B again shows the highest rank. The difference is more striking between Groups B and A than between Groups B and C since the two heavier subjects, C-9 and C-10, rank in the nineteenth percentile. It should be remembered, however, that the data in Tables 7 and 8 reflect significantly greater differences between Groups B and C.

All anthropometric comparisons have consistently been made with reference to the informative values of the various dimensions as defined by the Committee on Nutritional Anthropometry of the Food and Nutrition Board of the National Research Council (39).

Ages, Heights, and Weights of Parents

Tables 10 and 11 summarize ages, heights and weights of the parents as they were reported by these individuals to the investigator. In each of these tables is also shown a comparison of parental weights to data in the 1960 United States Department of Agriculture Tables on weights and heights for adults in the United States (57). Hathaway (58),

TABLE 9

PERCENTILE RANKS OF THE SUBJECTS' HIP WIDTHS, CHEST CIRCUMFERENCES, AND LEG GIRTHS ACCORDING TO STUART-MEREDITH STANDARDS

Subject No.	Yr	Mo	Hip Width (Biiliac Diameter) cm	Percentile Rank	Chest Circ cm	Percentile Rank	Leg Girth (Calf) cm	Percentile Rank
Group A								
1	9	0	19.0	10-	53.0	10-	23.5	10-
2	9	1	20.0	10-	59.5	50	25.5	25-
3	10	3	21.0	25-	58.25	25-	24.0	10-
4	10	2	21.0	25-	58.0	25-	25.5	10-
Group B								
5	8	2	22.0	90-	62.5	90-	29.0	90-
6	9	2	24.0	90-	71.5	90-	30.0	90-
7	10	3	24.0	90-	71.0	90-	31.5	90-
8	9	5	26.0	90-	89.5	90-	35.5	90-
Group C								
9	8	1	21.0	50-	64.0	90-	26.5	75-
10	8	0	19.0	10	64.5	90	28.25	90-
11	7	10	20.0	50-	58.0	50-	26.5	75-
12	9	6	21.5	50-	64.5	75-	27.0	50-

TABLE 10

AGES, HEIGHTS, AND WEIGHTS OF FATHERS COMPARED TO DATA FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE

Father No.	Age yr	Ht. in.	Wt. lb.	USDA Comparison Rank	USDA Comparison Wt. lb.
Group A					
1a	38	70	145	Low	147
2a	49	68	135	Low	139
3a	48	72	160	Low to Median	160.5
4a	38	70	140	Low	147
Mean	43.25	70	145	Low	147
Range	38-49	68-72	135-160	Low - Low-Median	139-160.5
Group B					
5a	31	70.5	165	Median to High	168.5
6a	35	74.5	170	Low to Median	170
7a	41	69	165	Median to High	162.5
8a	51	72.5	163	Low to Median	162.5
Mean	39.5	71.6	165.75	Median	165.4
Range	31-51	69-74.5	163-170	Low-Median - Median-High	162.5-170
Group C					
9a	40	71	200	High (22 lb. above)	178
10a	38	70	170	High (4 lb. above)	174
11a	40	66	165	High (10 lb. above)	155
12a	45	70	170	High	174
Mean	40.75	69.25	176.25	High (6.25 lb. above)	170
Range	38-45	66-71	165-200	High - High plus	155-178

TABLE 11

AGES, HEIGHTS, AND WEIGHTS OF MOTHERS COMPARED TO DATA FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE

Mother No.	Age Yr	Ht. in.	Wt. lb.	USDA Comparison Rank	USDA Comparison Wt. lb.
Group A					
1b	37	64.5	130	Median-High	131
2b	48	66.5	132	Median-High	133
3b	(43)[1]	65.5	125	Median	127
4b	34	65.5	124	Low-Median	124.5
Mean	40	65.6	127.75	Median	127
Range	37-48	64.5-66.5	124-132	Low - Median-High	124.5-133
Group B					
5b	29	63.5	130	High	130
6b	36	67.0	137	Median-High	137
7b	39	66.0	150	High (11 lb. above)	139
8b	48	67.0	145	High (3 lb. above)	142
Mean	38	65.9	140.5	High (1.5 lb. above)	139
Range	29-48	63.5-67.0	130-150	Median-High - High	130-142
Group C					
9b	35	67.0	150	High (8 lb. above)	142
10b	36	62.0	135	High (10 lb. above)	125
11b	38	64.5	126	Median	128.5
12b	43	60.0	108	Median	109
Mean	38	63.4	129.75	High	129.6
Range	35-43	60.0-67.0	108-150	Median - High plus	109-142

[1]Estimated age; not included in Mean age.

who compiled these tables, has said that they were based on the measurements of college men from 25 to 29 years of age and college women of 20 to 24 years of age, measured without shoes or clothing. She further stated that the weight, at any age, for height probably should not vary from these data more than five or ten pounds for shorter or taller adults, respectively (58).

Table 10 shows the mean ages of the fathers to have been 43, 39, and 41 years for Groups A through C, respectively. The mean ages of the mothers were 40, 38 and 38 years for Groups A through C, respectively. One Group-A mother did not report her age; her estimated age is shown in parenthesis in Table 10 and was not considered in the mean.

The mean weight ranks of the fathers as shown in Table 10 were: Group A, low; Group B, median; Group C, high with a poundage of 6.25 pounds above this rank.

Mean weight ranks of the mothers are given in Table 11 as follows: Group A, median; Group B, high with an excess of 1.5 pounds; Group C, high.

It is evident from Tables 10 and 11 that the parents of Group-B subjects apparently were slightly taller than those of Groups A or C. The weights of Group-A parents seem to have had more relation to the weights of their daughters than did other parental weights. The weights of all Group-B mothers and those of C-1-b and C-2-b were high or median to high in rank. Group-B fathers had a lower weight rank while Group-C fathers were somewhat overweight. If these data are

valid, it appears that a greater weight relationship existed between the subjects and their mothers than between the subjects and their fathers.

Appraisals of the Past Body Weights of the Subjects, Their Parents, and Grandparents

Some insight into the past weight patterns exhibited by the subjects and their more immediate forebears was needed. Since obtaining actual past weights was not practicable, the following descriptive categories were used by the parents for appraisals: very thin, moderately thin, average, slightly plump, and overweight. The writer was fully aware that this approach was highly empirical, but felt that trends in familial weight patterns might be suggested by these appraisals.

All appraisals were made by the parents of the subjects and, except for the grandparents, were reported for several age periods. Only one appraisal was made for each grandparent; this was for their weight during periods of their good health.

Detailed weight appraisals for all the individuals concerned appear in the Appendix. Summaries of these data, which are reported in Tables 12 through 15, show the percentages of times which weight categories were reported for any group of individuals. Thus the relative predominance of one or more categories within a group can be appreciated. Predominance for subjects as shown in Table 12 for four age periods was: Group A, moderate thinness; Group B, average weight and slight plumpness with equally large percentage for each; Group C, average weight.

Category predominance for the fathers for eight age periods as shown in Table 13 was: Group A, moderate thinness; Group B, average

TABLE 12

SUMMARY: BODY WEIGHTS OF SUBJECTS FROM BIRTH TO TIME OF STUDY AS APPRAISED BY MOTHERS

Weight Category	Group A		Group B		Group C	
	No.	Percentage	No.	Percentage	No.	Percentage
Very Thin	3	18.8	-	-	2	12.5
Moderately Thin	11	68.7	1	6.2	-	-
Average	2	12.5	7	43.8	13	81.3
Slightly Plump	-	-	7	43.8	-	-
Overweight	-	-	1	6.2	1	6.2[1]
Total	16	100.0	16	100.0	16	100.0

[1] This was an appraisal for birth to one year of age.

TABLE 13

SUMMARY: BODY WEIGHTS OF FATHERS AND MOTHERS FROM BIRTH THROUGH THE FOURTH DECADE - - SELF APPRAISALS

Weight Category	Group A		Group B		Group C	
	No.	Percentage	No.	Percentage	No.	Percentage
Fathers						
Very Thin	4	12.5	6	18.8	-	-
Moderately Thin	22	68.8	4	12.5	14	43.8
Average	6	18.7	16	50.0	15	46.9
Slightly Plump	-	-	5	15.6	2	6.2
Overweight	-	-	1	3.1	1	3.0
Total	32	100.0	32	100.0	32	100.0
Mothers						
Very Thin	-	-	-	-	-	-
Moderately Thin	7	21.9	5	16.1	5	15.6
Average	23	71.9	19	61.3	21	65.6
Slightly Plump	2	6.2	4	12.9	6	18.8
Overweight	-	-	3	9.7	-	-
Total	32	100.0	31	100.0	32	100.0

TABLE 14

SUMMARY: BODY WEIGHTS OF GRANDPARENTS OF SUBJECTS DURING PERIODS OF GOOD HEALTH AS APPRAISED BY FATHERS AND MOTHERS OF SUBJECTS

Category	Group A		Group B		Group C		Group A		Group B		Group C	
	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
	Paternal Grandfather						Maternal Grandfather					
Very Thin	-	-	-	-	-	-	-	-	-	-	-	-
Moderately Thin	2	50	1	25	1	25	-	-	1	25	1	25
Average	2	50	2	50	2	50	3	75	1	25	3	75
Slightly Plump	-	-	1	25	1	25	-	-	1	25	-	-
Overweight	-	-	-	-	-	-	1	25	1	25	-	-
Totals	4	100	4	100	4	100	4	100	4	100	4	100
	Paternal Grandmother						Maternal Grandmother					
Very Thin	-	-	1	25	1	25	-	-	-	-	-	-
Moderately Thin	-	-	1	25	1	25	-	-	-	-	-	-
Average	1	25	-	-	2	50	1	25	1	25	4	100
Slightly Plump	3	75	-	-	-	-	2	50	3	75	-	-
Overweight	-	-	2	50	-	-	1	25	-	-	-	-
Totals	4	100	4	100	4	100	4	100	4	100	4	100

TABLE 15

SUMMARY: COMPOSITE PERCENTAGE CONTRIBUTION OF EACH OF SEVERAL CATEGORIES OF BODY WEIGHT OF SUBJECTS, PARENTS, AND GRANDPARENTS AS A FAMILY UNIT

Family Unit	Very Thin	Mod. Thin	Average	Sl. Plump	Overweight
Group A	4.5	30.0	39.7	18.7	7.1
Group B	6.3	15.7	36.4	28.2	13.4
Group C	1.7	19.8	63.0	14.2	1.3

weight; Group C, moderate thinness and average weight with equally large percentages of each. The predominant category for all mothers, as shown in Table 14, was that of average weight, although Group B and C mothers showed a tendency toward slight plumpness and in the case of Group B, overweight.

All grandfathers apparently were of predominantly average weight as shown in Table 15, except Group-B maternal grandfathers, whose weights were equally distributed throughout all categories, except that of "very thin."

In Table 15 the predominant category for grandmothers is reported. For paternal grandmothers this was: Group A, slight plumpness; Group B, overweight; Group C, average weight. For maternal grandmothers this was: Group A, slight plumpness; Group B, slight plumpness, a greater percentage than for Group A; Group C, average weight.

Table 16 shows a composite percentage contribution which each category made in each family unit. From these figures it appears that the following weight categories predominate: Group A, moderate thinness and average weight; Group B, average weight and slight plumpness; Group C, average weight. It is apparent in Table 16 that more overweight and slight plumpness was reported for Group B than for the other groups.

The patterns of predominance of weight levels which have emerged from these appraisals seem to reflect the lean/heavy/average physique grouping of the subjects. However, since the weights were subjectively

TABLE 16

MEAN DIETARY INTAKES OF SUBJECTS FOR A SEVEN DAY PERIOD

Subject	Calories	Protein	Fat	Carbohydrate
Group A				
1	17,591	626.0	779.5	2117.9
2	14,552	531.7	585.3	1921.6
3	15,752	578.6	676.2	1882.3
4	13,519	480.0	659.3	1731.8
Group Total	61,414	2216.3	2700.3	7653.6
Group Mean	15,354	554.1	675.1	1913.4
Group B				
5	11,472	420.1	417.9	1570.6
6	12,757	533.0	522.1	1533.7
7	13,290	447.9	521.6	1630.1
8	16,370	632.5	595.8	1853.5
Group Total	53,889	2033.5	2057.4	6587.9
Group Mean	13,472	508.4	514.4	1647.0
Group C				
9	11,819	406.0	484.4	1558.1
10	12,531	650.9	424.4	1615.7
11	13,170	480.7	531.3	1692.8
12	11,811	432.5	478.4	1532.9
Group Total	49,331	1970.1	1918.5	6399.5
Group Mean	12,328	492.5	479.6	1600.0

estimated and were not actual, their validity is certainly open to question. Therefore, while no tenable inference can be drawn from these data, the weight patterns which have emerged do seem to reflect familial food habits as handed down through two generations.

Mayer (10, 65) reported that certain studies which have been done in the United States show obesity expectancy in children to be: less than 10 per cent when parents are of normal weight; 40 to 50 per cent when one parent is overweight; and 80 per cent if both parents are overweight.

Daily Dietary Intakes of the Subjects

The dietary intakes for the subjects were derived from 7-day records of amounts of consumed foods as kept by the mothers. While the mothers conscientiously attempted to carefully estimate and measure amounts of foods consumed by the subjects, the writer has recognized that certain errors are inherent in collection of data made in this manner. Calculations for total calories, protein, fat, and carbohydrate were made after the food intakes had been classified into nine categories: bread-cereal; desserts; sweets; dairy products (milk, ice cream, cheese); meat (also eggs and peanut butter); fruit: vegetable; fat; and miscellaneous items.

Weekly intakes by food groups appear in the Appendix. The total weekly intakes of calories, protein, fat, and carbohydrate, irrespective of food groups, is summarized in Table 16.

Mean daily dietary intakes of the subjects: Table 17 summarizes the mean daily intakes by subjects and by subject groups. These intakes, as shown in this table for each group, were: Group A, 2193 calories; Group B, 1925 calories; Group C, 1761 calories. Some dietary studies have shown that certain groups of overweight subjects obtained fewer calories than thinner subjects (18, 24, 25) and this seems to have been the case in this study. The positive energy balance is seemingly related more to differences in physical activity - - a feature which presently will be discussed.

In Table 18 are presented the mean daily margins of difference, by percentages, which appeared to exist between groups. Group A consumed 268 more calories than Group B, a difference of 13.9 per cent. Group A consumed 432 more calories than Group C, a difference of 24.5 per cent. Group B consumed 164 more calories than Group C, a difference of 9.3 per cent. Thus, the lean subjects were apparently consuming more calories than either the heavy or the "average" subjects, and the heavy subjects also exceeded the "average" subjects in calorie intake. It might be expected then that the degree of physical activity would reflect energy expenditures which would somehow correspond to these energy intakes and to the subsequent energy balances of the subjects. This possibility was explored and will be discussed later.

Contributions to the mean daily caloric intakes of the subjects by total protein, fat, and carbohydrate calories: No striking differences existed between groups regarding percentages of calories derived from

TABLE 17

MEAN DAILY DIETARY INTAKES OF SUBJECTS

Subject	Calories	Protein	Fat	Carbohydrate
Group A				
1	2513	88.4	111.4	302.6
2	2078	76.0	83.6	274.5
3	2250	82.7	96.6	268.9
4	1931	68.6	94.2	247.4
Group Total	8772	316.7	385.8	1093.4
Group Mean	2193	79.2	96.4	273.3
Group B				
5	1639	60.0	59.7	224.4
6	1822	76.1	74.6	219.1
7	1898	64.0	74.5	232.9
8	2339	90.4	85.1	264.9
Group Total	7698	290.5	293.9	941.1
Group Mean	1925	72.6	73.5	235.3
Group C				
9	1688	58.0	69.2	222.6
10	1790	93.0	60.6	230.8
11	1881	68.7	75.9	241.8
12	1687	61.8	68.3	219.0
Group Total	7046	281.5	274.0	914.2
Group Mean	1761	70.4	68.5	228.6

TABLE 18

DIFFERENCES IN MEAN DAILY CALORIC INTAKES OF SUBJECTS BY CALORIES AND BY PERCENTAGE

Subject No.	Mean Daily Caloric Intakes Calories
Group A	2193
Group B	1925
Group C	1761

Differences in Mean Daily Caloric Intakes of Subjects Group Intakes	Calories	Percentage
A minus B	268	13.9
A minus C	432	24.5
B minus C	164	9.3

the nutrients which were calculated, as is shown in Table 19. A slightly larger percentage of fat calories and an equally smaller percentage of carbohydrate calories were consumed by the lean subjects, compared to the other two groups. Some adults have lost weight most rapidly on isocaloric diets in which fat contributed the greatest proportion of the calories, and have lost weight least rapidly when carbohydrate was the predominant calorie source (8). There may be some association between this and the usual ratios of fat and carbohydrate consumed by heavy or leaner individuals. A detailed breakdown of these calorie contributions is shown in the Appendix.

Calorie contributions made by food groups to mean daily intakes of the subjects: It is evident in Table 20 that there were no dramatic differences between subject groups regarding the calorie contributions made by various groups of foods. The bread-cereal and dairy groups probably account for the differences in fat and carbohydrate intakes which have been discussed. The Group-B subjects did consume a slightly larger percentage of calories from the meat group; otherwise, differences seem unimportant. It was somewhat surprising to see that Group A apparently derived a greater percentage of their calories from desserts and sweets than Group B.

Comparisons of the calorie and protein intakes of the subjects to daily allowances as recommended by the National Research Council in 1958 (36): Comparisons of the caloric and protein intakes of each subject to the interpolated recommended daily allowances of the Food and Nutrition

TABLE 19

CONTRIBUTION OF PROTEIN, FAT, AND CARBOHYDRATE CALORIES

TO THE MEAN DAILY CALORIC INTAKES OF SUBJECTS

Subject No.	Mean Daily Intake	Mean Caloric Values	Percentage Contribution
Group A			
Calories	2193		
Protein	79.2 gm	317	14.5
Fat	96.4 gm	868	39.6
Carbohydrate	273.3 gm	1008[1]	45.9
Group B			
Calories	1925		
Protein	72.6 gm	290	15.1
Fat	73.5 gm	662	34.4
Carbohydrate	235.3 gm	973[1]	50.5
Group C			
Calories	1761		
Protein	70.4 gm	282	16.0
Fat	68.5 gm	617	35.0
Carbohydrate	228.6 gm	862[1]	49.0

[1] By difference.

TABLE 20

SUMMARY: CALORIE CONTRIBUTION MADE BY FOOD GROUPS

TO MEAN DAILY CALORIC INTAKES OF SUBJECTS

Mean Daily Caloric Intake	Group A 2193 cal.		Group B 1925 cal.		Group C 1761 cal.	
Food Group	Calories	Percentage of Total Calories	Calories	Percentage of Total Calories	Calories	Percentage of Total Calories
Bread-Cereal	336	15.3	354	18.4	259	14.7
Desserts	357	16.2	211	11.0	151	8.6
Sweets	142	6.5	169	8.8	141	8.0
Total Desserts/Sweets	499	22.8	380	19.7	291	16.6
Dairy (Milk, Ice Cream, Cheese)	550	25.1	408	21.2	439	24.9
Meat, Egg, Peanut Butter	331	15.1	396	20.6	332	18.9
Fruit	152	6.9	148	7.7	180	10.3
Vegetable	172	7.8	132	6.9	160	9.1
Fat	124	5.6	92	4.8	65	3.7
Miscellaneous	28	1.3	17	0.9	15	0.9

Board of the National Research Council appear in the Appendix. A summary of these data is presented in Table 21. All groups consumed a mean caloric intake which was lower than the recommended allowances: Group A was 5.3 per cent lower; Group B was 15.1 per cent lower; Group C was 17.9 per cent lower.

All groups seemingly consumed more than the recommended daily allowances of protein as is shown in Table 21.

The consumption of fewer calories and more protein than have been recommended by the Food and Nutrition Board of the National Research Council is not an unusual finding for children of the ages of the subjects (18). This board (36) has particularly emphasized that caloric intakes are entirely dependent on individual needs and that their recommended allowances do not constitute requirements. Further, the Board has reported that many American children of one to nine years of age are known to consume as much as five to 20 per cent more protein than the recommended daily allowances, adding that it is unknown whether these greater intakes are helpful, but stating that there is no evidence to show that they are harmful (36). Some nutritionists (18, 50) have recommended that 15 per cent of the total calories be derived from protein for children and adolescents; the findings in this study, as shown in Table 19, agree with this recommendation.

The Amounts of Time Which Subjects and Parents Devoted to Various Activities

The amounts of time which all individuals devoted to a variety of activities, for one week, were indicated, by the parents, on schedules

TABLE 21

SUMMARY: MEAN DAILY CALORIE AND PROTEIN INTAKES OF SUBJECTS COMPARED WITH INTERPOLATED DAILY ALLOWANCES RECOMMENDED BY THE FOOD AND NUTRITION BOARD OF THE NATIONAL RESEARCH COUNCIL, 1958

Subject No.	Yr	Mo	Mean Daily Intake cal	NRC Allowances (Interpolated) cal	Deviation (unit) cal	Deviation (Percentage)
Calories						
Group A						
Mean	9	7	2193	2316	-123	- 5.3
Range	9	0	1931 - 2513	2233 - 2400	-457 - +280	-19.2 - +12.6
	- 10	3				
Group B						
Mean	9	3	1925	2266	-341	-15.1
Range	8	2	1639 - 2339	2122 - 2400	-502 - +51	-22.8 - +2.2
	- 10	3				
Group C						
Mean	8	4	1761	2144	-383	-17.9
Range	7	10	1687 - 1881	2077 - 2300	-613 - -196	-26.6 - -9.4
	- 9	6				

TABLE 21 (Continued)

Subject No.	Yr	Mo	Mean Daily Intake gm	NRC Allowances (Interpolated) gm	Deviation (unit) gm	Deviation (Percentage)
Protein						
Group A						
Mean	9	7	79.2	65	+14.0	+21.6
Range	9 – 10	0 – 3	68.6 - 89.4	63 - 68	+1.6 - +26.4	+2.4 - +41.9
Group B						
Mean	9	3	72.6	64	+ 8.6	+13.4
Range	8 – 10	2 – 3	60.0 - 90.4	60 - 68	-4.0 - +26.4	-5.9 - +40.6
Group C						
Mean	8	4	70.4	61	+10.3	+16.9
Range	7 – 9	10 – 6	61.8 - 93.0	59 - 65	-3.2 - +33.0	-4.9 - + 55.0

especially designed for this purpose. Copies of these schedules appear in the Appendix. The writer recognizes the subjective nature of data reported in this manner and is fully aware of the presence of inherent errors.

Tables 22 through 24 are devoted to summarizing the percentages of time spent by all individuals in a variety of pursuits classified as those spent lying down, sitting, standing, and in strenuous activity.

Subjects: From the data in Table 22 it appears that Groups A and C spent less time reclining or lying down than Group B. Apparently, Group A spent less time in sitting activities than Groups B or C while the latter spent somewhat more time than did Group B. Group A seems to have devoted more time to standing activities than did Group B or C, who spent about equal amounts of time in standing activities. Strenuous activities appear to have more often occupied Group A than Group B or C, although Group C exceeded Group B.

Generally, these data suggest that Group-A subjects were more active than Group C or B subjects and that Group-C subjects were more active than Group B.

Fathers: Table 23 summarizes the supposed percentage of time which the fathers devoted to various pursuits. Group C seems to have spent more time reclining than Group A, who, in turn, spent more time than did Group B. Sitting activities were apparently practiced more by Group A than by Group B and more by Group B than by Group C. Group A seemingly spent the smallest amount of time in standing activities while Group B

TABLE 22

PERCENTAGE OF TIME DEVOTED BY SUBJECTS TO VARIOUS ACTIVITIES

Subject No.	Lying Down	Sitting	Standing	Strenuous Activity
Group A				
1	34.4	45.5	7.8	12.2
2	39.9	38.4	7.4	14.3
3	41.2	40.3	7.9	10.6
4	45.0	37.4	8.2	9.4
Mean	40.1	40.4	7.8	11.6
Range	34.1-45.0	37.4-45.5	7.4-8.2	9.4-14.3
Group B				
5	48.7	39.9	2.5	8.9
6	47.6	41.5	3.2	7.7
7	46.0	44.0	5.5	4.6
8	42.9	44.6	5.2	7.3
Mean	46.3	42.5	4.1	7.1
Range	42.9-48.7	39.9-44.6	2.5-5.5	4.6-8.9
Group C				
9	41.7	37.9	5.9	14.6
10	48.5	39.9	4.6	6.9
11	33.3	55.4	4.2	7.1
12	39.5	47.6	4.2	8.7
Mean	40.8	45.2	4.7	9.3
Range	33.3-48.5	37.9-55.4	4.2-5.9	6.9-14.6

TABLE 23

PERCENTAGE OF TIME DEVOTED BY FATHERS TO VARIOUS ACTIVITIES

Father No.	Lying Down	Sitting	Standing	Strenuous Activity
Group A				
1a	31.8	50.5	13.1	4.5
2a	33.8	46.7	15.5	4.5
3a	33.8	50.9	5.4	10.4
4a	34.4	41.3	18.8	5.6
Mean	33.2	47.4	13.2	6.3
Range	31.8-34.4	41.3-50.5	5.4-18.8	4.5-10.4
Group B				
5a	33.8	48.1	10.0	8.1
6a	32.3	38.7	23.2	5.8
7a	29.6	54.6	14.5	1.3
8a	28.4	39.6	29.0	3.0
Mean	31.0	45.3	19.2	4.6
Range	28.4-33.8	38.7-54.6	10.0-29.0	1.3-8.1
Group C				
9a	34.8	42.1	19.6	3.8
10a	37.0	43.2	10.3	9.6
11a	36.9	31.0	25.6	6.5
12a	36.9	50.0	9.5	3.6
Mean	36.4	41.6	16.3	5.9
Range	34.8-37.0	31.0-50.0	9.5-25.6	3.6-9.6

TABLE 24

PERCENTAGE OF TIME DEVOTED BY MOTHERS TO VARIOUS ACTIVITIES

Mother No.	Lying Down	Sitting	Standing	Strenuous Activity
Group A				
1b	33.9	27.3	36.4	2.4
2b	36.6	27.7	34.1	2.4
3b	32.6	29.4	31.1	7.0
4b	37.1	35.9	24.7	2.3
Mean	35.1	30.1	31.6	3.5
Range	32.6-37.1	27.3-35.9	24.7-36.4	2.3-7.0
Group B				
5b	34.4	42.7	22.7	0.7
6b	29.4	28.3	41.2	1.1
7b	35.9	42.5	38.3	0.3
8b	27.5	33.3	37.7	1.5
Mean	31.8	36.7	34.9	0.9
Range	27.5-35.9	28.3-42.7	22.7-41.2	0.3-1.5
Group C				
9b	36.6	29.8	30.4	3.3
10b	20.5	50.5	28.9	0
11b	33.3	25.0	37.5	4.2
12b	35.1	36.3	26.2	2.4
Mean	31.4	35.4	30.7	2.5
Range	20.5-36.6	25.0-50.5	26.2-37.5	0 - 4.2

spent the greatest amount of time in this way. Group A evidently devoted more time to strenuous activities than Group C, who spent more time in this way than did Group B.

Generally speaking, the Group-A and C fathers seem to have reclined more than Group B, but they also devoted more time to strenuous pursuits. It should be remembered that Group-A and B fathers were not overweight while Group-C fathers were slightly overweight.

Mothers: Table 24 is a summary of the supposed percentage of time which the mothers spent in various activities. Groups B and C reported about equal amounts of time spent in reclining, which was more than was reported by Group B. This was also true for reported sitting activities. Group A and C apparently spent about equal and less amounts of time in standing activities than did Group B. Group A exceeded Group C in supposed strenuous activities while Group C exceeded Group B in this respect.

In general, Group-A and Group-C mothers reported more strenuous activity, but they also reported that they spent more time reclining.

If all of these data are indicative of the activities of the individuals, it appears that the lean subjects spent more time in strenuous activities than did the heavy subjects or the subjects of "average" weight and that the latter, in turn, devoted slightly more time to this than did the heavy subjects. From the reported evidence it would seem that this relationship also exists among the parents, except for the fathers in Group C.

Food Preferences and Certain Eating Practices of the Subjects and Parents

A preponderance of disliked foods or a preference for a limited few, irregularity of meals, meals hastily eaten or dawdled over, and possibly the presence of presumed or actual food allergies are some of the factors which characterize erratic patterns of eating (59). These, in turn, may underlie extremes of energy balance (59); therefore, some insight into whether these factors were operating in the subjects in this study was needed.

Detailed tables appear in the Appendix in which are reported foods especially liked by the subjects and the parents. Tabulations of individual foods were arranged into food groups so that preferences for general types of foods might be revealed. Table 25 is a general summary of the Appendix tables. In this table it is evident that there were distinctly more especially liked than disliked foods reported by the parents; for the subjects the difference was less striking. Generally speaking, the subjects and the parents reported liking a wide variety of foods and none of the individuals disliked a preponderance of foods.

Among the food groups which apparently were more significantly liked, as shown in Table 25, were: non-starchy vegetables and fruits, which were more often reported by Group-A parents and subjects than for other individuals; desserts and sweets, which were more often reported by Group-B fathers and subjects than for other individuals. Among the more significantly disliked food groups reported, were non-starchy

TABLE 25

SUMMARY: FOOD PREFERENCES OF PARENTS AND SUBJECTS

BY GROUPS OF FOODS

	Fathers			Mothers			Subjects		
Especially Liked Foods	A	B	C	A	B	C	A	B	C
Meat	4	5	5	11	6	4	7	6	3
Starchy Vegetables; Bread	2	5	3	-	2	2	3	-	2
Other Vegetables; Fruits	7	3	3	9	2	5	5	3	1
Milk; Cheese	1	1	1	1	-	1	-	1	-
Desserts; Sweets	-	3	-	1	3	4	1	6	3
Total	14	17	12	22	13	16	16	16	9
Especially Disliked Foods									
Meat	-	1	-	3	2	-	2	2	4
Starchy Vegetables; Breads	-	-	-	-	-	-	3	1	1
Other Vegetables; Fruits	1	-	3	1	1	1	4	8	3
Milk; Cheese	-	-	1	-	-	1	-	-	1
Desserts; Sweets	-	-	-	-	-	-	-	-	-
Miscellaneous Foods; Fats	1	1	2	-	-	2	1	3	1
Total	2	2	6	4	3	4	10	14	10

vegetables and fruits, which were more frequently reported for Group-B subjects than for the other individuals. Otherwise differences seem unimportant.

In Tables 26 and 27 are summarized certain eating practices and related factors for the subjects and the parents. Regularity of meals eaten during a reasonable length of time was reported for all individuals as is shown in these tables. In Table 26 it is shown that Group-B subjects were considered to be "good eaters" somewhat more frequently than the other subjects. "Slow eating" was reported for only two subjects, both of whom were members of Group A. "Fast eating" was reported for two subjects, one from Group B and one from Group C. Otherwise, subjects were considered by their parents to be "average eaters" with respect to the time. No consistent consumption of vitamin or mineral supplements was reported for any group of individuals, with the exception of Group-B subjects who were reported as regularly consuming vitamin supplements. Food allergies were consistently reported as not being present, except for Group-B parents. Evidently these individuals were not deterred from enjoying a wide variety of foods, however, for they reported as much.

The food practices about which individuals in this study were questioned do not appear to have been extreme, rather they seem to have been desirable.

Parental Attitudes Toward Certain Child Feeding Practices

Parental attitudes toward certain child feeding practices were sampled through the use of several questions selected for the purpose

TABLE 26

FACTORS RELATING TO CERTAIN EATING PRACTICES OF SUBJECTS

(Parental Answers)

	Group A	Group B	Group C
Good Eater	Yes-2 No-1 Fair-1	Yes-4	Yes-2 No-1 Fair-1
Slow Eater	Yes-2	No-4	No-4
Average Eater	Yes-2	Yes-3	Yes-3
Fast Eater	None	Yes-1	Yes-1
Regular Vitamin Supplement	Yes-1 No-3	Yes-3 Occasionally-1	Yes-2 No-2
Regular Mineral Supplement	No-4	No-4	No-4
Food Allergy	No-3 (1 outgrew infant egg allergy) Shell Fish-1	No-3 (1 outgrew chocolate allergy) Possibly Fresh Pineapple - 1	No-4
Are Meals Eaten at Regular Times?	Yes-4	Yes-4	Yes-4
Mean Time Spent Eating			
A.M.	20 min	15 min	15 min
Noon	15-20 min	15-20 min	15 min
Evening	50 min	30-35 min	50 min

TABLE 27

FACTORS RELATED TO CERTAIN EATING PRACTICES OF PARENTS

	Fathers			Mothers		
	A	B	C	A	B	C
Regular Meal Times	Yes-4	Yes-4	Yes-4	Yes-4	Yes-4	Yes-4
Time Spent Eating						
A.M.	15-20 min	15-20 min	15 min	15-20 min	15-20 min	15 min
Noon	20 min	20 min	20 min	20 min	20 min	15-20 min
Evening	40-45 min	30-35 min	35 min	40-45 min	35 min	30-35 min
Vitamin Supplements	Yes-1 No-2 Occ in winter -1	No-4	Yes-2 No-2	Yes-1 No-3	Occ-1 No-3	Yes-1 Occ-1 No-1 No Answer -1
Mineral Supplements	No-4	No-4	No-4	Yes-1 No-3		No-4
Food Allergy	Yes-2 No-2	No-4	No-4	Yes-2 No-2	No-4	No-3 No Answer -1

of gaining some insight into parent-child relationships during meals, the degree of freedom permitted the children in their choice of amounts and kinds of foods, and the regularity of the children's exposure to certain between-meal or snack foods. These questions were developed from a study of parental attitudes toward feeding habits as discussed by Jeans, et al; Breckenridge and Murphy; and Spock and Lowenburg (60-62).

Responses to these questions were difficult to evaluate since parents were allowed to qualify their statements; accordingly, analysis became involved. Responses will be discussed according to the general practices about which several questions were asked.

> Joining family meals: Do you permit your children to eat with the family: (a) from infancy; (b) as soon as the child, in your opinion, demonstrates ability to adjust to the family group; if (b), at about what age?

Groups A and B were in general agreement in regard to permitting their children to join family meals. One fourth of each of these groups permitted this upon their children having demonstrated apparent ability to adjust to the family group. Group C responses were equally divided between the two practices.

The years of age reported for the latter practice varied equally for Groups A and B, ranging between one year and three years. Group A reported: one, one year or as soon as the child was on a schedule of three meals a day; one, fifteen months; one, two and one half years. Group B reported: one at one year and at evening meals and other meals if no conflict occurred in the feeding schedule; one at two years;

and one at three years. Group C reported: one at one year; and one, at the age when the child's meal schedule was similar to that of the family and when the child was able to sit in a high chair.

Since half of Group C parents reported permitting their children to join family meals from infancy and the other half reported beginning this at the age of about one year, there seems to be a general tendency toward an earlier beginning of this practice among Group C parents.

Permitting children to choose amounts of food: Do you permit your children to choose the amounts of food they wish to eat and, if so, at what age do you usually begin this technique?

All of Group B and one half of Groups A and C indicated that their children were permitted to choose the amount of food they wished to eat. One member of Group A did not respond. Two qualifying statements were given by two different parents from Group B. These included, "I often encourage her to eat more of certain foods and to cut down on some;" and, "not sweets or fats, she is overweight. Usually, I fix her plate and she doesn't ask for more."

Apparently, Group-B parents were somewhat more permissive regarding permitting their children to choose amounts of food.

The years of age reported for permitting children to choose amounts of food included: Group A: one, five years; and one, six years; Group B: one, two years; one, two to three years; and one, six years; Group C: one, three to four years; and one, six years.

Ages reported for all groups were relatively similar, except for the two younger ages reported by Group B.

Permitting children to choose kinds of food: Do you permit your children to choose the kinds of food they wish to eat and, if so, at what age do you begin this technique?

One fourth of Groups-A and C parents responded positively and one half negatively to the question of whether children are permitted to choose the kinds of food they wish to eat. One fourth of each of these groups failed to answer. One half of Group B responded positively and one half negatively regarding the choice of kinds of food.

All negative responses in Groups B and C were qualified. One Group-B parent indicated that she tended to serve foods which the family preferred; another Group-B parent stated that a choice of kinds of foods was not always allowed because the child would "choose just one food to fill up on." One Group-C parent qualified her negative response by indicating that she tended to serve foods which were popular with the family. Another Group-C parent indicated that she permitted choice of kinds of food at Sunday supper and that the pattern of the children's selections was similar to that of weekday meals.

There seemed to be a slightly greater tendency among Group-B parents toward permitting children to choose kinds of food.

The years of age for permitting this practice were indicated as ranging from four to six years among all groups. One fourth of the parents from each group reported beginning this practice at six years of age; one fourth of Group-B parents reported beginning at four to five years of age; and one fourth of Group C reported beginning at three to four years of age. One fourth of Group-C parents did not respond.

Sizes of portions of food: In serving food to your children, do you serve: (a) small portions permitting children to have additional food, if requested; (b) family size or average portions permitting child to eat only as much as he or she desires; (c) family or average size portions, requiring child to eat all food before being permitted to leave the table?

All parents responded positively to part-(a) of this question. One Group-A parent, however, indicated that she required these small portions to be entirely eaten before her child could be excused from the table.

All parents indicated that they did not practice the serving of family size portions to their children, permitting them to eat only as much as he or she desired.

All of Groups B and C and three fourths of Group A also responded negatively to part-(c), the service of family size portions with the requirement that the children eat all food before being permitted to leave the table. The one dissenting response from Group A had previously responded positively to part-(a) of this question. There is a possibility that this parent might have been thinking of her older children in answering part-(c).

Introduction of new foods: Do you introduce new foods to your child by: introducing them one at a time; (b) serving small portions; (c) both (a) and (b); (d) if you do none of these, what do you do?

Three fourths of each group indicated that new foods were introduced one at a time. All of Groups B and C and three fourths of Group A indicated that new foods were introduced in small portions. Three fourths of Groups B and C practiced both procedures, while half of Group A practiced both procedures.

Groups B and C are in slightly greater agreement with respect to the introduction of new foods to their children.

Parental supervision at meals: Do you supervise the child's behavior at the table (a) much; (b) medium; (c) little?

Responses revealed that much supervision was indicated by half of Group A, by none of Group B, and by one fourth of Group C. Medium supervision was indicated by half of Groups A and B, and by three fourths of Group C. Little supervision was indicated by none of Groups A and C, while half of Group B indicated that they practiced this.

Apparently, there was more agreement among all groups on the practice of a medium amount of parental supervision at mealtime, than for the more extreme degrees of supervision. There seems to be, however, somewhat direct disagreement for the latter where responses were given: Groups A and C said they never practiced little supervision, while Group B never practiced much supervision. It appears that Group B tended to be less strict than Group C and that Group C tended to be less strict than Group A.

Who supervises the children at meals: (a) mothers; (b) fathers; (c) both?

Relatively similar responses to the question of who supervises children at mealtime were indicated by all groups. Three fourths of Groups B and C and all of Group A indicated that both parents participated in this practice. One respondent from Group A indicated that the mother was the dominant supervisor, even though both parents participated

in mealtime supervision. One fourth of Groups B and C indicated that the mother exclusively supervised the children during meals.

> Availability of snack foods: Which of the following do you regularly make available to your family: (a) fruit and fruit juices; (b) soft drinks; (c) candy; (d) cookies and similar foods (potato chips, etc.)?

There was positive agreement in all groups for fruits and fruit juices. The question of availability of soft drinks and candy received positive responses from half of Groups A and B, however, all responses were qualified by a statement indicating that consumption of these items was controlled. The response from Group C was entirely negative for regular availability of soft drinks and candy.

All of Groups B and C and three fourths of Group A responded positively to the question of regular availability of cookies and similar items. Two qualifications, one each from Groups A and B, included: a statement from a Group-A parent that consumption of these items was regulated; and a statement from a Group-B parent that these items were served "mostly at meals."

> Agreement of the fathers with the responses of the mothers: Does your husband concur with your answers? If not, please indicate in what way he disagrees.

All responses to this question were positive, except two. These two negative responses especially pertained to the question on who supervised children at mealtime. One member of Group B seemed to contradict her initial response that both father and mother supervised the children when she made the statement, "my husband believes in more supervision and discipline at mealtimes and is much more strict than I."

The member of Group C who indicated that her husband disagreed, had previously stated that she exclusively supervised their children at mealtime and then reenforced that response by this statement, "my husband feels that I should not cater to 'likes' (food). He feels that mealtime is not the time for correction of manners, etc."

Comments made by mothers: Five mothers responded to the request that additional comments be made, if desired, regarding the tendency of their child toward leanness, "average" weight, or plumpness.

Two Group-A mothers made statements. The mother of the Group A subject whose calculated calorie intake exceeded that of all other subjects said:

> I was born a twin. My twin sister and I weighed only seven and one half pounds together. We both are small boned. Our growth development was steady, but slow. We were the smallest girls in our high school graduation class. _____ seems to have a similar growth pattern. I don't recall that being small ever caused me any anxiety, but _____ is very self conscious of her size. Her nearest playmates are large for their age which tends to emphasize ____'s smallness. Physically, she can and does compete with her playmates, but she is ready to "drop" at the end of the day. I believe she burns up her energy very rapidly.

Another Group-A mother, whose daughter was otherwise reported as a healthy child, said:

> _____ has a definite tendency toward asthma - I feel this may have"worked" on her.

Two Group-B mothers added statements, one of which was:

> _____ had her tonsils out just before her seventh birthday and has gained over forty pounds since that time.

The other Group-B mother stated:

> _____ was born with club feet and, with the exception of very short periods, wore hip length casts until she was five and one

> half years of age. She was in the hospital for two or three months a year for surgery, each time losing considerable amounts of weight, so she did not get fat. After the casts were off for good she gained weight rapidly and has been overweight ever since. Until the past year she was not very active. Now she does most of the things other children do. I have been trying to get her on a diet, but her doctor does not believe a child should be on a strict diet until her teens. I am a mild diabetic and she eats the same amounts of food that I do with the exception of desserts which I try to limit. Fortunately, my husband does not like fats and I am on a low fat diet, the food I prepare is done with as little fat as possible.

This subject had apparently received excellent treatment; in the writer's estimation, she moved around with a great deal of ease.

Only one Group-C mother made a comment and this was in regard to one of the slightly "overweight" children in this group of subjects; the comment was:

> _____ had a series of ear infections in the spring of her seventh year - this, plus heavy snow for a period of six weeks turned her interest to TV. Because of this she gained eight pounds in a few months. Her doctor suggested adjusting her diet only by using skim milk instead of whole milk. _____'s interest in outside play has been stimulated by having a new active friend in the neighborhood. This has improved her muscle tone.

Summary: Responses to questions relating to parental attitudes toward child feeding were difficult to evaluate. However, tendencies toward certain practices seem to have been shown.

Group-C parents seemed to permit their children to join family meals at an earlier age - - from infancy or at about one year of age - - than did the other parents.

Group-B parents appeared to have been more permissive than other parents in permitting children to choose both amounts and kinds of food they wish to eat.

There was apparent agreement among all three groups as to the serving of small portions of food to their children, permitting additional amounts as were requested by the children. There also appeared to be general agreement among parental groups that new foods be introduced one at a time and in small portions.

There was general agreement among all parents regarding a medium degree of parental supervision at meals. Where extremes were expressed, Group B tended to be less strict than Group C and Group C tended to be less strict than Group A. Mothers and fathers were reported as sharing supervision of their children at meals, except in two instances when the mother was reported as the dominant supervisor; these included one Group-B mother and one Group-C mother.

Group-C parents seemingly restricted the use of snack foods to a greater extent than did other parents, although such foods appear to have been controlled in most instances, except for fruit and fruit juices which were reported as being regularly available to all subjects.

Fathers were reported as concurring entirely with the mothers in their answers, except in the two instances which related to supervision at meals as mentioned above.

Personality Test and Interest Inventory Ranks of the Subjects

Personality test: In Tables 28 and 29 are summarized the percentile ranks of the subjects for the primary form of the California Test of Personality (51). Detailed data appears in the Appendix including relationships of the

TABLE 28

SUMMARY: PERCENTILE RANKS OF SUBJECTS FOR THE CALIFORNIA TEST OF PERSONALITY - PRIMARY FORM
(Part A)

	Personal Adjustment Percentile Ranks						Total
Subject No.	Self Reliance	Sense of Personal Worth	Sense of Personal Freedom	Feeling of Belonging	Withdrawing Tendencies	Nervous Symptoms	Personal Adjustment
Group A							
Mean	91	88	80	90	90	83	97
Range	80-95	80-90	70-90	90-90	90-90	60-90	90-99
Group B							
Mean	60	60	70	60	40	30	45
Range	40-80	10-90	50-90	30-90	30-60	10-40	30-50
Group C							
Mean	60	75	55	83	70	60	68
Range	40-80	50-90	50-70	70-90	30-90	30-90	50-80

TABLE 29

SUMMARY: PERCENTILE RANKS OF SUBJECTS FOR THE CALIFORNIA TEST OF PERSONALITY - PRIMARY FORM

(Part B)

	Social Adjustment Percentile Ranks							
Subject No.	Social Standards	Social Skills	Anti-Social Tendencies	Family Relations	School Relations	Community Relations	Total Social Adjustment	Total Personal and Social Adjustment Percentile Ranks
Group A								
Mean	80	80	80	88	70	75	89	95
Range	80-80	50-90	50-90	80-90	40-80	60-90	80-99	90-99
Group B								
Mean	80	60	45	83	48	40	55	53
Range	80-80	50-70	30-50	80-90	10-80	20-60	40-80	40-70
Group C								
Mean	65	60	85	55	65	55	65	68
Range	40-80	30-90	70-90	10-80	40-80	40-60	50-80	50-80

ranks of subjects to the standard scores published by the test's authors (52).

The writer does not present the results of this personality profile as conclusive evidence of the quality of the personal and social adjustments of the subjects in this study. Rather, she hopes that trends may be identified which might suggest what directions of adjustment were being taken by the subjects at the time of the study.

In general, according to the test's authors (52) maladjustment is shown by lower percentile scores which are, in general, more reliable than the higher scores. They have further pointed out that the lower percentile ranks represent difficulty while the higher ranks represent adjustment or at least a knowledge of acceptable behavior.

With these generalizations in mind, the mean percentile ranks for personal, social, and total adjustment as shown in Tables 28 and 29, suggest that the lean subjects had an unusually high degree of either adjustment or, at least, knowledge of acceptable behavior - their percentile ranks for personal, social, and total adjustment having been 97, 89, and 95, respectively. Subjects of "average" weight did not rank in percentiles which suggested adjustment of the high degree shown by those of the lean subjects; nevertheless, their mean ranks for personal, social, and total adjustment, which were 68, 65, and 68, respectively, suggest either good adjustment or a good knowledge of acceptable behavior. The heavy subjects consistently ranked in lower mean percentiles: personal adjustment, 45; social adjustment, 55; and total adjustment, 53. The components in which the heavy subjects

ranked below the fiftieth percentile were: withdrawing tendencies, nervous symptoms, anti-social tendencies, school relations, and community relations. Other components, notably a sense of personal freedom, social standards, and family relations received ranks above the fiftieth percentile by the heavy subjects. These data suggest that the heavy subjects did not have the same degree of adjustment or knowledge of behavior corresponding to that of the other groups of subjects.

As has been mentioned, the writer does not presume to evaluate the results of this test from the standpoint of causes or methods of correction. Identification of trends in directions of adjustment was the only objective which was sought by the investigator.

If any relationship exists between the personality of these groups of subjects, as measured by this instrument, and their weight patterns, in the opinion of the writer, it is probably more oriented to the effect of being overweight than to the cause of overweight.

Children's interest inventory: The writer's primary intent in using the inventory, What I Like to Do (53), was to compare the apparent interests of the groups of subjects in physical activities. The authors of this test (54) believe that a child's interest scores will correlate highly with observations of a child's current activity choices.

From the definition of the activity interest areas as given by the authors of the test (54), the areas of art, active play, quiet play, manual arts, and home arts are related to physical activity patterns of varying degrees. In each of these interest areas, as shown in Table 30,

TABLE 30

SUMMARY: PERCENTILE RANKS OF SUBJECTS FOR AN INVENTORY OF CHILDREN'S INTERESTS: WHAT I LIKE TO DO

	Activity Areas and Percentile Ranks							
Subject No.	Art	Music	Social Studies	Active Play	Quiet Play	Manual Arts	Home Arts	Science
Group A								
Mean	75	63	73	73	77	72	67	77
Range	45-99	7-99	45-99	60-97	35-99	45-99	20-99	50-99
Group B								
Mean	59	74	75	57	45	53	38	70
Range	20-85	45-99	50-99	30-80	7-65	35-70	3-80	30-75
Group C								
Mean	58	34	54	73	62	45	33	58
Range	30-75	10-60	20-80	40-70	1-95	5-70	5-55	30-80

Group-A subjects ranked considerably higher than Group-B subjects in areas related to active play and quiet play. If, as the authors of the test state, current activity choices can be measured by these interest scores, then the results of this test support the records of activity of the subjects as reported by the mothers.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to explore and compare certain factors related to obesity, leanness, or so-called average weight in 12 healthy preadolescent girls. Specifically, this study was designed to investigate: (a) anthropometric data collected from the subjects; (b) possible relationships of stature and weight between parents and subjects; (c) differences in the caloric intakes of the subjects: (d) activity patterns of the subjects and parents; (e) food preferences, practices, and attitudes of the subjects and parents; and (f) some personality components and activity-interests of the subjects as measured by certain standardized tests.

Data were collected in the spring of 1961 from the 12 preadolescent girls and their parents. The girls chosen for this study were enrolled in the second, third, or fourth grades of the Blacksburg, Virginia public schools and ranged in age from seven years, 10 months to 10 years, three months. Subjects were selected according to the physique appraisals of lean, heavy, or "average" weight. Four subjects were chosen for each of these weight groups, which were designated as Groups A, B, and C, respectively.

Data were collected by means of questionnaires, anthropometric measurements, 7-day food diaries, and administration of standardized tests for measuring certain personality components and activity

interests. From the data thus collected, the following results were obtained:

1. Subjects were of similar family backgrounds; parents and subjects were reported as being in good health with regular attention given to physical and dental examinations.
2. Group-A subjects had a mean weight of 23.4 kg and were 18.7 per cent underweight; Group-B subjects had a mean weight of 43.0 kg and were 29.5 per cent overweight; Group-C subjects had a mean weight of 27.8 kg and were within 4.9 per cent of "average" weight.
3. Group-B subjects, relatively speaking, were taller than either Group-A or Group-C subjects.
4. Other anthropometric data agreed with the comparative height-weight data in regard to physique rank of the subjects. When the informative values of various dimensions, as defined by the Committee on Nutritional Anthropometry of the Food and Nutrition Board of the National Research Council (39) were used as a reference, it was found that: Group-B subjects had a greater laterality of frame and a greater development of soft tissue, fat, and muscle than Group-A or Group-C subjects, as determined by bicristal and biacromial diameters and by chest, upper arm, and calf circumferences. Likewise, Group-B subjects seemingly outranked Group-A and Group-C subjects in amounts of subcutaneous fat deposits, as indicated by caliper measured skinfold thicknesses at three sites.

5. When the heights and weights of the parents were compared, Group-B parents were slightly taller and heavier than Group-A parents. Group-C fathers were the heaviest among the three father-groups, while Group-C mothers were not as heavy as Group-B mothers. A greater weight relationship appeared to exist, in all groups, between mothers and daughters than between fathers and daughters.
6. Evaluation of past body weight categories, as reported by the parents for themselves, the subjects, and the grandparents of the subjects, suggested that moderate thinness and average weight had predominated in Group A, as a family unit; that average weight and slight plumpness had predominated in Group B, as a family unit; and that average weight had predominated in Group C, as a family unit.
7. The calculated mean caloric intakes of the subjects were: for Group A, 2193 calories; for Group B, 1925 calories; and for Group C, 1761 calories. Group-A subjects apparently were consuming a greater number of calories per day than were the other groups. There was little difference in the percentage contribution of various food groups to the mean caloric intakes of the subjects.
8. Activity patterns, as reported by the parents, revealed that Group-A subjects and parents were more physically active than Group-B or Group-C subjects and parents; Group-C subjects and parents were more physically active than were Group-B subjects and parents.

9. Food preferences, as reported by the parents for all the groups, showed that both subjects and parents enjoyed a wide variety of foods and that they were not prone to dislike a great many foods. Food habits of both subjects and parents were considered to be desirable.

10. Responses of parents to questions relating to child feeding practices and attitudes were difficult to evaluate, but the following trends were observed:

    Group-C parents permitted children to join family meals at an earlier age.

    Group-B parents were more permissive in regard to their children choosing both amounts and kinds of foods at meals.

    There was general agreement among all parents that food should be served to their children in small portions with second servings being allowed as requested, and that new foods should be introduced one at a time and in small portions.

    While there was general agreement on a medium amount of parental supervision during meals, where extremes were expressed, Group-B parents tended to be less strict than Group-C parents and Group-C parents tended to be less strict than Group-A parents. Parental supervision at meals was generally shared by both parents.

    Except for fruits, snack foods were usually controlled among all groups; however, Group-C parents restricted snack foods to the greatest extent.

11. As measured by the California Test of Personality (51), the percentile ranks of the three groups of preadolescent girls for personal, social, and total adjustment, respectively, were: for Group A - - 97, 89, and 95; for Group B - - 45, 55, and 53; and for Group C - - 68, 65, and 68.

12. When tested by an inventory of children's activity interests (53), Group-A subjects ranked considerably higher than Group-B subjects in five out of eight interest areas. Likewise, Group-C subjects ranked higher than Group-B subjects in two out of eight interest areas. If the children's activity choices can be measured by these interest scores, then the results of this test support the records of the activities of the subjects as reported by the mothers.

Conclusion

In this particular study, a tendency toward obesity was more related to lack of active interest and participation in physical activities than to caloric intake.

Recommendations

After completing this study, the writer recommends:

1. That this investigation be used as a pilot study for developing a research program of much larger scope and greater depth to further pursue the study of factors related to obesity in children.
2. That work needs to be done with all age groups in order to firmly establish the relationship to obesity of caloric excesses and physical inactivity. The writer agrees that accurate statements regarding caloric intake cannot evolve from dietary surveys about which precise statements cannot

be made regarding reliability.

3. That comprehensive programs, related to maintenance of ideal body weight, be devised and vigorously pursued for the purpose of encouraging the revival and extension of physical activities involving the entire family unit. Such programs would necessarily incorporate nutrition education.

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VITA

Betty Joyce Moore was born in Polkton, North Carolina. After graduating from Polkton High School, she entered the Woman's College of the University of North Carolina in Greensboro, North Carolina, where she received a Bachelor of Science Degree in Home Economics with a major in Institution Economics. She completed her Dietetic Internship at the New York Hospital - Cornell Medical Center in New York, New York. After practicing administrative dietetics at the Woman's College of the University of North Carolina, she spent several years as Instructor in Diet Therapy in the School of Nursing and Chief Therapeutic Dietitian at the University of Virginia Hospital in Charlottesville, Virginia. In the fall of 1959, she began work at the Virginia Polytechnic Institute on a Master of Science Degree in Home Economics with a major in Foods and Nutrition. She held a graduate assistantship from the fall of 1959 through the fall of 1960 and a part-time instructorship during the winter and spring of 1961 in the School of Home Economics at the Radford College Division of the Virginia Polytechnic Institute. She completed her graduate study in August of 1961.

Betty Joyce Moore

APPENDIX

PARENTAL HISTORY

NAME _____
Last First Maiden

ADDRESS _____ TELEPHONE _____
Number Street City State

BIRTHPLACE _____ BIRTH DATE _____ AGE ____
City or Community State

EDUCATION

Name of School	Location	Years Attended	Degree/Diploma
H.S.			
Clg.			

Major college subject _____

OCCUPATION (complete description) _____

NATIONALITY _____
Father Mother

RELIGION _____ CLUBS (Church, social, civic) _____

_____

CHILDREN

Name	Birth Date	Age	Sex

DO YOU HAVE REGULAR PHYSICAL CHECK UPS? _____ DENTAL CHECK UPS? _____

APPROXIMATE DATES OF LAST TWO PHYSICAL CHECK UPS? _____

DO YOU CONSIDER YOURSELF A HEALTHY PERSON? _____ DO YOU TAKE MEDICINES

REGULARLY? _____ IF SO, WHAT? _____

DO YOU TAKE VITAMIN OR MINERAL SUPPLEMENTS? _____ IF SO, WHAT ARE THEY?

_____

HEIGHT _____ ft. _____ in. WEIGHT _____ lbs.

Please appraise your body weight at the following ages: (use X)

Age	Very thin	Mod. Thin	Average	Sl. Plump	Overweight
0-1	_____	_____	_____	_____	_____
1-6	_____	_____	_____	_____	_____
7-10	_____	_____	_____	_____	_____
11-12	_____	_____	_____	_____	_____
13-15	_____	_____	_____	_____	_____
16-20	_____	_____	_____	_____	_____
21-30	_____	_____	_____	_____	_____
31-40	_____	_____	_____	_____	_____

During periods of your parents' good health, how would you appraise their body weight? (Use X)

FATHER	_____	_____	_____	_____	_____
MOTHER	_____	_____	_____	_____	_____

DO YOU EAT YOUR MEALS AT A REGULAR TIME? _____ WHAT TIME DO YOU EAT?

MORNING MEAL: _____ NOON MEAL: _____ EVENING MEAL: _____

HOW LONG IS SPENT IN EATING MEALS? _____

A.M. NOON EVENING

PLEASE NAME THE FOODS WHICH YOU STRONGLY LIKE OR DISLIKE

STRONGLY LIKE STRONGLY DISLIKE

_____

_____

_____

_____

FOOD ALLERGIES, IF ANY _____

TYPICAL MEAL PATTERN PRACTICED AT THE PRESENT TIME:

FOOD ITEMS	AMOUNT	WHERE MEAL EATEN
MORNING MEAL		
BETWEEN		
NOON MEAL		
BETWEEN		
EVENING MEAL		
BETWEEN		

ADULT RECORD

Please state in terms of hours or fractions thereof the amount of time spent in the following activities each week: (SPRING, WINTER, FALL)

ACTIVITY	HOURS PER WEEK	COMMENT
Art		
Church, Sunday School		
Child Care		
Driving, riding (vehicle)		
Eating (meals & snacks)		
Games (cards, chess, etc.)		
Listening to radio, records		
Movies, concerts, etc.		
Musical instrument ( )		
Reading, writing, studying		
School, classes, lectures		
Typing		
Telephoning, visiting, chatting		
Spectator Sports		
Sewing		
Watching TV		
Other		
Other		
STANDING:		
Child Care		
Grooming (bathing & dressing)		
Food Preparation		
House Work		
Lecturing		
Office Work		
Other		
Other		
LYING DOWN:		
Resting		
Sleeping		
Sunbathing		
Other		
Other		
STRENUOUS ACTIVITES:		
Badminton		
Bicycling		
Bowling		
Dancing		
Fishing		
Gardening		
Golfing		
Horseback Riding		
Mowing Lawn		
Ping Pong		
Stairs		
Swimming		
Skating		
Tennis		
Walking, slowly		
Walking, rapidly		
Other		

Do you use:

Electric dishwasher? _____ washing machine? _____ vacuum cleaner?____

Automatic dryer? _____ Electric mixer? _____

Please answer the following: (Place X in appropriate blank at right).

	Yes	No
1. Do you permit your children to eat with the family		
(a) From infancy	____	____
(b) As soon as the child, in your opinion, demonstrates ability to adjust to the family group.	____	____
If (b), at about what age _____.		
2. Do you permit your children to choose the amount of good they wish to eat?	____	____
3. If so, at what age do you usually begin this technique? _____		
4. Do you permit your children to choose the kind of food they wish to eat?	____	____
5. If so, at what age do you begin this technique? _____		
6. In serving food to your children, do you		
(a) Serve small portions permitting child to have additional food, if requested?	____	____
(b) Serve family size or average portions permitting child to eat only as much as he or she desires?	____	____
(c) Serve family or average portions; requiring child to eat all food before being permitted to leave the table?	____	____

NOTE: Think of question six for children from ages one to five years.

7. Do you introduce new foods to your child by		
(a) introducing them one at a time?	____	____
(b) serving small portions?	____	____
(c) Both (a) and (b)	____	____
(d) if none of theses, what do you do? _____		
_____		
8. Do you supervise the child's behavior at the table?		
(a) Much?	____	____
(b) Medium	____	____
(c) Little	____	____

	Yes	No
9. Which of the following do you regularly make available to your family:		
(a) Fruits and fruit juices	_____	_____
(b) Soft drinks	_____	_____
(c) Candy	_____	_____
(d) Cookies and similar foods (potato chips, etc.)	_____	_____

NOTE: There may be more than one answer to the above choices.

10. Who supervises the children at meals?		
(a) Mother	_____	_____
(b) Father	_____	_____
(c) Both	_____	_____

11. Does your husband concur with your answers? _____

If not, please indicate in what way he disagrees: _____

_____

_____

_____

12. Is there a point concerning the growth pattern of your child as it relates to thinness, "normal" weight, or a tendency to plumpness which we have not covered which you feel might be helpful to us in this study?

CHILD'S HISTORY

NAME _____ NICK NAME _____
Last First Middle

PARENTS _____

BIRTH PLACE _____ BIRTH DATE _____
City or Community State

AGE (Nearest Birthday)_____GRADE IN SCHOOL (1960-61)_____

DOES THIS CHILD HAVE REGULAR PHYSICAL CHECK UPS? _____ DENTAL CHECK UPS?

_____

ARE THERE GROWTH AND/OR HEALTH RECORDS WHICH ARE AVAILABLE FROM YOUR PEDIATRICIAN? _____ MAY WE HAVE PERMISSION TO USE THEM IN THIS STUDY?_____

NAME OF PEDIATRICIAN _____

IS THIS CHILD IN YOUR OPINION A GOOD EATER?_____ A POOR EATER?_____

IS THIS CHILD A SLOW EATER?_____AVERAGE EATER?_____ FAST EATER?_____

COMMENT_____

ARE VITAMIN OR MINERAL SUPPLEMENTS TAKEN REGULARLY?_____

IF SO, NAME THEM _____

FOOD ALLERGIES _____

FOODS ESPECIALLY LIKED FOODS DISLIKED

_____

_____

_____

DO YOU CONSIDER THIS CHILD HEALTHY?_____

ARE MEDICINES TAKEN REGULARLY. IF SO, WHAT ARE THEY?_____

ARE MEALS EATEN AT REGULAR TIMES?_____ HOW LONG IS SPENT IN EATING

BREAKFAST_____ NOON MEAL _____ EVENING MEAL_____

WAS THIS CHILD BREAST FED?_____ BOTTLE FED?_____

HOW WOULD THE PARENTS OF THIS CHILD APPRAISE HER WEIGHT AT THE FOLLOWING AGES:

	Very Thin	Mod.Thin	Average	Sl.plump	Overweight
Birth to 1 year	_____	_____	_____	_____	_____
1 to 3 years	_____	_____	_____	_____	_____
4 to 6 years	_____	_____	_____	_____	_____
7 to present age	_____	_____	_____	_____	_____

TYPICAL MEAL PATTERN PRACTICED AT PRESENT TIME

FOOD ITEMS	AMOUNT EATEN	WHERE MEAL EATEN
BREAKFAST		
BETWEEN		
NOON MEAL		
BETWEEN		
EVENING MEAL		
BETWEEN		

CHILD'S ACTIVITY RECORD

Please state in terms of hours or fractions thereof which the child spends in the following activities each week: (Spring, Fall, Winter).

ACTIVITY	HOURS SPENT	COMMENT
SITTING:		
Art work		
Church, Sunday School		
Eating (meals, snacks)		
Games (cards, etc.)		
Listening to records, radio		
Movies, concerts, etc.		
Musical instruments ( )		
Reading, writing, studying		
Riding in automobile		
School (in class)		
Spectator sports		
Visiting, chatting		
Watching TV		
Other		
Other		
STANDING:		
Grooming (bathing, dressing)		
Cleaning room		
Other		
Other		
LYING DOWN:		
Resting		
Sleeping		
Other		
STRENUOUS ACTIVITIES:		
Badminton		
Ball ( )		
Bicycling		
Dancing		
Games (tag, other running games)		
Horseback riding		
Ping Pong		
Skating		
Swimming		
Stairs		
Tennis		
Volley ball, dodge ball		
Walking slowly (as to school)		
Walking rapidly		
Other		
Other		
Other		

7-DAY FOOD RECORD (SAMPLE SHEET)

NAME _____ DATE _____

DAY _____

FOOD ITEM	AMOUNT	WHERE EATEN
BREAKFAST		
BETWEEN		
NOON		
BETWEEN		
EVENING		
BETWEEN		

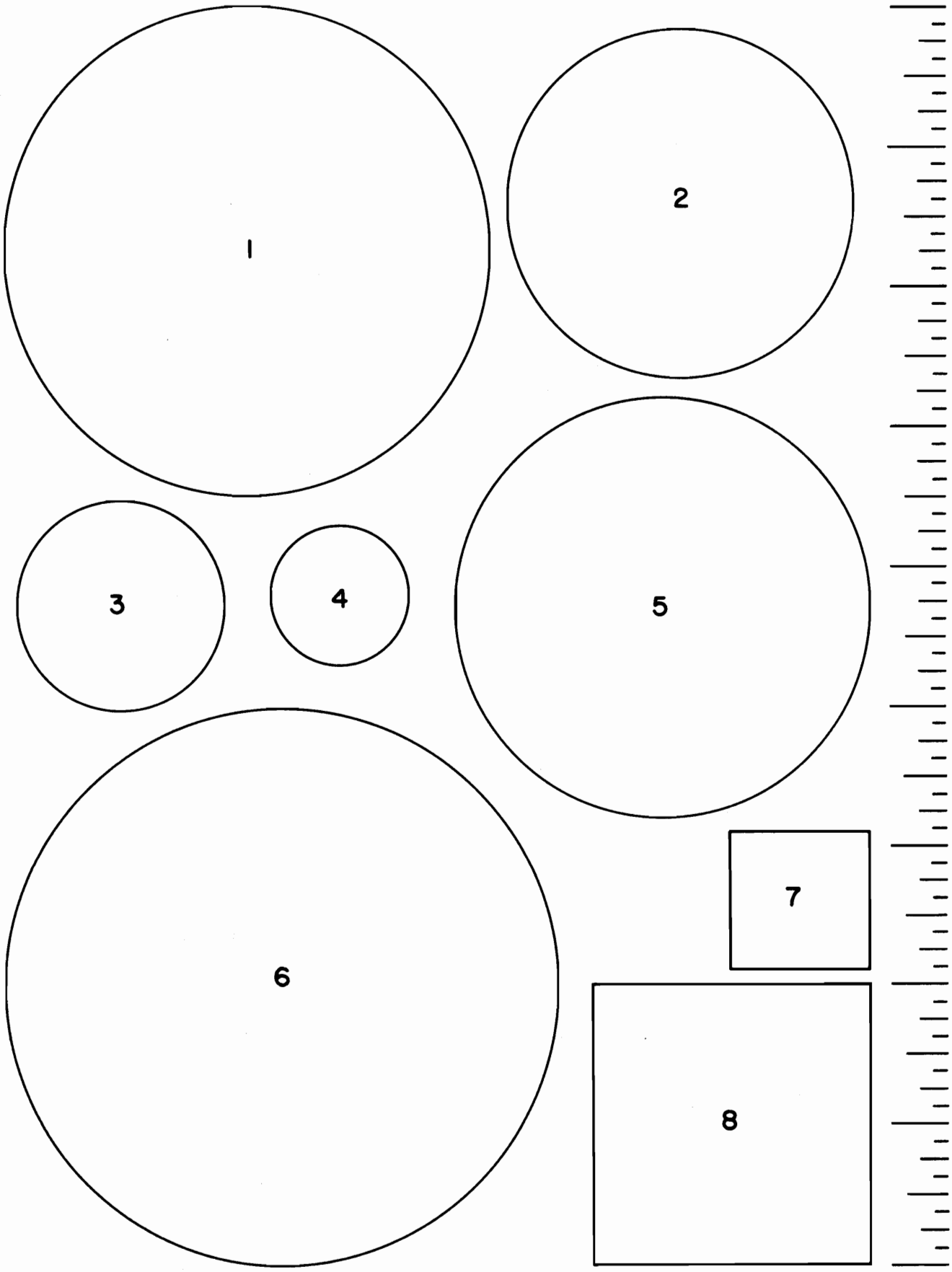
DIRECTIONS FOR KEEPING A SEVEN-DAY

FOOD RECORD AS USED BY MOTHERS

We do not want this dietary intake to be such a bother to you, but we would appreciate your helping us to make it as accurate as one could expect it to be for a child of this age.

1. Estimate food wherever possible in terms of standard measuring cups such as one cup of milk, or one half cup green beans, or one fourth cup baked beans.
2. Some shapes of food may be defined by the attached diagram, as an orange the size of shape "___" or a piece of corn bread the size of shape "___," for example.
3. Note whether food was canned, frozen, or fresh.
4. Show bread in number of slices, rolls, biscuits, etc. Indicate biscuit or roll size by number on the diagram sheet. Indicate if enriched, non-enriched or whole grain.
5. Estimate meat in ounces or in inches, such as a slice of cured ham two inches long, two inches wide, and one fourth inch thick.
6. Indicate all ingredients used in mixtures such as casseroles, salads, etc.
7. Indicate the use of all fats and sugar used for seasoning or sweetening foods.
8. Please record only the foods which your child actually consumes, NOT the amount served. This is of the upmost importance.

FOOD DIAGRAM SHEET



DIRECTIONS FOR OPERATION OF THE SKINFOLD THICKNESS CALIPER DESIGNED BY THE UNITED STATES ARMY MEDICAL NUTRITION LABORATORY

The instrument is grasped in the right hand, the thumb through the upper grip hole, the fourth finger through the lower. The body and scissors arm of the caliper are steadied with the first and second fingers. The jaws of the caliper are opened by opening the scissors mechanism. The stop on the slide catches on the pointer end of the scissors arm, causing the slide to move out. The skinfold to be measured is grasped with the thumb and index finger of the left hand. The contact faces are applied to the folded skin at least a centimeter away from the left hand. The size of bite depends on the thickness and relative tightness of the skin, generally varying from one half to six centimeters along the surface. The pointer is brought level with the tension index line on the slide and maintained there for several seconds while the entire instrument is moved back and forth slightly to overcome any tendency for friction in the slide mechanism. The skinfold thickness is read to the nearest half millimeter on the slide scale; the jaws are again opened and the instrument removed.

The instrument is capable of measuring skinfolds up to five centimeters in thickness at any cutaneous site.

SKINFOLD THICKNESS CALIPER DESIGNED BY

THE UNITED STATES ARMY MEDICAL NUTRITION LABORATORY

TABLE I

SUMMARY OF SELECTED HEIGHT-WEIGHT, ETC., STANDARDS USED FOR CHILDREN AND YOUTH IN THE UNITED STATES[1]

Hastings Tables, 1902	Single values for ht/wt/age 1-20	8000 boys, 7000 girls, Omaha, Nebr., 1899.
Woodberry Tables, 1921	Single values for ht/wt/age 1-6	Nationwide coverage
Baldwin-Wood, 1923	Single wts. for a series of hts. for age: 5-19 (ordinary clothing without shoes, coats, sweaters).	74,000 boys, 55,000 girls, Northeastern and North Central states.
Baldwin Tables, 1925	Extrapolated equivalent nude wt. from Baldwin-Wood, 1923	See above.
Bayer-Gray Charts, 1935	Charts for plotting ht/wt/bicristal diameter/age 1-19.	U.S. Children of Northwest European Stock having above average living conditions, 1931.
Wetzel Grid, 1941	Process for recording individual long-term growth progress for: physique appraisal; development level; nutritional grade, physical status, relative age advancement or retardation, state of maturation, basal heat requirement, and caloric needs.	Based on physical laws with mathematical formulas used to interpret growth.
Jackson-Kelly Charts, 1943	Three percentile ranks for wt: 16th, median, 84th; ht. expressed as mean and mean $\pm$ / standard deviation. Age 1-18.	13,500 ht. and 11,000 wt. measurements, Iowa City school children, 1920-1940.

TABLE I (Continued)[1]

Stuart-Meredith Tables, 1946	Five percentile values for ht/wt/hip width/ chest circ./leg girth/age 5-18. (light socks, shorts; older girls light socks, shorts, brassieres).	3,771 measurements, several hundred Iowa City school children of Northwest European stock attending experimental schools, 1930-1945.
National Education Association-American Medical Association data, 1949 (prepared by Meredith)	Five percentile values for ht/wt/age 5-18 for children wearing indoor apparel without shoes, coats, sweaters. Used for following growth progress.	Same as above.
Boyd Tables, 1952	Five smoothed percentile values for ht/wt/age 2-18.	12,000 measurements, 175 Denver, Colorado children on most of their succeeding birthdays.
United States Department of Agriculture Tables, 1957 (Hathaway)	Comprehensive compilation of ht/wt/ age 2-18, with comparative data to 2 "standards."	Research data from 34 states and D.C., 1920-1956 collected by variety of professional personnel.

[1]All data is summarized from Heights and Weights of Children and Youth in the United States by Millicent L. Hathaway, Home Economics Research Report No. 2, United States Department of Agriculture (1957): 1, 56-78. The Stuart-Meredith Tables, 1946 are further summarized from Rose's Handbook for Dietetics by C. M. Taylor and G. MacLeod, Macmillan (New York, 1949): 85-90.

TABLE II

BODY WEIGHTS OF SUBJECTS FROM BIRTH TO TIME OF STUDY

AS APPRAISED BY MOTHERS

	Years of Age			
	0 - 1	1 - 3	4 - 6	7 to Present
Group A				
1	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin
2	Average	Average	Mod. Thin	Mod. Thin
3	Mod. Thin	Very Thin	Mod. Thin	Mod. Thin
4	Very Thin	Very Thin	Very Thin	Mod. Thin
Group B				
5	Mod. Thin	Average	Average	Sl. Plump
6	Average	Average	Sl. Plump	Sl. Plump
7	Average	Sl. Plump	Average	Sl. Plump
8	Sl. Plump	Average	Sl. Plump	Overweight
Group C				
9	Average	Average	Average[1]	Average
10	Average	Average	Average	Average
11	Overweight	Average	Average	Average
12	Average	Average	Mod. Thin	Mod. Thin

[1] 6-7 years - Sl. Plump.

TABLE III

BODY WEIGHTS OF FATHERS FROM BIRTH THROUGH THE FOURTH DECADE -- SELF APPRAISAL

	Years of Age							
	0 - 1	1 - 6	7 - 10	11 - 12	13 - 15	16 - 20	21 - 30	31 - 40
Group A								
1a	Average	Average	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin
2a	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin
3a	Average	Average	Mod. Thin	Very Thin	Very Thin	Very Thin	Very Thin	Mod. Thin
4a	Average	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Average	Mod. Thin	Mod. Thin
Group B								
5a	Average	Sl. Plump	Sl. Plump	Average	Average	Average	Average	Average
6a	Average	Average	Overweight	Average	Mod. Thin	Mod. Thin	Average	Average
7a	Sl. Plump	Mod. Thin	Mod. Thin to Average	Average	Average	Average	Sl. Plump	Sl. Plump
8a	Very Thin	Very Thin	Very Thin	Very Thin	Very Thin	Very Thin	Average	Average
Group C								
9a	Mod. Thin	Mod. Thin	Average	Average	Average	Average	Average	Overweight
10a	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Overweight	Average to Sl. Plump
11a	Average	Average	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Average	Sl. Plump
12a	Average	Average	Average	Average	Average	Mod. Thin	Mod. Thin	Sl. Plump

TABLE IV

BODY WEIGHTS OF MOTHERS FROM BIRTH THROUGH THE FOURTH DECADE -- SELF APPRAISAL

	Years of Age							
	0 - 1	1 - 6	7 - 10	11 - 12	13 - 15	16 - 20	21 - 30	31 - 40
Group A								
1b	Average	Average	Average	Average	Average	Average	Average	Average
2b	Average	Average	Average	Average	Average	Average	Average	Sl. Plump
3b	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Average	Average
4b	Sl. Plump	Mod. Thin	Average	Average	Average	Average	Average	Average
Group B								
5b	Average	Mod. Thin	Average	Sl. Plump	Overweight	Average	Sl. Plump	Underweight
6b	Average	Average	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Average	Average
7b	Average	Average	Average	Average	Average	Average	Average	Overweight
8b	Average	Average	Sl. Plump	Average	Average	Average	Overweight	Sl. Plump
Group C								
9b	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Mod. Thin	Average	Average	Sl. Plump
10b	Average	Average	Sl. Plump	Average	Average	Average	Average	Average
11b	Average	Average	Average	Average	Average	Sl. Plump to Overweight	Average	Sl. Plump
12b	Sl. Plump	Sl. Plump	Average	Average	Average	Average	Average[1]	Average

[1] Two years, moderately thin; two years, slightly plump during this period.

TABLE V

BODY WEIGHTS OF GRANDPARENTS DURING PERIODS OF GOOD HEALTH

AS APPRAISED BY PARENTS

	Paternal Grandparents		Maternal Grandparents	
	Grandfather	Grandmother	Grandfather	Grandmother
Group A				
1	Average	Sl. Plump	Overweight	Sl. Plump
2	Mod. Thin	Sl. Plump	Average	Overweight
3	Mod. Thin	Average	Average	Sl. Plump
4	Average	Sl. Plump	Average	Average
Group B				
5	Average	Sl. Plump to Overweight	Average	Sl. Plump
6	Mod. Thin	Very Thin	Sl. Plump	Sl. Plump
7	Average	Overweight	Overweight	Sl. Plump
8	Sl. Plump	Mod. Thin	Mod. Thin	Average
Group C				
9	Average	Sl. Plump	Mod. Thin	Average
10	Average	Sl. Plump	Average	Average
11	Mod. Thin	Average	Average	Average
12	Sl. Plump	Mod. Thin	Average	Average

TABLE VI

DIETARY INTAKES OF SUBJECTS CALCULATED FOR A SEVEN DAY PERIOD BY FOOD GROUP

Subject	Bread - Cereal				Dessert			
	Calories	Protein	Fat	Carbo-hydrate	Calories	Protein	Fat	Carbo-hydrate
Group A								
1	3765	109.9	67.7	667.4	2439	35.7	68.9	445.3
2	2498	85.6	50.4	469.8	1285	30.9	28.0	229.3
3	2353	63.0	45.5	418.4	3082	52.2	106.0	488.6
4	790	52.1	20.4	342.9	3182	36.2	114.3	514.2
Group Total	9406	310.6	184.0	1898.5	9988	155.0	317.2	1677.4
Group Mean	2352	77.6	46.0	474.6	2497	38.8	79.3	419.4
Group B								
5	2645	74.7	37.5	492.4	110	1.5	3.3	18.8
6	2512	72.2	50.0	440.1	1029	12.4	33.3	173.6
7	1743	48.0	22.7	332.5	2884	25.9	93.8	482.6
8	3013	84.3	48.5	546.6	1880	30.8	58.7	311.1
Group Total	9913	279.2	158.7	1811.6	5903	70.6	189.1	986.1
Group Mean	2478	69.8	39.7	452.9	1476	17.6	47.3	246.5
Group C								
9	1639	65.5	21.7	310.2	426	6.5	13.5	70.1
10	1434	42.6	17.0	289.5	974	16.6	26.1	169.4
11	1829	53.0	28.3	335.0	2097	26.8	93.0	280.8
12	2336	67.8	32.6	440.3	719	13.7	15.0	133.4
Group Total	7238	228.9	99.6	1375.0	4216	63.6	147.7	653.7
Group Mean	1810	57.2	24.9	343.8	1054	15.9	36.9	163.4

TABLE VI (Continued)

SUBJECT	Sweets				Total Desserts and Sweets			
	Calories	Protein	Fat	Carbo-hydrate	Calories	Protein	Fat	Carbo-hydrate
Group A								
1	1036	6.3	29.9	201.2	3475	42.9	98.8	646.5
2	1236	0.4	0	323.2	2521	31.3	28.0	552.5
3	975	5.1	21.2	208.8	4057	57.3	127.2	697.4
4	730	2.0	9.5	169.2	3912	38.2	123.8	683.4
Group Total	3977	13.8	60.6	902.4	13,965	169.7	377.8	2579.8
Group Mean	994	3.4	15.2	225.6	3491	42.4	90.4	645.0
Group B								
5	1870	3.2	21.6	443.9	1982	4.7	24.9	462.7
6	570	3.2	9.7	125.4	1599	16.6	43.0	299.0
7	848	3.0	10.5	201.8	3732	28.9	104.3	684.4
8	1435	6.4	19.5	328.5	3315	37.2	78.2	639.6
Group Total	4723	15.8	61.3	1094.6	10,628	87.4	250.4	2085.7
Group Mean	1181	4.0	15.3	273.6	2657	21.8	62.6	521.4
Group C								
9	1706	6.6	31.3	371.9	2132	13.2	44.8	442.0
10	606	0	0	156.7	1580	16.6	26.1	326.1
11	242	0.4	0.4	77.0	2339	27.2	93.5	357.8
12	1386	9.3	41.2	269.4	2105	23.0	56.2	402.8
Group Total	3940	16.3	72.9	875.1	8156	79.9	221.0	1528.7
Group Mean	985	4.1	18.2	218.8	2039	20.0	55.2	382.2

TABLE VI (Continued)

SUBJECT	Dairy (Milk, Ice Cream, Cheese) Calories	Protein	Fat	Carbohydrate	Meat, Egg, Peanut Butter Calories	Protein	Fat	Carbohydrate
Group A								
1	3391	146.4	208.8	240.4	2606	257.8	162.7	32.2
2	4325	195.2	253.0	327.5	2629	166.0	203.5	47.6
3	4314	212.0	257.1	257.5	1934	169.7	130.1	16.7
4	3384	169.0	194.1	246.9	2096	165.8	148.7	24.2
Group Total	15,414	722.6	913.0	1072.3	9265	759.3	645.0	120.7
Group Mean	3854	180.6	228.2	268.1	2316	189.8	161.0	30.2
Group B								
5	2191	118.5	115.4	173.8	2148	173.4	142.1	39.2
6	2968	208.4	116.2	272.7	2444	186.0	180.2	10.1
7	3427	166.4	183.0	288.1	1860	161.8	125.4	9.2
8	2839	134.9	168.1	203.0	4628	328.4	222.7	24.8
Group Total	11,425	628.2	582.7	937.6	11,080	849.6	670.4	83.3
Group Mean	2856	157.0	145.7	234.4	2770	212.4	167.6	20.8
Group C								
9	2147	82.1	125.8	178.7	1680	122.9	124.0	19.4
10	4514	297.3	144.7	507.2	3241	262.4	223.5	38.8
11	3506	160.0	161.9	362.6	2143	172.9	154.9	2.1
12	2713	128.4	157.4	202.5	2239	173.3	160.9	28.3
Group Total	12,880	667.8	589.8	1251.0	9303	731.5	663.3	88.6
Group Mean	3072	167.0	147.4	312.8	2326	182.9	165.8	22.2

TABLE VI (Continued)

SUBJECT	Fruit				Vegetables			
	Calories	Protein	Fat	Carbo-hydrate	Calories	Protein	Fat	Carbo-hydrate
Group A								
1	1170	9.7	4.3	303.7	1578	41.6	70.2	209.9
2	1288	13.4	3.1	338.6	834	31.4	8.1	166.6
3	1013	10.7	4.8	260.7	709	27.6	4.4	154.3
4	796	10.3	2.8	205.7	1704	39.5	77.5	226.6
Group Total	4267	44.1	15.0	1108.7	4825	140.1	160.2	757.4
Group Mean	1067	11.0	3.8	277.2	1206	35.0	40.0	189.4
Group B								
5	879	6.0	3.5	235.1	1041	30.1	39.6	155.9
6	1226	11.4	5.1	319.0	840	20.5	18.3	159.9
7	1075	11.9	4.7	155.4	879	24.0	41.2	111.8
8	924	16.0	6.1	227.4	927	23.4	17.9	182.6
Group Total	4104	45.3	19.4	936.9	3687	98.0	117.0	610.2
Group Mean	1035	11.3	4.8	234.2	922	24.5	29.2	152.6
Group C								
9	567	7.6	2.3	143.4	3002	83.4	114.4	434.3
10	1338	12.2	5.6	376.0	156	10.1	2.1	31.8
11	1972	20.1	7.0	509.9	440	18.0	4.1	92.6
12	1152	19.3	3.5	302.5	888	18.3	28.1	151.7
Group Total	5029	59.2	18.4	1331.8	4486	129.8	148.7	710.4
Group Mean	1257	14.8	4.6	333.0	1122	32.4	37.2	177.6

TABLE VI (Continued)

SUBJECT	Fat				Miscellaneous			
	Calories	Protein	Fat	Carbo-hydrate	Calories	Protein	Fat	Carbo-hydrate
Group A								
1	1578	16.5	166.5	11.9	28	1.2	0.5	5.9
2	340	2.8	34.7	6.0	117	6.0	4.5	13.0
3	722	9.1	77.1	9.6	650	29.2	30.0	67.7
4	837	5.1	92.0	2.0	-	-	-	-
Group Total	3477	33.5	370.3	29.5	795	36.4	35.0	86.6
Group Mean	869	8.4	92.6	7.4	199	9.1	8.8	21.6
Group B								
5	531	12.2	53.5	0.8	55	0.5	1.4	10.7
6	1134	17.3	109.1	24.5	34	0.6	0.2	8.4
7	349	0.6	37.6	3.7	225	6.3	2.7	45.0
8	557	2.9	47.9	6.1	167	5.4	6.4	23.4
Group Total	2571	33.0	248.1	35.1	481	12.8	10.7	87.5
Group Mean	643	8.2	62.0	8.8	120	3.2	2.7	21.9
Group C								
9	535	19.4	46.9	17.1	117	6.0	4.5	13.0
10	9	-	-	-	259	9.7	5.4	46.3
11	907	28.9	81.4	24.4	34	0.6	0.2	8.4
12	378	2.4	39.7	4.8				
Group Total	1829	50.7	168.0	46.3	410	16.3	10.1	67.7
Group Mean	457	12.7	42.0	11.6	102	4.1	2.5	16.9

TABLE VII

FOODS ESPECIALLY LIKED OR DISLIKED BY SUBJECTS

Especially Liked Food Groups	Subject Group A	B	C	Total
Meat				
Beef, all	-	-	1	1
Beef, steak	2	2	1	5
Beef stew	-	1	-	1
Hamburgers	-	1	1	2
Meat, seafood	-	1	-	1
Pork, Pork chops	3	-	-	3
Shrimp	2	-	-	2
Weiners	-	1	-	1
Total	7	6	3	16
Starchy vegetables, breads				
Beans, all	-	-	1	1
Corn	1	-	-	1
Potatoes	-	-	1	1
Potatoes, French Fried	1	-	-	1
Rolls, Biscuits	1	-	-	1
Total	3	0	2	5
Non-starch vegetables, fruits				
Broccoli	1	-	-	1
Brussel sprouts	1	-	-	1
Pepper, green	1	-	-	1
Spinach	-	-	1	1
Tomatoes	1	-	-	1
Vegetables, raw	-	1	-	1
Vegetable soup, homemade	-	1	-	1
Fruits, all	1	1	-	2
Total	5	3	1	9
Milk				
Milk	-	1	-	1
Total	0	1	0	1

TABLE VII (Continued)

Especially Liked Food Groups	Subject Group A	B	C	Total
Desserts				
Cake	-	1	1	2
Chocolate syrup	-	1	-	1
Desserts	1	-	1	2
Desserts, chocolate	-	1	-	1
Fudge	-	1	-	1
Ice Cream	-	2	-	2
Pie	-	-	1	1
Total	1	6	3	10
Grand Total	16	16	9	41

Especially Disliked Food Groups	A	B	C	Total
Meat			(except	
Eggs	1	-	1 scrambled)	2
Fish	-	-	1	1
Liver	1	2	2	5
Total	2	2	4	8
Starchy vegetables, breads				
Casseroles	1	-	-	1
Beans, dried	-	1	-	1
Potatoes, Irish	1	-	-	1
Potatoes, Sweet	1	-	-	1
Rice, Spanish	-	-	1	1
Total	3	1	1	5
Non-starchy vegetables, fruits				
Asparagus	1	-	-	1
Beans, Green	-	1	-	1
Cabbage, cooked	-	1	-	1
Cabbage, slaw	-	1	-	1
Greens	-	1	-	1
Leafy vegetables, cooked	-	-	1	1

TABLE VII (Continued)

Especially Disliked Food Groups	Subject Group A	B	C	Total
Non-starchy vegetables, fruits (continued)				
Peas, green	-	1	-	1
Spinach	-	2	-	2
Squash	2	1	-	3
Tomatoes	-	-	1	1
Vegetable soup	-	-	1	1
Watermelon	1	-	-	1
Total	4	8	3	15
Milk				
Buttermilk	-	-	1	1
Total			1	1
Miscellaneous; fats				
Cocoanut	1	-	-	1
Gravies	-	1	-	1
Mayonaise	-	-	1	1
Sauces	-	1	-	1
Highly spiced food	-	1	-	1
Total	1	3	1	5
Grand Total	10	14	10	34

TABLE VIII

FOODS ESPECIALLY LIKED AND DISLIKED BY FATHERS

Especially Liked Food Groups	Father Group A	B	C	Total
Meat				
Beef	2	-	1	3
Beef roast	-	-	1	1
Beef steak	1	2	1	4
Fish	-	1	1	2
Liver	-	1	1	2
Pork chops	1	-	-	1
Seafood	-	1	-	1
Total	4	5	5	14
Starchy vegetables, breads				
Beans	-	1	-	1
Bread, hot	-	-	1	1
Cornbread	-	1	1	2
Corn, cream	-	1	-	1
Potatoes, white	1	1	1	3
Potatoes, yams	-	1	-	1
Rice	1	-	-	1
Total	2	5	3	10
Non-starchy vegetables, fruits				
Asparagus	1	-	1	2
Beans, green	-	1	-	1
Broccoli	1	-	-	1
Collards	1	-	-	1
Salads	1	1	-	2
Tomatoes	1	-	-	1
Turnips	-	-	1	1
Vegetables, all	-	-	1	1
Vegetables, green	-	1	-	1
Vegetables, home grown	1	-	-	1
Citrus fruit	1	-	-	1
Total	7	3	3	13

TABLE VIII (Continued)

Especially Liked Food Groups	Father Group A	B	C	Total
Milk				
Milk	1	-	1	2
Cheese	-	1	-	1
Total	1	1	1	3
Desserts				
Cake	-	1	-	1
Pie, cherry	-	1	-	1
Pies	-	1	-	1
Total	0	3	0	3
Grand Total	14	17	12	43

Especially Disliked Food Groups	Subject Group A	B	C	Total
Meat				
Oysters	-	1	-	1
Seafood except fish	-	-	-	0
Total	0	1	0	1
Non-starchy vegetables, fruits				
Eggplant	-	-	1	1
Peas, green	1	-	-	1
Spinach	-	-	1	1
Squash	-	-	1	1
Total	1	0	3	4
Milk				
Cheese	-	-	1	1
Total	0	0	1	1

TABLE VIII (Continued)

Especially Disliked Food Groups	Father Group A	B	C	Total
Miscellaneous; fats				
Cocoanut	1	-	-	1
Mayonaise	-	-	1	1
Peanut Butter	-	1	-	1
Salad Dressing	-	-	1	1
Total	1	1	2	4
Grand Total	2	2	6	10

TABLE IX

FOODS ESPECIALLY LIKED OR DISLIKED BY MOTHERS

Especially Liked Food Group	Mother Group A	B	C	Total
Meat				
Egg	1	-	1	2
Beef	1	1	-	2
Beef, steak	-	2	-	2
Chicken	1	-	-	1
Chicken, fried	1	1	-	2
Chicken, stewed	1	-	-	1
Liver	-	-	1	1
Meats, all	1	1	1	3
Pork	1	-	1	2
Crab	1	-	-	1
Lobster	1	-	-	1
Salmon	1	-	-	1
Seafood	-	1	-	1
Shrimp	1	-	-	1
Total	11	6	4	21
Starchy vegetables, breads				
Chili	-	1	-	1
Macaroni	-	-	1	1
Potatoes	-	-	1	1
Spaghetti	-	1	-	1
Total	0	2	2	4
Non-starchy vegetables; fruits				
Cauliflower	1	-	-	1
Collards	1	-	-	1
Greens	-	-	1	1
Greens, Turnip	1	-	-	1
Lettuce	1	-	1	2
Salads	1	-	1	2
Tomatoes	1	-	-	1
Vegetables, leafy	1	1	-	2
Apples	1	-	-	1
Fruits, all	-	1	1	2
Oranges	1	-	-	1
Watermelon	-	-	1	1
Total	9	2	5	16

TABLE IX (Continued)

Especially Liked Food Group	Mother Group A	B	C	Total
Milk				
Milk	-	-	1	1
Cheese	1	-	-	1
Total	1	0	1	2
Desserts				
Cakes	-	1	-	1
Desserts	1	-	-	1
Ice Cream	-	1	-	1
Pie	-	1	-	1
Total	1	3	0	4
Grand Total	22	13	12	47

Especially Disliked Food Group	Mother Group A	B	C	Total
Meat				
Liver	1	1	-	2
Oysters	1	1	-	2
Tongue	1	-	-	1
Total	3	2	0	5
Non-starchy vegetables, fruits				
Beets	1	-	-	1
Kraut	-	-	1	1
Parsnips	-	1	-	1
Total	1	1	1	3
Milk				
Buttermilk	-	-	1	1
Total	0	0	1	1

TABLE IX (Continued)

Especially Disliked Food Group	Mother Group A	B	C	Total
Miscellaneous; fats				
Olives	-	-	1	1
Raisins	-	-	1	1
Total	0	0	2	2
Grand Total	4	3	4	11

TABLE X

CALORIC CONTRIBUTION OF PROTEIN, FAT, CARBOHYDRATE, AND TOTAL CALORIES

TO MEAN DAILY CALORIC INTAKES OF SUBJECTS BY FOOD GROUPS

	Group A		Group B		Group C	
	Calories	Percentage of Total Calories	Calories	Percentage of Total Calories	Calories	Percentage of Total Calories
Mean Daily Caloric Intake	2193		1925		1761	
Food Groups						
Bread-Cereal	336	15.3	354	18.4	259	14.7
Protein	44	2.0	40	2.1	33	1.9
Fat	59	2.7	51	2.6	32	1.8
Carbohydrate	233	10.6	263	13.7	194	11.0
Desserts	357	16.3	211	11.0	151	8.6
Protein	22	1.0	10	0.5	9	0.5
Fat	102	4.6	61	3.2	47	2.7
Carbohydrate	233	10.7	140	7.3	95	5.4
Sweets	142	6.5	169	8.8	141	8.0
Protein	2	0.1	2	0.1	2	0.1
Fat	20	0.9	20	1.1	23	1.3
Carbohydrate	120	5.5	147	7.6	116	6.6
Total Desserts-Sweets	499	22.8	380	19.7	291	16.6
Protein	24	1.1	12	0.6	11	0.6
Fat	116	5.3	80	4.2	71	4.0
Carbohydrate	359	16.4	288	15.0	209	12.0
Dairy (Milk, Ice Cream, Cheese)	550	25.1	408	21.2	439	24.9
Protein	103	4.7	90	4.7	95	5.4
Fat	293	13.4	187	9.7	190	10.8
Carbohydrate	154	7.0	131	6.8	154	8.7

TABLE X (Continued)

Food Groups	Group A Calories	Group A Percentage of Total Calories	Group B Calories	Group B Percentage of Total Calories	Group C Calories	Group C Percentage of Total Calories
Meat, Egg, Peanut Butter	331	15.1	396	20.6	332	18.9
Protein	108	4.9	121	6.3	105	6.0
Fat	207	9.4	215	11.2	70	4.0
Carbohydrate	16	0.8	60	3.2	157	8.9
Fruit	152	6.9	148	7.7	180	10.3
Protein	6	0.3	6	0.3	8	0.4
Fat	5	0.2	6	0.3	6	0.3
Carbohydrate	141	6.4	136	7.1	166	9.4
Vegetable	172	7.8	132	6.9	160	9.1
Protein	20	0.9	14	0.7	19	1.1
Fat	51	2.3	38	2.0	48	2.7
Carbohydrate	101	4.6	80	4.2	93	5.3
Fat	124	5.6	92	4.8	65	3.7
Protein	5	0.2	5	0.2	7	0.4
Fat	119	5.4	80	4.2	54	3.1
Carbohydrate	-	-	7	0.4	4	0.2
Miscellaneous	28	1.3	17	0.9	15	0.9
Protein	5	0.2	2	0.1	2	0.1
Fat	11	0.5	3	0.2	3	0.2
Carbohydrate	12	0.6	12	0.6	10	0.7

TABLE XI

COMPARISON OF MEAN DAILY CALORIE AND PROTEIN INTAKES OF SUBJECTS TO INTERPOLATED RECOMMENDED DAILY ALLOWANCES OF THE FOOD AND NUTRITION BOARD OF THE NATIONAL RESEARCH COUNCIL, 1958

	Age		Calories				Protein			
Subject	Yr	Mo	Mean Daily Intake	Interpolated NRC Allowances	Calorie Deviation	Percentage Deviation	Mean Daily Intake (gm)	Interpolated NRC Allowances (gm)	Gram Deviation	Percentage Deviation
Group A										
1	9	0	2513	2233	+280	+12.6	89.4	63	+26.4	+41.9
2	9	1	2078	2244	-166	- 7.4	76.0	63	+13.0	+20.6
3	10	3	2250	2400	-150	- 6.3	82.7	68	+14.7	+21.6
4	10	2	1931	2388	-457	-19.2	68.6	67	+ 1.6	+ 2.4
Mean	9	7	2193	2316	-123	- 5.3	79.2	65	+14.0	+21.6
Range	9 – 10	0 – 3	1931 – 2513	2233 – 2400	-457 – +280	-19.2 – +12.6	68.6 – 89.4	63 – 68	+ 1.6 – +26.4	+ 2.4 – +41.9

TABLE XI (Continued)

Subject	Age Yr	Age Mo	Calories: Mean Daily Intake	Calories: Interpolated NRC Allowances	Calories: Calorie Deviation	Calories: Deviation	Protein: Mean Daily Intake (gm)	Protein: Interpolated NRC Allowances (gm)	Protein: Gram Deviation	Protein: Percentage Deviation
Group B										
5	8	2	1639	2122	-483	-22.8	60.0	60	None	None
6	9	2	1822	2255	-433	-19.2	76.1	64	+12.1	+18.9
7	10	3	1898	2400	-502	-20.9	64.0	68	- 4.0	- 5.9
8	9	5	2339	2288	+ 51	+ 2.2	90.4	65	+26.4	+40.6
Mean	9	3	1925	2266	-341	-15.1	72.6	64	+ 8.6	+13.4
Range	8 - 10	2 - 3	1639 - 2339	2122 - 2400	-502 - + 51	-22.8 - + 2.2	60.0 - 90.4	60 - 68	- 4.0 - +26.4	- 5.9 - +40.6

TABLE XI (Continued)

Subject	Age		Calories				Protein			
	Yr	Mo	Mean Daily Intake	Interpolated NRC Allowances	Calorie Deviation	Percentage Deviation	Mean Daily Intake (gm)	Interpolated NRC Allowances (gm)	Gram Deviation	Percentage Deviation
Group C										
9	8	1	1688	2111	-423	-20.0	58.0	60	+ 2.0	+ 3.3
10	8	1	1790	2100	-310	-14.8	93.0	60	+33.0	+55.0
11	7	10	1881	2077	-196	- 9.4	68.7	59	+ 9.7	+16.4
12	9	6	1687	2300	-613	-26.6	61.8	65	- 3.2	- 4.9
Mean	8	4	1761	2144	-383	-17.9	70.4	61	+10.3	+16.9
Range	7 – 9	10 – 6	1687 – 1881	2077 – 2300	-613 – -196	-26.6 – - 9.4	61.8 – 93.0	59 – 65	- 3.2 – +33.0	- 4.9 – +55.0

TABLE XII

PERCENTILE RANKS OF SUBJECTS FOR THE CALIFORNIA TEST OF PERSONALITY (PRIMARY FORM)

(Possible Percentile Ranks: 1, 2, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95, 98, 99)

PERSONAL ADJUSTMENT

	Self Reliance	Sense Personal Worth	Sense of Personal Freedom	Feeling of Belonging	Withdrawing Tendencies	Nervour Symptoms	TOTAL PERSONAL ADJUSTMENT
Group A							
1	95	90	90	90	90	90	99
2	95	90	90	90	90	90	99
3	95	80	70	90	90	90	98
4	80	90	70	90	90	60	90
Mean	91	88	80	90	90	83	97
Range	80-95	80-90	70-90	90-90	90-90	60-90	90-99

TABLE XII (Continued)

	Self Reliance	Sense Personal Worth	Sense of Personal Freedom	Feeling of Belonging	Withdrawing Tendencies	Nervous Symptoms	TOTAL PERSONAL ADJUSTMENT
Group B							
5	40	90	70	70	30	40	50
6	60	90	90	50	60	10	50
7	60	50	70	90	30	30	50
8	80	10	50	30	40	40	30
Mean	60	60	70	60	40	30	45
Range	40-80	10-90	50-90	30-90	30-60	10-40	30-50
Group C							
9	80	50	50	90	30	30	50
10	60	90	50	90	90	60	70
11	60	80	50	70	80	90	80
12	40	80	70	90	80	60	70
Mean	60	75	55	83	70	60	68
Range	40-80	50-90	50-70	70-90	30-90	30-90	50-80

TABLE XII (Continued)

SOCIAL ADJUSTMENT

	Social Standards	Social Skills	Anti-Social Tendencies	Family Relations	School Relations	Community Relations	TOTAL SOCIAL ADJUSTMENT	TOTAL PERSONAL AND SOCIAL ADJUSTMENT	STANDARD SCORES RELATIONSHIPS
Group A									
1	80	90	90	90	80	60	98	99	73
2	80	90	90	90	80	90	99	99	73
3	80	90	50	80	80	60	80	90	63
4	80	50	90	90	40	90	80	90	63
Mean	80	80	80	88	70	75	89	95	67
Range	80-80	50-90	50-90	80-90	40-80	60-90	80-99	90-99	63-73
Group B									
5	80	50	30	80	40	40	50	50	50
6	80	70	50	90	80	60	80	70	55
7	80	70	50	80	60	20	50	50	50
8	80	50	50	80	10	40	40	40	47
Mean	80	60	45	83	48	40	55	53	53
Range	80-80	50-70	30-50	80-90	10-80	20-60	40-80	40-70	47-55

TABLE XII (Continued)

	Social Standards	Social Skills	Anti-Social Tendencies	Family Relations	School Relations	Community Relations	TOTAL SOCIAL ADJUSTMENT	TOTAL PERSONAL AND SOCIAL ADJUSTMENT	STANDARD SCORES RELATIONSHIPS
Group C									
9	60	70	90	10	60	40	50	50	50
10	80	50	90	80	80	60	80	80	58
11	40	90	90	50	80	60	70	80	58
12	80	30	70	80	40	60	60	70	55
Mean	65	60	85	55	65	55	65	68	55
Range	40-80	30-90	70-90	10-80	40-80	40-60	50-80	50-80	50-58

TABLE XIII

PERCENTILE RANKS OF SUBJECTS FOR AN INVENTORY OF CHILDREN'S INTERESTS:

WHAT I LIKE TO DO

(POSSIBLE PERCENTILE RANKS: 1, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95, 99)

	Activity Areas and Percentile Ranks							
Group A	Art	Music	Social Studies	Active Play	Quiet Play	Manual Arts	Home Arts	Science
1	99	99	99	97	99	99	99	99
2	95	80	99	70	99	97	99	99
3	45	7	45	65	75	45	20	50
4	60	65	50	60	35	45	50	60
Mean (Rounded)	75	63	73	73	77	72	67	77
Range	45-99	7-99	45-99	60-97	35-99	45-99	20-99	50-99
Group B								
5	20	70	80	80	50	70	40	85
6	85	99	99	65	65	45	80	95
7	80	80	70	50	55	35	30	70
8	50	45	50	30	7	60	3	30
Mean (Rounded)	59	74	75	57	45	53	38	70
Range	20-85	45-99	50-99	30-80	7-65	35-70	3-80	30-95

TABLE XIII (Continued)

	Activity Areas and Percentile Ranks							
	Art	Music	Social Studies	Active Play	Quiet Play	Manual Arts	Home Arts	Science
Group C								
9	65	40	60	45	60	60	55	60
10	30	10	20	60	95	45	20	60
11	75	60	80	70	90	70	50	80
12	60	25	60	40	1	5	5	30
Mean (Rounded)	58	34	54	73	62	45	33	58
Range	30-75	10-60	20-80	40-70	1-95	5-70	5-55	30-80

ABSTRACT

This study is a comparison of certain factors related to leanness, obesity, and "average" weight in 12 healthy preadolescent girls of above average intelligence and similar family backgrounds. Factors considered were anthropometric data from the subjects, possible height-weight relationships between subjects and parents, 7-day caloric intakes of the subjects, 7-day activity records and certain eating practices of the subjects and parents, and some personality components and activity interests of the subjects as measured by standardized tests.

The subjects, ranging in age from eight to 10 years, were selected according to the physique appraisals of lean, heavy, and "average." Mean weights of the lean, heavy, and "average" subjects, respectively, were 23.4 kg, 43.0 kg, and 27.8 kg. Corresponding mean percentage deviations from standard height-weight criteria were 18.7 per cent underweight, 29.5 per cent overweight and within 4.9 per cent of the standard. Eight additional anthropometric findings supported these physique appraisals. Calculated mean daily caloric intakes for the lean, heavy, and "average" subjects, respectively, were 2193 calories, 1925 calories, and 1761 calories. Reported activity patterns suggested that the lean subjects and their parents were the most physically active, while the heavy subjects and their parents were least active. These findings for the subjects were supported by their scores in a standardized interest inventory.

A tendency toward obesity in the subjects studied was more related to lack of interest and participation in physical activities than to excessive caloric intakes.