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Food Behaviors of Adolescents Relative to Adiposity

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To the Graduate Council:

I am submitting herewith a dissertation written by Kitty Roberts Coffey entitled "Food Behaviors of Adolescents Relative to Adiposity." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.

Mary A. Bass, Major Professor

We have read this dissertation and recommend its acceptance:

Grayce E. Goertz, Leo F. Droppleman, William M. Bass, Ira E. Harrison, Henry J. Montoye

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Vice Chancellor
Graduate Studies and Research

FOOD BEHAVIORS OF ADOLESCENTS RELATIVE TO ADIPOSITY

A Dissertation

Presented for the

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Degree

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Kitty Roberts Coffey

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ABSTRACT

Food behaviors relative to adiposity were studied in 226 seventh-grade students from selected junior high schools in Knoxville, Tennessee. Height, weight, and triceps fatfold thickness were obtained for each subject. Based on triceps fatfold measurements (mm) students were divided as equally as possible into three groups and designated as "lean," "middle," and "fat." A questionnaire was designed and administered to obtain specific demographic information and to investigate differences between the "lean" and "fat" with regard to their perceived food preferences, food connotative meanings, knowledge of energy values of food and activity, and taste preferences for four Kool-Aid solutions ranging from zero to two times the manufacturer's recommended sweetness.

The prevalence of obesity was relatively high (26.9 percent); however, an even greater percentage (32.7) of students indicated that they considered themselves "overweight." Seventy percent of the self-declared overweight students reported the age of onset as after 9 years. Nearly one-half (47.3 percent) of the students expressed a desire to lose weight, whereas a little less than one-third (30.1) indicated a desire to gain weight.

No meaningful significant differences were found between the "lean" and "fat" adolescents for perceived food preferences, sucrose taste preferences, food connotative meanings, and knowledge of energy values of food and activity. Several differences of interest were observed

between races and sexes, especially the former; however, these differences must be interpreted cautiously because compounding factors of race, sex, and socioeconomic status were inherent within race and sex groupings. The blacks and whites differed significantly in their preferences for 26 of 84 foods and the males and females for 20 of 84 foods with the blacks and males preferring a greater variety of foods than their counterparts.

Several significant differences were observed between mean scores of blacks and whites on three Calorie related connotative meaning scales; whites associated more foods with "high Calorie," "fattening," and "gaining" polar terms than blacks. Knowledge of energy values of food and activity was low with students correctly answering only one-third (34 percent) of the items. The mean scores on knowledge of energy values of foods for whites (11.0 ± 3.7) and blacks (9.7 ± 3.4) were significantly different ($p < 0.05$); moreover, for knowledge of energy values of activities the mean scores of whites (12.1 ± 3.2) and blacks (8.8 ± 3.5) were statistically different ($p < 0.001$).

For all three body fatness classes and both races and sexes the order of preference for the four Kool-Aid solutions was directly related to sucrose concentration. Mean taste scores substantiated the students' ability to rank the solutions with respect to sweetness. Sucrose preference or aversion did not appear to be a significant factor in the perpetuation of fatness or leanness under the conditions of this study.

As body weight is an equilibrium state between energy intake and energy expenditure, further research is needed to determine if the

obesity of these "fat" subjects is the result of genetic or environmental factors or a combination. Additional study is needed to ascertain when differences become apparent between the "fat" and "lean" adolescents with regard to their familial-culturally evolved food preferences, meanings, and knowledge influencing food behaviors.

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CHAPTER I

INTRODUCTION

Obesity, defined as excessive accumulation of body fat, has been identified as the "major public health problem confronting the United States and other developed nations" (Bray, 1974) as well as the most frequent nutritional disturbance of childhood (Winick, 1974). Although national statistics for the prevalence or incidence of juvenile obesity are not apparent, 12 to 20 percent of the pre-adult population is estimated to be obese with the percentage anticipated to increase (Seltzer and Mayer, 1970).

Obesity in childhood tends to persist with approximately 80 percent of the obese children becoming obese adults (Mobbs, 1970). Moreover, obesity which develops in childhood or adolescence is more difficult to treat and may cause more severe personality and psychological problems than adult onset obesity (Bruch, 1973a). Adolescence, along with the last trimester of pregnancy and the first 3 years of life, may be the most critical periods in determining whether a person will be obese (Winick, 1974).

The 1973 New York City Conference on Childhood Obesity, held under the sponsorship of the Institute of Human Nutrition of Columbia University, College of Physicians and Surgeons, identified childhood obesity as a dangerous form of obesity and as a significant health hazard. The Conference urged that the medical and nutritional communities and concerned parents throughout the entire U.S. institute the necessary

programs "to study and eradicate what is perhaps the greatest 'nutritional danger' in our country today" (Winick, 1974, 1975).

Despite the magnitude of the obesity problem and its long history of research, actually little undisputed knowledge was accumulated regarding its etiology and treatment. The etiology of a small number of obese cases was attributed to genetic factors or to injury to the hypothalamus, hormonal imbalance, or other abnormal metabolic factors (Schachter, 1971a). More recently the fat cell theory suggested that there are two types of obesity: hyperplastic, wherein the patient has too many fat cells, primarily characteristic of early or childhood onset obesity; and hypertrophic obesity, wherein the patient has fat cells which are excessively large, primarily characteristic of late or adult onset obesity (Hirsch and Knittle, 1970). It appears, however, that most obesities, whether of adult or juvenile onset, can be attributed not to abnormal metabolism but generally to food behavior maladjusted to the metabolic need, i.e. the eating of more food than is needed normally or to failure to reduce food intake to match lowered metabolic requirement (Winick, 1974).

With regard to etiological classification of obesity, Van Itallie and Campbell (1972) presented the following tentative groupings of forms of obesity according to mechanism:

I. Regulatory obesity (no primary metabolic abnormality)
   A. Psychologic
      1. Nonneurotic overeating (orientation toward "external" and sensory cues relating to the eating process)
      2. Overeating associated with neurosis

B. Physiologic
   1. Increased energy intake (brain damage)
   2. Decreased energy intake (sedentary existence)

II. Metabolic obesity
   A. Enzymatic (? certain forms of genetic obesity)
   B. Hormonal (hyperadrenocorticism)
   C. Neurologic (? certain forms of lipodystrophy)

III. "Constitutional" obesity
   A. Fat cell hyperplasia

Genetic (enzymatic type of metabolic obesity) versus environmental (regulatory) factors in the etiology of obesity are difficult to separate because the latter also tend to run in families. Garn et al. (1975b) in studying the Ten-State Nutrition Survey data found spouses were almost as similar in their fatfolds ($r = 0.27$) as were they with their oldest children of both sexes (r's = 0.25 to 0.29). After having made observations of fatfold data on several thousand pairs of individuals from different surveys, Garn and Clark (1975) suggested that "the level of fatness may be more acquired because of family eating and exercising than genetically inherited."

Mayer (1975) proposed that the genetic component of obesity is the inheritance of body type with specific body types having a greater association with obesity. Thus as society de-emphasizes physical activity the genetic component has increased chance of expression.

Genetic variations in the efficiency of energy utilization due to differences in metabolic efficiency, or the efficiency by which ATP is formed and utilized in the body, was suggested as a possible cause of obesity (Sheldon, 1970). Recently cytochrome P-450 levels in the liver microsomes of obese and normal mice were investigated in an effort to identify the metabolic alteration responsible for the hypothesized increased efficiency of energy utilization in obese humans (Dorsey, 1976).

The etiology of obesity is not yet clear in that interrelationships between the metabolic and regulatory factors affecting energy balance are so intricate. Recognizing the complexity of the etiological factors in obesity, Van Itallie and Campbell (1972) recommended a multi-disciplinary approach to the problem involving methodologies drawn from both the metabolic and behavioral scientists.

Historically, most treatment programs for obesity reported in the medical literature were relatively ineffective (Stunkard, 1958, 1976; Stunkard and McLaren-Hume, 1959). Behavior modification principals were rather effectively applied over the past 30 years in the treatment of alcoholism, mental retardation, neurosis, and psychosis (Bandura, 1969; Pomerleau et al., 1975). Ferster et al. (1962), Stuart and Davis (1972), and Ferguson (1975) described programs of behavioral techniques for treating obesity aimed at promoting change in food intake patterns.

In the past 10 years attempts to apply the principles of behavior modification to the treatment of obesity in adults resulted in some of the most successful programs reported in the literature (Stuart, 1967, 1971; Harmatz and Lapuc, 1968; Harris, 1969; Wollersheim, 1970; Penick et al., 1971; Stunkard, 1972; Levitz, 1973; Hagen, 1974; Paulsen et al., 1976). Behavioral therapy techniques appeared to promote modification of food intake patterns in self-help groups for the obese (Jordan and Levitz, 1973; Levitz and Stunkard, 1974). Recently self-monitoring and self-reinforcement of food behavior were investigated (Mahoney, 1974; Bellack, 1976).

More research and continued refinement of behavioral programs for modification of food intake patterns are necessary, especially for application with obese persons of low socioeconomic status and with obese children (Weisenberg and Fray, 1974). Prerequisite to development of any successful treatment program, however, is an increased understanding of obese individuals with respect to their food behavior including their food and taste preferences, food connotative meanings, and knowledge and beliefs regarding energy values of food and physical activity.

Therefore, the original objectives of this study were:

1. to investigate the leaner and fatter adolescents' taste preferences for sucrose,
2. to investigate the leaner and fatter adolescents' perceived food preferences,
3. to investigate the leaner and fatter adolescents' perceived preferences for higher Calorie versus lower Calorie foods,
4. to investigate the leaner and fatter adolescents' knowledge of energy values of food and activity, and
5. to investigate the leaner and fatter adolescents' food connotative meanings.

As the study progressed, the original objectives were enlarged to include investigation of these same parameters for the white and black races and for males and females. Furthermore, the following hypotheses were proposed:

1. fatter adolescents differ from leaner adolescents in their taste preference for sucrose;

2. fatter adolescents differ from leaner adolescents in their perceived food preferences;
3. fatter adolescents have a greater perceived preference for higher Calorie foods versus lower Calorie foods than do leaner adolescents;
4. fatter adolescents differ from leaner adolescents in their knowledge of energy values of food and activity; and
5. fatter adolescents differ from leaner adolescents in their food connotative meanings.

CHAPTER II

REVIEW OF LITERATURE

I. Measurement and Evaluation of Body Fatness

The term obesity does not refer to weight, relative weight, or percent overweight as it has been expressed so frequently. An overweight, muscular individual may be lean whereas an underweight, slightly built person may be overly fat. Therefore obesity must be defined in terms of fatness, not body weight, and measured as fat (Garn, 1972).

Numerous laboratory approaches to measurement of body fatness were used in recent years. These included estimation of body density by underwater weighing; estimation of body potassium; estimation of fat under the skin by ultrasonics or radiographs; estimation of body volume by helium dilution, air displacement, or photogrammetry; determination of total body water; and creatinine excretion. Unfortunately, these methods, many of which have established validity, are impractical in population surveys (Keys and Brozek, 1953; Montoye, 1975).

Skinfold or fatfold measurements have the advantages of simplicity, practicality, rapidity, and validity if the procedure is properly standardized. Because of these advantages, fatfold measurements generally were accepted as the most practical measurement of fatness both for clinic and field populations (Seltzer and Mayer, 1965, 1967;

Seltzer et al., 1965; Malina, 1966, 1971; Robson et al., 1971; Montoye, 1975).

The fatfold is the loose tissue over the upper arm, below the scapula, over the abdomen, at the waistline, and at other places on the body which may be grasped between the thumb and index finger. This fold of tissue includes subcutaneous fat encased in a double layer of skin and is measured with a skinfold caliper in millimeters. Of the several different calipers available the Franzen caliper (1929) with modification was the first to be widely used in this country. Tanner and Whitehouse (1955) in England developed the Harpenden caliper and rigorously tested its accuracy (Edwards et al., 1955). More recently Lange and Brozek (1961) developed the Lange caliper and demonstrated it to measure with negligible error. Although the English Harpenden and American Lange calipers differ in the area and shape of their respective jaw faces, they comply to the internationally accepted pressure exerted on the fatfold at the caliper face of 10 g/mm^2 (Tanner and Whitehouse, 1962).

The sites for fatfold measurements most frequently reported in the literature are over the triceps muscle and at the tip of the scapula. Seltzer and Mayer (1965) cited the triceps fatfold as the easiest to measure and the most predictive of total body fat. Keys and Brozek (1953) observed a high correlation ($r = 0.742$ to 0.938) among fatfold measurements of various sites on the same subject. Montoye (1975) in the Tecumseh Community Health Study observed correlation coefficients between triceps and subscapular fatfolds ranging from 0.6 to 0.8 for males and females in 10-year age groups. When Montoye (1975) correlated

the sum of four fatfolds with the sum of two and found coefficients generally near 0.9, he observed that the law of diminishing returns became quickly applicable indicating that the determination of a few fatfolds was almost as accurate an assessment of body fat as taking measurements at many sites. Seltzer and Mayer (1965) went even further to suggest that there was no particular advantage in utilizing other fatfold sites in addition to the triceps. Comprehensive explanations of techniques and sites of measurement of fatfolds were made available by Keys and Brozek (1953), Brozek (1961), and Tanner and Whitehouse (1962).

Several studies (Pett and Ogilvie, 1956; Garn, 1972; Garn and Clark, 1975) indicated that fatfold values are skewed negatively at early ages and positively at later ages. During infancy and childhood subcutaneous fat in nonobese subjects varies with highest values being obtained at about 1 year of age and during adolescence. Generally there is a rather steady increment in fatfold thickness during adulthood followed by a decrement in old age. Garn (1972) showed that with triceps fatfold measurements in boys and girls (birth to 18 years) participating in the 1968-1970 Ten-State Nutrition Survey, the fatfold means were displaced upward of fatfold medians. Garn (1972) therefore suggested that the median was the preferable measure to report at all ages and that percentiles were preferable to standard deviations.

Standards for fatfolds, especially triceps and subscapular, were published that assist in classifying children by percentile norms. Hammond (1955) reported means on British children for six fatfolds at yearly intervals from 2 through 18 years for both males and females;

variability data were lacking, however. Pett and Ogilvie (1956) published percentile norms for triceps fatfolds of Canadian children of both sexes from ages 2 to 20 years and then in 5-year intervals to age 65. Tanner and Whitehouse (1962) presented percentile norms for triceps and subscapular fatfolds for British children of both sexes at 1 year age intervals from birth to 18 years. Corbin (1969) published triceps and subscapular fatfold percentile standards for American (Texas) boys and girls ages 6 to 12 years; black children accounted for 12.5 percent of the subjects.

Ethnic and racial differences in fatfold thicknesses were compared by Malina (1966, 1971) in American (Philadelphia) black and white children and by Robson et al. (1971) in Caribbean and English children. Malina (1971) found that white American children had more subcutaneous fat at each of three fatfold sites (triceps, subscapular, and mid-axillary) studied than did black children of both sexes throughout the 6 to 13 year age range. In both the studies by Malina (1966) and Robson et al. (1971) differences between the black and white children's fatfolds were most marked for the triceps site. The National Health Examination Survey (NHES) of 1963-1965 (N.C.H.S., 1972, 1974) including children and youth 1 to 17 years of age, the Ten-State Nutrition Survey of 1968-1970 (C.D.C., 1972) which included adolescents 10 to 16 years of age, and the Health and Nutrition Examination Survey (HANES) of 1971-1972 (N.C.H.S., 1975) reported similar racial differences.

Ruffer (1970) observed that in spite of the generally recognized value of the simple and practical fatfold technique, data were limited with regard to the establishment of body fatness norms based on

subcutaneous fat measurements at specific body sites. One method of identifying those individuals who should be classified as obese was advanced by Seltzer and Mayer (1965). These workers proposed that "in the American population the qualification of obesity be reserved for those individuals less than 30 years old in whom the triceps fatfold is greater than one standard deviation than the mean" or roughly the 84th percentile. Seltzer and Mayer (1965) presented a table of obesity standards for Caucasian Americans of both sexes. In the table these workers listed fatfold thicknesses suggestive of obesity for each year, 5 through 29 years, and for ages 30 through 50 inclusive. Ruffer (1970) disagreed with the criterion of obesity set forth by Seltzer and Mayer (1965) and applied two alternate indices (A and B) for identifying obesity to weight and triceps fatfold data. Index A represented the Seltzer and Mayer (1965) system modified to the 90th percentile as a cutoff for obesity. Index B, which was derived from the formula:

$$\text{Index B} = \frac{\text{triceps fatfold}}{\text{weight}} \times 1000$$

was recommended as an improved method for identifying obesity.

More recently fatfold and weight data from the 1968-1970 Ten-State Nutrition Survey (C.D.C., 1972) indicated that the conventionally used 20 percent overweight definition of obesity for adults was not an appropriate definition for infants and children. Thus Garn (1972), Garn and Clark (1975), and Garn et al. (1975a) recommended that through adolescence the operational definition of obesity should be taken as the 85th percentile for the norms or standards used. In adulthood, however, when fatness continues to rise, it is no longer acceptable to

define obesity in terms of the 85th percentile for age and sex. If we assume that fatness values for young adults can be taken as the ideal throughout later life, then according to Garn (1972) we have a new and simple definition of adult obesity: "An obese adult is one who exceeds the 85th percentile for age 20-25."

Grinker et al. (1976), in studying taste parameters with children and adolescents, divided the population into thirds on the basis of percent fat. These workers labeled the three groups "lightest," "middle," and "heaviest." Percent fat variously was estimated by circumference or fatfold measures including the triceps fatfold. On the basis of relative fat, Grinker et al. (1976) compared differences between heavier and lighter children with regard to taste parameters for sucrose.

Although Rauh and Schumsky (1969) proposed that an experienced clinician can visually assess obesity with relative accuracy, this is a qualitative rather than a quantitative index. A variety of tables of "ideal" or "desirable" weights were devised to provide quantitative estimates of overweight. The standard weight for children and adolescents is based upon age, sex, and height. Various height-weight tables developed for use with children and adolescents include those of Faber (1929), Wetzel (1941), Jackson and Kelly (1945), Stuart and Meredith (1946), Falkner (1962), and Hamill et al. (N.C.H.S., 1970, 1973). Manuel (1934) and Steggerda and Densen (1936) developed tables for use with minority groups. Although the aforementioned tables have limited use in the assessment of obesity as they do not differentiate weight into its component parts, these tables frequently may be the only tools

available, especially in the public school systems, for the evaluation of weight.

II. The Obese Adolescent

Obese adolescents may be described in terms of their physical, social, and psychological characteristics as well as their behavior in regard to food and activity. Care must be taken not to overgeneralize, however, as obese adolescents like all humans are subject to individual differences.

Physical Characteristics

There are several physical characteristics that differentiate the obese from the nonobese adolescent. For example, obese boys and girls are taller than their lean age peers from at least the second year of life on and tend to have advanced bone age. At age 2 years the difference in height is approximately 4 cm increasing to approximately 5 cm at age 12 years. Since epiphysial closure takes place earlier than normal and is attributable to the advanced bone age, the obese adolescent is not excessively tall as an adult, however. Nevertheless, as skeletal development is advanced in obese adolescents they exhibit greater skeletal mass than their nonobese peers (Garn and Clark, 1975). The weight differences between obese and lean boys and girls increases from less than 2 kg at the second year to nearly 20 kg at age 12 years (Garn et al., 1975a).

Since obese children generally are advanced in both size and development over the average and even more so as compared with the lean

boys and girls, it is not surprising that the obese and lean differ in the fat-free weight (FFW) as well as in the weight of fat (FW) or in the percent fat (percent F). Fat-free weight differences tend to increase with increasing chronological age, and at about 10 to 12 years there is a difference of approximately 2 kg (about 7 percent) between the FFW of the obese white male of European ancestry and the FFW of his lean counterpart. Similar fatness related differences in the FFW separately occur for black boys and girls (Garn et al., 1975a).

At all ages obese children have a far greater percentage of fat (percent F). Thus in the two-component model of percent F + percent FFW = 100, the obese have a smaller percentage of lean (percent FFW). However, according to Garn et al. (1975a), it is a mistake to contend that the obese have a smaller FFW, as has been done, or that obesity in childhood is attained at the expense of the lean. The fact is that obese children have a larger fat-free weight and a larger skeletal mass (Garn et al., 1975a). Other physical characteristics of adolescent obesity include early menarche (Hammer et al., 1972), elevated hemoglobins and hematocrits (Garn and Clark, 1975), and increased fat cell size and number (Winick, 1974). Physical complications of adolescent obesity were identified as suspect hypogenitalism; suspect gynaecomastia; cutaneous striae; orthopedic problems such as genu valgum, coxa vara, and slipped femoral epiphysis; and high blood pressure (Jones, 1972).

Social Class Characteristics

A strong inverse relationship between socioeconomic status and obesity was demonstrated in adults. Goldblatt et al. (1965) and

Moore et al. (1962) reported that obesity was six times more prevalent among women of lower versus women of higher socioeconomic status. Moreover, an inverse relationship between obesity and parental socioeconomic status was found. Furthermore, upwardly mobile females were less obese than the downwardly mobile females. Finally, the longer a woman's family was in this country the less likely she was to be obese. Similar but less marked trends were obtained for men.

Stunkard et al. (1972), in a study of the triceps fatfolds of 3,344 white school children ages 5 to 18 years, found obesity to be more prevalent in the lower social class girls than in the upper class girls. By age 6 years, 29 percent of the girls in the lower social class were obese as opposed to 3 percent of the upper social class girls. This class associated difference continued through age 18 years, falling to a minimum at 12 years of age when 13 and 9 percent of the lower and upper social classes, respectively, were obese. Less dramatic although similar trends were found among males of the divergent social classes.

The work of Garn and Clark (1974, 1975), however, is contradictory to that of Stunkard et al. (1972). When Garn's (1972) "above the 85th percentile" definition of obesity was applied to the Ten-State Survey data as a whole, the proportion of obese children varied with the different socioeconomic groups. In general, beyond infancy and into adolescence the obese were the more affluent; and the lean were the below poverty children within each ethnic and racial group for which there were sufficient subjects for comparison. This generalization was applicable to males of all ages, with some early exceptions, and to females through early adolescence (Garn and Clark, 1974, 1975). When Garn and Clark

(1975) separated out the super obese (upper 5 percent in fatness), however, these individuals were not primarily middle income as were the simply obese. Thus perhaps the discrepancy in the findings of Stunkard et al. (1972) and Garn and Clark (1974 and 1975) in part can be attributed to differences in their respective criteria for defining obesity.

Regardless of age or socioeconomic group, females exhibit more surface fatness at all ages beginning in childhood than do males. Adolescence for the females, both rich and poor, is a period of increasing surface adiposity. As adolescence progresses, however, females of lower socioeconomic status become fatter whereas those of higher socioeconomic status become leaner (Garn et al., 1975a).

Psychological Characteristics

Obese adolescents, especially girls, exhibit a number of social and psychological problems. The effects of social, cultural, and familial attitudes toward obese juveniles with regard to personality (Monello and Mayer, 1963; Stunkard and Burt, 1967; Stunkard and Mendelson, 1967; Dwyer and Mayer, 1968-1969; Lerner and Gellert, 1969; Nathan and Pisula, 1970; Stanley et al., 1970; Hammar et al., 1972; Nathan, 1973; Sallade, 1973), college acceptance (Canning and Mayer, 1966), and socio-economic class (Goldblatt et al., 1965; Stunkard and Burt, 1967; Stunkard and Mendelson, 1967) showed obese juveniles to be victims of intense prejudice and often the products of psychologically disturbed families (Bruch, 1971; Hammar et al., 1972). Moreover, the developmentally obese adolescents appear to manifest emotional

disturbances, perhaps the most important of which is the feeling of not being in control of their own sensations and actions, i.e. absence of hunger awareness. In their families the obese adolescents appear to occupy a unique position; they often are the focus of parental conflicts, a source of embarrassment, or a sibling scapegoat (Hammar et al., 1972). In addition, their families often fail to recognize them as individuals and to allow them to express themselves (Bruch, 1973b).

Obese girls were shown to exhibit passivity, obsessive concern with self-image, expectations of rejection, and progressive withdrawal—all strikingly similar to the traits of ethnic and racial minority groups attributable to their status as victims of intense prejudice (Monello and Mayer, 1963). The obese girl had significantly fewer dates and was in fewer nonsport organizations and groups in and outside of school than the nonobese girl. Furthermore, the obese girl participated less actively in the groups of which she was a member than did the nonobese girl (Bullen et al., 1963).

Obese adolescents of both sexes often are characterized by depression, low self-esteem, social isolation, and defective body image development (Hammar et al., 1972). Body image, the physical aspects of one's self-concept, consistently appears as a personality problem among obese juveniles (Stunkard and Burt, 1967; Stunkard and Mendelson, 1967; Lerner and Gellert, 1969; Nathan and Pisula, 1970; Nathan, 1973).

Disturbance and/or negative evaluations of body size or shape develop during a relatively short period of time in childhood and adolescence. Persons becoming obese during their adult years were not shown to develop negative evaluations irrespective of their body size

(Stunkard and Burt, 1967). Body concept appeared to be articulated increasingly between the ages of 8 and 14 years with little change after those ages (Faterson and Witkin, 1970).

III. Activity and Food Behaviors of the Obese Adolescent

Activity Patterns

Excessive energy intake and reduced energy expenditure are the two major environmental causes of obesity in children (Garn and Clark, 1975; Garn et al., 1975b). Mayer (1975) proposed the latter as the more important variable based upon studies of obese adolescents in summer camps (Johnson et al., 1956; Stefanik et al., 1959; Bullen et al., 1963, 1964). In addition, other investigators demonstrated a relationship between physical inactivity and obesity (Duddleston and Bennion, 1970; Hammar et al., 1972; Johnson et al., 1972).

Obese adolescents were found to be less physically active and more interested in sedentary pursuits than their nonobese counterparts (Johnson et al., 1956; Stefanik et al., 1959; Bullen et al., 1963, 1964; Huenemann et al., 1966b, 1967, 1974; Hammar et al., 1972). Moreover, obese adolescents appeared to exert themselves less vigorously when engaged in physical activity (Stefanik et al., 1959; Bullen et al., 1964). Longitudinal investigation of adolescents (Hampton et al., 1966; Huenemann et al., 1966a and b, 1967, 1968, 1974) suggested that the obese consumed fewer Calories than the nonobese and were similarly inactive physically; more recently Bradfield et al. (1971) supported these findings.

Food Intake Patterns

Several investigators (Johnson et al., 1956; Stefanik et al., 1959; Bullen et al., 1963; Huenemann et al., 1966a and b, 1968, 1974; Hammar et al., 1972) reported the food preferences and food behaviors of the obese adolescent. Perhaps the most interesting finding was that obese adolescents ate no more and perhaps less than their nonobese counterparts (Johnson et al., 1956; Stefanik et al., 1959; Huenemann et al., 1966a and b, 1968, 1974; Bradfield et al., 1971; Hammar et al., 1972). The reliability of studies finding obese adolescents to eat less than the nonobese was questioned, however, and the suggestion made that the obese under reported food intake as a "defense mechanism" (Heald, 1975).

Several observations were made regarding food behaviors of obese adolescents. The obese boys and girls were the breakfast skippers (Bullen et al., 1963; Huenemann et al., 1966a and b, 1968, 1974). Obese boys snacked more and the obese girls the same or less than other girls (Bullen et al., 1963; Huenemann et al., 1966a and b, 1968, 1974). Obese boys and girls ate smaller amounts of dairy products, vegetables, and fruits than did the nonobese (Huenemann et al., 1966a and b, 1968, 1974). Obese girls reported more dieting and eating sprees than did the nonobese and attributed their obesity to food (Bullen et al., 1963).

Food choices (Gates et al., 1975) and eating rates (Gaul et al., 1975; Hill and McCutcheon, 1975; Wagner and Hewitt, 1975) were studied recently in adults. Gaul et al. (1975) observed that the obese persons chose larger quantities of food and selected more foods from the high Calorie, low nutrient group versus the protective food group than did the nonobese persons. Obese adults were shown to take more bites

(Gaul et al., 1975), to spend less time chewing (Gaul et al., 1975; Wagner and Hewitt, 1975), and generally to consume food at a faster rate (Hill and McCutcheon, 1975) than the nonobese adults.

Weinseir (1976) observed that leaner population groups emphasize vegetables, fruits, and starches in their diets whereas fatter population groups emphasize meats, sweets, and fats. The relative caloric density of these food groups as adapted from Weinseir (1976) is presented graphically below:

Decreased Caloric Density				Increased Caloric Density	
(1) Vegetables	(2) Fruits	(3) Starches	(4) Meats	(5) Sweets	(6) Fats/oils
5-10 kcal/oz	15 kcal/oz	50 kcal/oz	75 kcal/oz	150 kcal/oz	170-270 kcal/oz

Those foods of greater caloric density are fast-eating foods and have less bulk or residue as opposed to the foods of less caloric density which are slow-eating foods of greater bulk or residue.

Several workers (Hashim and Van Itallie, 1965; Goldman et al., 1968; Nisbett, 1968b; Schachter, 1971b; Price and Grinker, 1973; Hill and McCutcheon, 1975) established that the obese eat more high preference food and less low preference food than do nonobese individuals. Closely associated with the "good tasting" hypothesis was the popular myth that people become obese by overindulging in sweets or carbohydrates (Grinker et al., 1976).

Pangborn and Simone (1958), Grinker et al. (1972,1976), and Grinker (1975) studied sucrose sensitivity in obese adults. Grinker et al. (1972) reported no differences in sucrose thresholds between

obese and normal weight adult subjects or among obese adults differing in age at onset of obesity. Grinker et al. (1976) found that the taste preferences of obese subjects for sucrose solutions were inversely related to concentration. Pangborn and Simone (1958) indicated no significant difference in preferences for apricots, pears, peaches, and vanilla ice cream, of differing sugar contents, which could be attributed to variation in body size among 12,505 individuals participating in consumer surveys.

Only a few workers investigated taste preferences for sucrose in children. Using a pineapple juice in five degrees of sweetness, Laird and Breen (1939) reported a higher preference for the sweeter juices by boys than girls, ages 12 to 18 years. Grinker et al. (1976) studied the taste preferences for sucrose solutions (1.95 percent to 19.50 percent) in normal weight and obese children ages 8 to 10 years using the method of paired comparisons. These same workers (Grinker et al., 1976) studied taste preferences for Kool-Aid solutions sweetened with sucaryl (ranging from 1.0 to 2.5 times manufacturer's recommended sweetness) in obese children ages 8 to 11 years using hedonic ratings. Grinker et al. (1976) also obtained hedonic ratings and magnitude estimates of cherry Kool-Aid solutions sweetened with sucaryl 0, 0.5, 1, and 2 times the manufacturer's recommended sweetness corresponding to 5.60 percent to 27.38 percent sucrose solutions on 90 obese adolescent girls and 7 boys at a summer camp in North Carolina and on 14 obese adolescent girls at a camp in California. This finding was in contrast to popular a priori reasoning that the obese had a "sweet tooth" (Nordsiek, 1972).

In the past decade nonneurotic overeating or orientation toward external versus internal cues relating to the eating process was studied rather extensively in adults (Schachter, 1968, 1971b). Investigations included the effects of food deprivation (Schachter et al., 1968; Nisbett and Kanouse, 1969), fear (Schachter et al., 1968; McKenna, 1972), time (Goldman et al., 1968; Schachter and Gross, 1968), work involvement (Nisbett and Gurwitz, 1970; Schachter, 1971a), cue prominence (Goldman et al., 1968; Nisbett, 1968a; Kozlowski and Schachter, 1975), and taste sensitivity (Hashim and Van Itallie, 1965; Goldman et al., 1968; Nisbett, 1968b; Schachter, 1971a; Grinker et al., 1972; Grinker, 1975; Kozlowski and Schachter, 1975) on eating behavior as associated with body weight differences. Relatively little work, however, except for that of Grinker et al. (1976) was reported on the external and sensory cues relating to food behavior in children.

The work of Grinker et al. (1976) indicated that sucrose aversion appeared in obese children as early as 8 years. Moreover, the degree of overweight was directly related to the extent of the aversion. The children's preferences for Kool-Aid also were related to the degree of overweight with the more overweight children least preferring the sweeter Kool-Aid solutions. These findings held true for different populations in different locations. Based on their findings Grinker (1975) and Grinker et al. (1976) suggested that preference for sweet foods is unlikely to be a major factor in the establishment and maintenance of the obese state.

Food Connotative Meanings

Foods have numerous meanings; nutritive value is but one meaning of food (Fewster et al., 1973). Todhunter (1972) described food as power, security, expression of status, symbol of hospitality and friendship, and an outlet for emotions. The connotative meaning of a word or concept includes all of the ideas, attitudes, and feelings which an individual associates with that word or concept (Krech et al., 1962). Fewster et al. (1973) adapted an instrument for measuring the connotative or implied meanings of food from the semantic differential, a behavioral science research technique (Osgood et al., 1957).

Gifft et al. (1972) suggested that the meanings attributed to food are learned and are the result of sociocultural, psychological, sensory, and intellectual experiences. The symbolic meanings of food often can be of greater importance than the rational meanings (Pumpian-Mindlin, 1954; Moore, 1967; Gifft et al., 1972). Symbolic uses of food include reward and punishment (Pumpian-Mindlin, 1954; Moore, 1957; Axler and Schwarz, 1972), status (Gifft et al., 1972; Bleibtreu, 1973), sociability and friendship (Moore, 1957; Gifft et al., 1972; Steelman, 1974), and family tradition (Eppright, 1947; Steelman, 1974).

Implied food meanings can have age (Moore, 1957; Axler and Schwarz, 1972; Gifft et al., 1972), sex (Moore, 1957; Schafer and Yetley, 1975), and stress (Pumpian-Mindlin, 1954; Babcock, 1961; Gifft et al., 1972) dimensions. For example, olives are for adults, peanut butter sandwiches for children (Moore, 1957), hamburgers for teenagers (Axler and Schwarz, 1972), meat and potatoes for men (Moore, 1957; Schafer and Yetley, 1975),

and high Caloric desserts for periods of frustration and loneliness (Gifft et al., 1972).

In a family atmosphere lacking commensality, unity, and sociability a child's own expressions of need can be disregarded resulting in an important functional deficit, namely "hunger awareness." The child, unable to internally regulate his food intake, becomes dependent on external stimuli and thereby misuses eating for various nonnutritional needs which have widely differing symbolic meanings. Food is eaten by the child in response to feelings of emotional tension or frustration or because the food is good tasting or readily available rather than in response to internal physiological hunger (Bruch, 1973a and b). Moreover, in the developmental process perhaps the child experienced infant feeding problems or received solids very early or was given food as a reinforcer for good behavior (Hammar et al., 1972). Thus food can hold numerous and different meanings for the obese adolescent. Moreover, these meanings can affect significantly his food intake (Bruch, 1973a and b).

McConnell (1974) measured some connotative meanings of food with 97 female and 61 male high school students in Hancock County, Tennessee, using an instrument similar to that of Fewster et al. (1973). Most meats and spinach were associated with masculine images; salads and nonmeat entrees were associated with feminine images. Foods which the teenagers associated with the words "teenager" and "young" were their preferred foods. The teenagers associated less preferred foods with "baby," "adult," and "old." Applesauce, pudding, and carrot strips were associated with sick versus well persons.

Carlisle (1975) studied the food connotative meanings of 354 high school students in Shelby County, Alabama, the southernmost county in Appalachia. Pizza, French fried potatoes, and hamburger, foods high on the students' preference lists, were closely associated with the term "young." Whereas pizza was associated nearer the polar term "young" by whites, French fried potatoes and hamburger were associated nearer the same polar term by blacks. The blacks were less inclined than the whites to associate foods with sex related terms. The white students and the female students associated more high Calorie foods with the polar terms "fattening" and "high Calorie" than did the black or male students. Males and females rated the least preferred food for the opposite sex. Social class had little effect on connotative meanings except for the highest social class students who associated broccoli and spinach with "high school student" and "teenager" more than did students in the other social classes.

Knowledge of Energy Values of Food and Activity

Huenemann et al. (1966b, 1974) reported that in general, obese adolescents have a reasonably good knowledge of dietary needs and causes of obesity although popular misconceptions do exist. Dwyer et al. (1967), in a study of 446 high school girls, found that their knowledge of kilocalories with regard to food and activity was low but higher among the dieters and the obese than among the nondieters and the nonobese.

The obese adolescents, in their belief that food is primarily responsible for obesity (Bullen et al., 1963), lack knowledge regarding

the relationship of exercise to weight, and moreover, fail to recognize their disinclination to exercise (Bullen et al., 1964). The attitudes of the obese regarding exercise are reflected in their being less physically active and more interested in sedentary pursuits than their nonobese counterparts (Johnson et al., 1956; Stefanik et al., 1959; Bullen et al., 1963, 1964; Huenemann et al., 1966b, 1967, 1974; Hammar et al., 1972). Moreover, Hammar (1965) observed that obese adolescents frequently were inept in physical education, embarrassed in shower rooms and in gym clothing, and felt left out of group activities.

A few workers investigated perceived or believed caloric values of food in relation to hunger (Wooley, 1972; Wooley et al., 1972). Wooley (1972) obtained evidence that both obese and nonobese subjects ate significantly less and reported a greater feeling of satiety after consuming a 200 kilocalorie milkshake designed to appear high Calorie, versus a 600 kilocalorie milkshake designed to appear low Calorie. Wooley et al. (1972) observed that their seven obese and seven nonobese subjects demonstrated almost no ability to identify liquid meals of disguised caloric content as high or low Calorie; and moreover, the subjects reported hunger more in relation to belief about caloric value rather than actual caloric content.

CHAPTER III

PROCEDURES

Food preferences, sucrose taste preferences, food connotative meanings, and knowledge of energy values of food and activity were studied in 226 children representing approximately 10 percent of the seventh-grade population in junior high schools in the Knoxville, Tennessee, City School System. An application for review of this research involving human subjects was submitted to the Departmental and University Human Rights Committees and subsequently approved (Appendix A).

I. Sample

Permission was obtained from Dr. Paul Kelley, the Director of Instruction, Knoxville City Schools, to conduct the study with seventh-grade students in five Knoxville junior high schools (Appendix A). The five schools were recommended by the director as representative of the west, south, east, and north sectors of the city. From Schools III, IV, and V, 60, 51, and 57 students, respectively, were selected, whereas 30 and 28 students were selected from Schools I and II, respectively (Table 16, Appendix B). Schools I and II were chosen upon the advice of the director to represent the northern sector of the city because of the markedly divergent socioeconomic status of the respective student bodies (Knoxville School Administration, 1976). Percentages of economically disadvantaged students, defined as children from families whose annual income was reported as $4,316 or less, from each school

were: School I (9 percent), School II (28 percent), School III (8 percent), School IV (68 percent), and School V (2 percent) (Knoxville School Administration, 1976).

The study involved a total of 226 subjects including 165 whites (77 males and 88 females), 59 blacks (31 males and 28 females), one Oriental male, and one male whose race was unidentified (Table 16, Appendix B). The 110 male and 116 female subjects ranged in age from 11.2 years to 14.5 years with a mean age of 12.6 years (Table 17, Appendix B).

II. Anthropometric Data

Height, weight, and triceps fatfold measurements were taken on all subjects by physical anthropologists. Height was measured with the subjects' stocking feet together, back and heels against the upright bar of the anthropometer, head approximately in the Frankfort horizontal plane ("look straight ahead") and standing erect ("stand up really straight"); the measurement was read to the nearest millimeter. Weight also was taken in stocking feet and light clothing and recorded in pounds which later were converted to kilograms for reporting purposes. The triceps fatfold measurement was taken on the right arm at a site halfway between the tip of the acromial process on the shoulder and the tip of the olecranon process (elbow). The fatfold was lifted on the back of the arm parallel to the long axis of the arm about 1 cm above the site. Lange calipers exerting a constant pressure of 10 g/mm^2 of jaw surface were allowed to compress the fatfold about 1 cm below the

point where the fatfold was lifted. After allowing approximately 3 sec for drift, the caliper dial was read to the nearest 0.5 mm (Keys, 1956).

III. Questionnaire Development

A questionnaire (Appendix C) was designed to obtain certain demographic information, perceived food preferences, sucrose taste preferences, food connotative meanings, and knowledge of energy values of food and of activity. Verbal directions given to the subjects regarding their answering of the questionnaire also can be found in Appendix C.

Demographic Information

A two-page questionnaire (Appendix C) was developed to obtain the following information pertaining to the informant: school attended; birthdate; age; sex; race; self-perception of body weight; if applicable, age of onset of overweight; desired weight change; method of choice for losing weight; and the subject's definition of a Calorie. Questions regarding the respondent's family included: mother and father's occupations, places of employment, and years of education.

Perceived Food Preferences

Perceived food preferences of the fatter versus leaner adolescents were investigated using an instrument (Appendix C) which was a modification of the food preference questionnaire developed by Carlisle (1975). The questionnaire of Carlisle (1975), an adaptation of an instrument originated by McConnell (1974), contained 84 randomly listed food items representative of the many types of food used by families in Southern

Appalachia. For the purposes of this study several foods uniquely representative of foodways of rural Southern Appalachia were replaced with foods more representative of those available in urban areas of the same region. The preferences were measured by the frequency a subject would choose the food when available. Response choices included "everytime," "most of the time," "some of the time," "seldom," "never," "have never tasted the food," and "do not know the food."

Sucrose Taste Preferences

The subjects' taste preferences for Kool-Aid solutions sweetened with sucrose at 0.0, 0.5, 1.0, and 2.0 times the manufacturer's (General Foods Corporation) recommended sweetness, corresponding to 0.0 percent, 5.0 percent, 9.5 percent, and 17.4 percent sucrose solutions, respectively. (Table 25, Appendix F), were measured by a five-interval, hedonic-type scale (Grinker et al., 1976) (Appendix C). At the same time subjects were asked to estimate the magnitude of sweetness of each solution on a similar type scale. Directions read to the subjects prior to presentation of the samples can be found in Appendix C (Peryam and Girardot, 1952). Subjects were asked to drink approximately 120 ml (4 oz) of tap water before beginning the testing and requested to drink water between samples.

Ratings were made in the classroom on a Tuesday, Wednesday, or Thursday, 8:45 a.m. to 12:30 p.m. or 1:00 p.m. to 3:30 p.m. For sweet materials Harper (1949) recommended the period from 10:00 to 10:30 a.m. because the satiation of breakfast has passed but the subject is not yet hungry enough to eat rather than taste the samples. Christie (1956)

recommended mid-morning or mid-afternoon for testing. As eating habits affect test results, Larmand (1967) suggested that it was desirable to avoid testing from one hour prior to a meal through two hours past the meal. Attempts were made to schedule testing sessions for the optimal time periods 9:30 to 10:30 a.m. or 2:30 to 3:30 p.m.; however, this was not possible in all schools in that a limited number of classes meeting the sample criteria was available.

Each Kool-Aid solution, coded with three digits selected from a table of random numbers, was presented twice with order of presentation randomly determined (Amerine et al., 1965; Larmand, 1967). Approximately 30 ml (1 oz) of each solution (Berg et al., 1955) was presented at room temperature in a clear plastic cup thus avoiding the imparting of a taste or odor to the sample (Cartwright et al., 1952; Larmand, 1967). The simultaneous presentation of samples, with instructions to taste sequentially from left to right, permitted retasting (Berg et al., 1955). Water at room temperature was provided for drinking between samples to remove all traces of flavor (Larmand, 1967).

Connotative Meanings of Food

The instrument revised for measurement of food connotative meanings was developed originally by Carlisle (1975) who patterned it after the method of Fewster et al. (1973) for measuring the connotative or implied meanings of food using an adaptation of the semantic differential (Osgood et al., 1957; Tannenbaum, 1959; and Miller, 1964). The revised instrument (Appendix C) employed three pairs of polar terms to study perceived Calorie differences associated with 31 of the original 32 food

items used by Carlisle (1975) plus Kool-Aid added for the purposes of this investigation.

Each page of the instrument contained a pair of polar terms separated by a seven-step continuum. "Extremely," "moderately," and "slightly" were qualifiers used in both directions from a central neutral point labeled "both." Blocked spaces were provided to the right of the continuum for subjects who were unable to associate the food with either of the polar terms or who did not know the food. As the purpose was to elicit an emotional response rather than a reasoned response the question at the top of the page read simply, "Do you think of the food listed below as . . ."

Knowledge of Energy Values of Food

The adolescents' knowledge of energy values of foods (Appendix C) was investigated using an adaptation of the instrument prepared by Carlisle (1975) for the study of food connotative meanings. The subject was asked to indicate the energy values of the 32 foods, previously described for the food connotative meanings instrument, using a continuum divided into seven 50-kilocalorie intervals ranging from 0 to 350. Energy values for the purpose of ranking the foods were taken from Adams (1975). Caloric content of foods not listed by Adams (1975) was obtained from commercial packages for two items and from Church and Church (1975) and from Home and Garden Bulletin No. 72 (U.S.D.A., 1971) for nine items.

Knowledge of Energy Values of Activity

The adolescents' knowledge of the energy values of activities, both leisure and daily living, was investigated using a tool developed for this purpose (Appendix C). Items considered to be representative of activities of daily living were selected from lists of office work and domestic tasks for which energy expenditures were determined (Passmore and Durnin, 1955; Durnin and Passmore, 1967). Leisure activities were taken from a list of such activities used by Cunningham et al. (1970) in their study of Tecumseh, Michigan, residents and from a coded list of sports (Montoye et al., 1957). Energy costs for the various activities of leisure and daily living were calculated from the ratios of work metabolism to basal metabolism (WMR/BMR) (Reiff et al., 1967).

The 32 activities selected for inclusion in this knowledge test were ranked according to energy costs (Reiff et al., 1967). The energy range (1.5 to 12 kilocalories) of these activities was divided as equally as possible into five intervals designated by numbers one to five with the higher numbers representing the greater energy requirement. Subjects were asked to rate the randomly ordered activities with regard to energy cost using the five-interval scale.

IV. Pretesting and Implementation of Questionnaires

The food preference, sucrose taste preference, connotative food meaning, and knowledge of food and activity questionnaires were pretested with a seventh-grade class not included in the sample. The questionnaires were pretested for clarity and length of time to administer and revised accordingly. The pretesting session also provided an

opportunity for standardizing procedures for the sensory evaluation of the Kool-Aid solutions.

Subsequently, arrangements were made with each principal and classroom teacher regarding the dates and times for administering the questionnaires and sensory evaluation. The questionnaires and sensory evaluation were administered during single class periods within a two-week period in October, 1976.

V. Analyses of Data

Demographic data, food preferences, sucrose taste preferences, food connotative meanings, and knowledge of energy values of food and activity questionnaires were numerically coded. Numbers were assigned for the occupations of the father and the mother of each subject using the standardized scores for specific occupations derived from national income and educational distributions associated with each occupation (Green, 1970). The numbers assigned for occupation ranged from 22 to 83 with the higher numbers denoting greater socioeconomic status. Green (1970) indicated that the only necessary feature of an index of socioeconomic status was that it ordinally place individuals or families with regard to their social status relative to others in the same community. Therefore numbers in the 20, 30, 40, 50, 60, 70, and 80 occupational categories were assigned to socioeconomic classes one through seven, respectively (Carlisle, 1975). The *t*-test was used to determine if significant differences existed between the races for occupational scores as well as years of education for both mothers and fathers of subjects. The students' scores on the various questionnaires

were not analyzed with regard to socioeconomic status, however, because many of the students did not know the years of education or occupations of one or both parents.

For data analyses with regard to fatness, 204 12- and 13-year-old subjects were divided into two groups with respect to age. Each age group then was subdivided into four groups according to sex/race combinations. On the basis of triceps fatfold (mm) each of these eight subgroups was divided as equally as possible into thirds, the lowest third representing the "lean," the middle third representing the "middle," and the upper third representing the "fat" subjects. For data analyses the total number of "lean" subjects (61) was compared with the total number of "fat" subjects (68). This method for designating leaner versus fatter adolescents was adapted from that of Grinker et al. (1976).

Frequency counts were made for conception of body weight, desire to lose or gain weight, number of pounds desired lost or gained, treatment of choice for losing weight, age of onset of overweight, and definition of a Calorie; moreover, proportions and means were computed as appropriate for race, sex, and body fatness class. The t-test was used to determine if a significant difference existed between means for age of onset of overweight for "fat" and "lean" subjects, males and females, and blacks and whites; the analysis of variance F test with a Newman-Keuls procedure (Champion, 1970) was used to ascertain differences among schools for age of onset of overweight. Chi-square was used to determine if significant differences existed between races, sexes, schools, and between "lean" and "fat" subjects for conception of body weight, desire to lose or gain weight, choice of treatment modality for obesity, and definition of a

Calorie. Statistical analyses of the number of pounds desired lost or gained were omitted as the students' responses were judged unreliable on these two questions.

Perceived Food Preferences

The following code was assigned to the perceived food preference responses: 7 = "do not know the food," 6 = "have never tasted the food," 5 = "everytime," 4 = "most of the time," 3 = "some of the time," 2 = "seldom," 1 = "never." Frequency counts were obtained for all of these responses for the 84 food items on the food preference questionnaire. For the purpose of preferentially ranking the foods, the subjects' preference responses for each food were summed and the food ranked with regard to its respective sum. Therefore the food with the highest score was designated the most preferred food. Preferential rankings were prepared for sexes, races, and fatness classes and for the total sample. The same 84 food items were categorized, as suggested by Weinseir (1976), into six food groups with respect to relative caloric density. Frequency counts were made of the number of foods in each categcry receiving more and less than 50 percent "everytime" and "most of the time" responses in an effort to ascertain if the subjects had a greater preference for higher versus lower Calorie foods. The t-test was used to determine the significance of differences between mean food preference scores for sex, race, and body fatness class ("fat" versus "lean").

Sucrose Taste Preferences

The following code was assigned to the hedonic-type scale for sucrose preference and sweetness magnitude (taste):

	1	2	3	4	5	
like extremely	___:	___:	___:	___:	___	dislike extremely
very sweet	___:	___:	___:	___:	___	not at all sweet

Frequency counts were obtained on all responses to both sweetness preference and sweetness magnitude for each of the four solutions. The t-test was used to determine significance of difference between mean preference scores and between mean taste scores for each solution for sex, race, and body fatness class ("fat" versus "lean").

Connotative Meanings of Food

The following values were assigned to the semantic differential scales for food connotative meanings:

	1	2	3	4	5	6	7		8	9
Low Calorie	___:	___:	___:	___:	___:	___:	___	High Calorie	Neither	Do not know the food

Frequency counts were obtained on all responses for the 32 foods for each of the three polar terms. A t-test was used to determine if significant differences existed between mean scores on each of the 32 foods for body fatness class ("fat" versus "lean"), sex, and race with regard to the three connotative dimensions of food energy value.

Knowledge of Energy Values of Food and Activity

Total correct answer scores were assigned to the knowledge of energy values of food and activity questionnaires for each subject. A t-test was used to determine significance of differences between means scores on each test for sex, race, and body fatness class ("fat" versus "lean").

CHAPTER IV

RESULTS AND DISCUSSION

I. Anthropometry

Height

Height data for the 226 subjects by age, sex, and race are presented in Table 1. The mean heights of 12-year-old white and black females were almost identical, 154.4 cm versus 154.2 cm, respectively; however, the 13-year-old black females were 6.0 cm taller (158.9 cm versus 152.9 cm) than their white counterparts. On the other hand, 12-year-old white males were 4.1 cm taller (154.0 cm versus 149.9 cm) than the black males of the same age; however, the mean heights for the two races at age 13 years were similar, 157.1 cm and 157.8 cm, respectively, for the white and black males. Perhaps additional study with equal representation of the races is warranted.

The 12-year-old males were 1.5 cm shorter than the females (152.9 cm versus 154.4 cm), whereas the 13-year-old males were 2.4 cm taller than the females (157.4 cm versus 155 cm). These reversals in height superiority for the sexes were not surprising in that the adolescent growth spurt in females generally occurs between ages 9 to 11 which is, on the average, 2 years earlier than the more dramatic 2- to 4-year growth spurt occurring in males between ages 12 to 14 (Krogman, 1972).

Height data from the recent HANES, which was "the first program to collect measures of nutritional status for a scientifically designed

Table 1

Height Data (cm) for Seventh-Grade Students

Age (Yr)	Race																Sex							
	White								Black								Male				Female			
	Male				Female				Male				Female											
	n	Mean	S.D.	Median	n	Mean	S.D.	Median	n	Mean	S.D.	Median	n	Mean	S.D.	Median	n	Mean	S.D.	Median	n	Mean	S.D.	Median
11.00-11.99	4	146.1	66.8	148.8	11	151.8	86.8	150.0	1	159.3	--	--	1	154.6	--	--	5	148.8	82.6	149.4	12	152.0	83.1	150.2
12.00-12.99	58	154.0	78.7	152.8	68	154.4	64.2	155.1	16	149.9	67.2	151.2	22	154.2	58.8	154.9	76	152.9	77.8	151.6	90	154.4	62.6	155.1
13.00-13.99	15	157.1	82.6	158.5	9	152.9	57.0	153.7	11	157.8	90.0	162.0	5	158.9	62.5	162.8	26	157.4	84.1	159.7	14	155.0	64.1	154.7
14.00-15.00	--	--	--	--	--	--	--	--	3	160.4	49.8	161.0	--	--	--	--	3	160.4	49.8	161.0	--	--	--	--

sample representative of the U.S., noninstitutionalized population" ages 1 to 74 years (N.C.H.S., 1975), was compared with the present data. In the HANES at ages 12 to 17 years, with the exceptions of ages 12 and 13, the black females were taller than white females; the latter exception at age 13 was not observed in the small sample of the present study. At ages 12 to 17 years the HANES white males were generally taller than black males except at ages 14 and 15 with the greatest difference occurring at age 13. The similar mean heights obtained for 13-year-old white and black males in the present study again probably is reflective of the small sample size for that age group.

In Table 2 mean and median values for height for 12- and 13-year-old subjects in the present study, the HANES (N.C.H.S., 1975), the Ten-State Nutrition Survey (C.D.C., 1972), and the NHES (N.C.H.S., 1973) are compared. Height means and medians for the 12-year-old subjects in the present study were similar to those of HANES with no values deviating by more than 2.5 cm. However, height means in the present study were consistently greater than those reported by the Ten-State Survey for 12-year-old subjects with the greatest difference being for white males. Perhaps these differing results can be attributed to a number of factors including methodology, geographic area, and socioeconomic status (Garn, 1972; Garn and Clark, 1974, 1975).

For the 13-year-old subjects comparison with HANES data was less consistent especially for the white race, perhaps attributable to the small number of 13-year-old subjects in the present study; data comparison for the black race was more favorable with sample sizes being relatively smaller for both studies. Despite the great discrepancy in sample size

Table 2

Height Data (cm) for 12- and 13-Year-Old Adolescents

Group	Age	n				Means				Medians			
		Present	NHES[a]	Ten-State[b]	HANES[c]	Present	NHES	Ten-State	HANES	Present	NHES	Ten-State	HANES
White Males	12	58	--	254	74	154.0	--	146.8	154.4	152.8	--	--	153.2
	13	15	--	246	57	157.1	--	154.5	161.4	158.5	--	--	160.4
White Females	12	68	--	233	50	154.4	--	148.8	154.0	151.1	--	--	152.7
	13	9	--	203	71	152.9	--	154.3	160.3	153.7	--	--	161.2
Black Males	12	16	--	169	27	149.9	--	146.8	151.3	151.2	--	--	153.1
	13	11	--	166	31	157.8	--	152.6	155.4	162.0	--	--	153.5
Black Females	12	22	--	179	33	154.2	--	150.9	153.2	154.9	--	--	152.8
	13	5	--	162	27	158.9	--	154.8	157.9	162.8	--	--	158.1
Males	12	76	643	--	--	152.9	152.3	--	--	151.6	152.5	--	--
	13	26	626	--	--	157.4	159.8	--	--	159.7	159.6	--	--
Females	12	90	547	--	--	154.4	155.2	--	--	155.1	155.4	--	--
	13	14	582	--	--	155.0	158.8	--	--	154.7	158.9	--	--

[a]National Health Examination Survey, 1966-1970 (N.C.H.S., 1973).

[b]Ten-State Nutrition Survey, 1968-1970 (C.D.C., 1972).

[c]Health and Nutrition Examination Survey, 1971-1972 (N.C.H.S., 1975).

of 13-year-old subjects in the present study and in the Ten-State Survey, data were surprisingly similar. Perhaps the 13-year-olds in the present study, who are a year behind in school, were more representative of the socioeconomic strata studied in the Ten-State Survey. The generally more favorable comparison of height data in the present study with that of HANES perhaps reflected somewhat that study's probability sample design permitting estimates to be made for the total population, whereas the Ten-State Survey had more limited objectives concentrating on high risk groups.

Comparison of the present data with NHES data, based on a much larger sample, was limited to sex as race was not considered. Height means and medians were similar for 12-year-old males and females separately. However, both the 13-year-old males and females in the NHES were taller than their counterparts in the present study; again the small sample of 13-year-old subjects in the present study can help explain the discrepancy.

Weight

In Table 3 weight data for the 226 subjects by age, sex, and race are presented. The mean weight of 12-year-old black females (50.1 kg) was slightly greater (1.5 kg) than white females (48.6 kg); moreover, on the average the 13-year-old black females were 6.7 kg heavier than their white counterparts (49.7 kg versus 43.0 kg). On the other hand, the 12-year-old white males were on the average 9.8 kg heavier (49.5 kg versus 39.7 kg) than the black males of the same age. At 13 years of

Table 3

Height Data (kg/lb) for Seventh-Grade Students

Age N=226	Race																								Sex											
	White														black										Male						Female					
	Male								Female						Male						Female															
	n	Mean kg	Mean lb	S.D. kg	S.D. lb	Median kg	Median lb	n	Mean kg	Mean lb	S.D. kg	S.D. lb	Median kg	Median lb	n	Mean kg	Mean lb	S.D. kg	S.D. lb	Median kg	Median lb	n	Mean kg	Mean lb	S.D. kg	S.D. lb	Median kg	Median lb	n	Mean kg	Mean lb	S.D. kg	S.D. lb	Median kg	Median lb	n	Mean kg	Mean lb	S.D. kg	S.D. lb	Median kg	Median lb
11.00-11.99	4	44.3	97.5	11.8	26.0	35.0	77.0	11	41.8	91.9	9.8	21.6	40.4	89.0	1	47.7	105.0	--	--	47.7	105.0	1	43.6	96.0	--	--	43.6	96.0	5	45.0	99.0	10.4	22.8	47.7	105.0	12	41.9	92.2	9.4	20.6	40.7	89.5
12.00-12.99	58	49.5	109.0	14.7	32.4	48.0	105.5	68	48.6	106.9	10.5	23.1	48.8	105.5	16	39.7	87.4	3.6	8.0	38.0	83.5	22	50.1	110.1	9.2	20.2	50.1	110.2	76	47.1	103.7	13.7	30.1	42.3	93.0	90	49.0	107.7	10.2	22.4	48.7	107.2
13.00-13.99	15	47.3	104.1	8.9	19.7	46.4	102.0	9	43.0	94.6	2.8	6.2	42.3	93.0	11	45.7	100.6	8.3	18.2	45.9	101.0	5	49.7	109.4	6.5	14.3	52.3	115.0	26	46.6	102.6	8.6	18.8	46.1	101.5	14	45.4	99.9	5.4	11.8	43.0	94.5
14.00-15.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	66.8	147.0	18.5	40.7	56.8	125.0	--	--	--	--	--	--	--	3	66.8	147.0	18.5	40.7	56.8	125.0	--	--	--	--	--	--	--

age, however, the mean weight of the white males (47.3 kg) was only slightly greater (1.6 kg) than that of the black males (45.7 kg).

The 12-year-old females were on the average 3.6 kg heavier than the males (46.6 kg versus 43.0 kg) whereas the mean weights of the 13-year-old males and females were very similar, although the latter still weighed slightly more (50.0 kg versus 50.5 kg). These data are in keeping with that anticipated as the adolescent weight "spurt" occurs between ages 10 to 14 years in females and between ages 12 to 15 years in males with the females showing again a 2-year precocity in comparison with males (Krogman, 1972).

Weight data from the recent HANES were compared with the present data. In the HANES study, from age 12 through 17 years, white males generally were heavier than black males with the greatest difference occurring at age 13. Although a similar trend was observed in the present data, the difference in mean weights at age 13 years was only slightly greater for the white males. There was no consistent pattern in the weights of white and black females from ages 9 through 17 in HANES; however, at ages 12 and 13 the white females were heavier than the black females, a finding not supported by the present study.

In Table 4 mean and median values for weight for 12- and 13-year-old subjects in the present study, the HANES (N.C.H.S., 1975), the Ten-State Nutrition Survey (C.D.C., 1972), and the NHES (N.C.H.S., 1973) are compared. Weight means and medians for the 12-year-old subjects in the present study consistently were greater than those of HANES with the exception of black males. Just the opposite was true of the 13-year-old subjects as the mean weights of the HANES subjects consistently were

Table 4

Weight Data (kg) for 12- and 13-Year-Old Adolescents

Group	Age	n				Means				Medians			
		Present	NHES[a]	Ten-State[b]	HANES[c]	Present	NHES	Ten-State	HANES	Present	NHES	Ten-State	HANES
White Males	12	58	--	254	74	49.5	--	40.0	45.2	48.0	--	--	43.9
	13	15	--	246	57	47.3	--	45.8	51.8	46.4	--	--	49.8
White Females	12	68	--	231	50	48.6	--	42.0	46.2	48.0	--	--	44.9
	13	9	--	203	71	43.0	--	47.7	53.4	42.3	--	--	50.6
Black Males	12	16	--	153	27	39.7	--	38.7	41.9	38.0	--	--	41.3
	13	11	--	143	31	45.7	--	43.3	44.7	45.9	--	--	42.3
Black Females	12	22	--	148	33	50.1	--	42.4	43.3	50.1	--	--	41.5
	13	5	--	138	27	49.7	--	47.4	52.3	52.3	--	--	50.6
Males	12	76	643	--	--	47.1	43.0	--	--	42.3	41.6	--	--
	13	26	626	--	--	46.6	50.0	--	--	46.1	48.3	--	--
Females	12	90	547	--	--	49.0	46.6	--	--	48.7	45.4	--	--
	13	14	582	--	--	45.4	50.5	--	--	43.0	48.8	--	--

[a]National Health Examination Survey, 1966-1970 (N.C.H.S., 1973).

[b]Ten-State Nutrition Survey, 1968-1970 (C.D.C., 1972).

[c]Health and Nutrition Examination Survey, 1971-1972 (N.C.H.S., 1975).

greater than those of the present study with black males again being the exception.

Weight means for both age groups in the present study consistently were greater than those reported by the Ten-State Survey with the exception of 13-year-old white females. Comparison of the present data with NHES again was limited to sex as race was not considered. Consistently, the mean and median weights of the 12-year-old subjects in the present study and the 13-year-old subjects in the NHES were greater than those of their counterparts for both sexes. In both the present study and the NHES the 12-year-old females weighed more than the males of the same age; however, this trend did not hold consistently with the 13-year-old females who weighed only 0.5 kg more than the males in the NHES and 1.2 kg less than males in the present study.

The generally greater mean weight of the 12-year-old subjects in the present study perhaps was indicative of these subjects' possible higher socioeconomic status in relation to subjects from the comparative studies which intentionally had a great proportion of low-income subjects. The small sample of 13-year-old subjects in the present study was insufficient for a realistic comparison.

Triceps Fatfolds

Triceps fatfold data for the subjects by age, sex, and race are presented in Table 5. The medians were used for analysis of fatfold data although means and standard deviations also are presented in the table. The median is recommended as the best measure of central tendency because of the potential for marked skewness of fatfold distributions

Table 5

Triceps Fatfold Thickness (mm) for Seventh-Grade Students

Age (Yr)	Race																Sex							
	White								Black								Male				Female			
	Male				Female				Male				Female											
	n	Mean	S.D.	Median	n	Mean	S.D.	Median	n	Mean	S.D.	Median	n	Mean	S.D.	Median	n	Mean	S.D.	Median	n	Mean	S.D.	Median
11.00-11.99	4	19.2	5.1	17.0	11	16.4	4.9	15.0	1	9.0	--	9.0	1	14.0	--	14.0	5	17.2	6.4	16.0	12	16.2	4.7	14.5
12.00-12.99	58	16.5	7.6	14.5	68	19.5	6.8	18.6	16	9.7	2.3	9.8	22	18.7	9.2	16.5	76	15.0	7.3	12.3	90	19.3	7.4	18.5
13.00-13.99	15	15.0	5.5	12.4	9	13.3	4.0	12.0	11	8.9	3.5	9.6	5	15.4	4.0	17.0	26	12.4	5.6	11.0	14	14.1	4.0	14.0
14.00-15.00	--	--	--	--	--	--	--	--	3	19.7	10.1	25.0	--	--	--	--	3	19.7	10.1	25.0	--	--	--	--

(N.C.H.S., 1972, 1974, 1975). The median triceps fatfolds of the white subjects were greater than those of black subjects for both sexes and age groups with the exception of the extremely small sample of 13-year-old black females. Median triceps fatfolds for females exceeded those for males. Similar race and sex differences for the triceps fatfold were reported by Malina (1966), Robson et al. (1971), N.C.H.S. (1974, 1975), and C.D.C. (1972).

In Table 6 medians and means for triceps fatfolds for 12- and 13-year-old subjects in the present study, the HANES (N.C.H.S., 1975), the Ten-State Survey (C.D.C., 1972), and the NHES (N.C.H.S., 1974) are compared. Triceps fatfold medians for both the 12- and 13-year-old subjects in the present study consistently were greater than those for the HANES and NHES subjects with the exception of the 13-year-old white females. As medians are not available for the Ten-State Survey fatfold data, means are compared. Triceps fatfold means in the present study exceeded those for the Ten-State Survey except for 12- and 13-year-old black males and 13-year-old white females. In general, fatfolds for the present study were greater than those reported by HANES, the Ten-State Survey, and the NHES. Perhaps these differences can be attributed to a number of factors including possible differences of measurement inherent in both the fatfold instruments and in the techniques. Garn and Clark (1974, 1975) suggested that fatfold thickness was positively associated with socioeconomic status; however, socioeconomic data for the present study was insufficient to support such an association. Moreover, the comparative studies included subjects from diverse geographical areas.

Table 6

Triceps Fatfold Data (mm) for 12- and 13-Year-Old Adolescents

Group	Age	n				Means				Medians			
		Present	NHES[a]	Ten-State[b]	HANES[c]	Present	NHES	Ten-State	HANES	Present	NHES	Ten-State	HANES
White Males	12	58	540	252	74	16.5	11.0	12.4	11.6	14.5	9.7	--	10.8
	13	15	542	245	57	15.0	10.8	11.7	11.9	12.4	9.4	--	10.4
White Females	12	68	455	229	50	19.5	13.0	14.2	14.9	18.6	12.0	--	15.1
	13	9	490	202	71	13.3	13.8	15.3	16.7	12.0	12.7	--	15.7
Black Males	12	16	101	172	27	9.7	8.7	10.2	8.7	9.8	7.4	--	7.6
	13	11	80	164	31	8.9	8.5	10.5	8.4	9.6	7.2	--	7.6
Black Females	12	22	88	177	33	18.7	12.2	13.1	14.5	16.5	10.6	--	14.8
	13	5	91	161	27	15.4	12.0	14.1	16.0	17.0	9.8	--	15.7

[a]National Health Examination Survey, 1966-1970 (N.C.H.S., 1974).

[b]Ten-State Nutrition Survey, 1968-1970 (C.D.C., 1972).

[c]Health and Nutrition Examination Survey, 1971-1972 (N.C.H.S., 1975).

Garn and Clark (1974, 1975), who conducted in-depth analyses of the Ten-State Nutrition Survey data, concluded that generally within each racial and ethnic group the poor people were leaner and the median-income people were fatter. With a few early exceptions this generalization held for males at all ages and for females through early adolescence after which time the trend reversed itself.

The prevalence of obesity, as measured by triceps fatfold thicknesses compared with Seltzer and Mayer's (1965) table of obesity standards, was relatively high, 27 percent, for the population sample. Whites had a greater percentage of obesity than blacks (32 percent versus 15 percent) and males a greater prevalence of obesity than females (30 percent versus 25 percent). The percentage of obesity for each of the four sex/race groups in descending order were white males (39 percent), white and black females (25 percent), and black males (6 percent).

Comparison of percent obese by age, sex, and race with data of the Ten-State Nutrition Survey (C.D.C., 1972) revealed a higher prevalence of obesity in the present study for the following groups: 12-year-old white males (35.9 versus 18.3 percent), 13-year-old white males (46.7 versus 15.9 percent), 12-year-old white females (29.4 versus 10.0 percent), and 12-year-old black females (31.8 versus 9.0 percent). The prevalence of obesity in the present study was 0.0 percent for 12- and 13-year-old black males and 13-year-old white and black females whereas the corresponding percent obese in the Ten-State Nutrition Survey (C.D.C., 1972) were 9.3, 9.8, 14.9, and 13.0, respectively.

II. Demography

Parental Education

Parents of most of the subjects in the present study had a high school education with the fathers being somewhat better educated than the mothers. The mean years of education for the population sample was 13.3 years ± 2.9 for fathers and 12.6 years ± 2.5 for mothers (Table 18, Appendix D). The formal education for fathers ranged from 7.0 years to 20.0 years, whereas the mothers' formal education ranged from 2.0 years to 20.0 years. A *t*-test performed on the mean years of education for whites and blacks determined that the fathers were similarly educated but that the mean years of education for the mothers (12.8 years for whites versus 11.7 years for blacks) were significantly different ($p < 0.05$).

Parental Occupation

The occupations of most parents, with the exception of black mothers, fell into occupational categories 3 and 4 of 7 possible categories. The mean occupation score for fathers was 3.9 ± 1.0 and for mothers 3.6 ± 1.1 (Table 19, Appendix D). A *t*-test performed on the mean occupational scores of white fathers (4.0) and black fathers (3.5) determined that the races were significantly different ($p < 0.05$). Likewise, a *t*-test performed on the mean occupational scores of white and black mothers (4.0 and 2.3, respectively) indicated a significant difference ($p < 0.001$) between races.

Self-Perception of Body Weight

Relative frequencies for the subjects' expressed overweight concept and desires to gain or lose weight by total sample, race, sex, school, and body fatness class are provided in Table 7. Approximately one-third (32.7 percent) of the subjects indicated via questionnaire that they considered themselves overweight. Nearly one-half (47.3 percent) of the subjects expressed a desire to lose weight, whereas a little less than one-third (30.1 percent) of the subjects wished to gain weight.

In order to determine if the percentages of subjects expressing an overweight concept and/or a desire to lose or gain weight were significantly different for the races, sexes, schools, or body fatness classes, Chi-square values were computed. As may be seen in Table 8, several significant differences existed. The percentage of subjects expressing an overweight concept was significantly different ($p < 0.01$) for females (40.5 percent) and for males (24.5 percent) as well as for "fatter" (61.8 percent) and for "leaner" (14.8 percent) and "middle" (18.7 percent) subjects ($p < 0.001$).

The percentage of females (61.2 percent) expressing a desire to lose weight was significantly different ($p < 0.001$) from males (32.7 percent) as was the percentage of "fatter" (76.5 percent), "middle" (40.0 percent), and "leaner" (23.0 percent) adolescents ($p < 0.001$). The percentage of subjects expressing a desire to gain weight was significantly different ($p < 0.01$) for blacks (44.1 percent) and for whites (24.8 percent), for males (45.5 percent) and for females (15.5 percent) ($p < 0.001$), and for "leaner" (50.8 percent), "middle" (33.3 percent), and "fatter" (10.3 percent) adolescents ($p < 0.001$). In other words, the female and the

Table 7

Concept of Body Weight for Seventh-Grade Students (Percent)

Expression of:	Total Sample N=226	Race		Sex		School					Body Fatness Class		
		White n=165	Black n=59	Male n=110	Female n=116	I n=30	II n=28	III n=60	IV n=51	V n=57	"Lean" n=61	"Middle" n=75	"Fat" n=68
Overweight concept	32.7	34.5	28.8	24.5	40.5	36.7	28.6	43.3	29.4	24.6	14.8	18.7	61.8
Desire to lose	47.3	50.3	39.0	32.7	61.2	56.7	35.7	55.0	39.2	47.4	23.0	40.0	76.5
Desire to gain	30.1	24.8	44.1	45.5	15.5	20.0	39.3	23.3	43.1	26.3	50.8	33.3	10.3

Table 8

Chi-Square Values for Concept of Body Weight for Seventh-Grade Students

	Race		Sex		School		Body Fatness Class	
Expression of:	χ^2	d.f.	χ^2	d.f.	χ^2	d.f.	χ^2	d.f.
Overweight concept	1.07	2	6.31**	1	5.15	4	42.96***	2
Desire to lose	3.06	2	17.59***	1	5.68	4	38.40***	2
Desire to gain	9.11**	2	21.65***	1	7.67	4	26.55***	2

**Significantly different ($p < 0.01$)

***Significantly different ($p < 0.001$).

"fatter" adolescents more often wanted to lose weight whereas the black, male, and "leaner" adolescents more often wanted to gain weight. It is not known, however, which components of body weight (muscle, bone or fat) the students were desirous of increasing. Moreover, as the students did not reliably report the number of pounds desired lost and gained, that data are not given.

In Carlisle's (1975) study of teenagers in central Alabama, 54 percent of the girls and 16 percent of the boys expressed a desire to lose weight, whereas 57 percent of the boys and 28 percent of the girls wished to gain weight. Several other studies support the findings that girls usually are displeased with their body weight and shape and wish to lose weight (Wakefield and Miller, 1971), whereas boys generally want to gain weight or build up their bodies (Huenemann et al., 1966; Dwyer et al., 1967,1969; Dwyer and Mayer, 1971).

In Table 20 (Appendix D) data on the subjects' ages at time of self-perception as overweight are presented for the population sample, races, sexes, and body fatness classes. The mean age at which the 71 self-described overweight subjects perceived themselves as such was 9.7 ± 2.1 yr. The ages designated for onset of overweight by these adolescents ranged from 1 to 12 years with a mode of 10 years. Seventy percent of all the self-declared overweight reported onset after age 9 years. Of the self-described overweight 68 and 86 percent of whites and blacks, respectively, 64 and 74 percent of males and females, respectively, and two-thirds of the "fat" subjects reported their onset of overweight as after age 9 years.

A t-test performed on the mean ages for onset of overweight of whites (9.5 ± 2.2 yr) and of blacks (10.6 ± 1.2 yr) determined that the races were different ($p < 0.05$) for this population. The t-test also determined that mean ages for onset of overweight were similar for the sexes and for the "fat" and "lean" adolescents. Likewise, an analysis of variance performed on mean ages for onset of overweight for the five different schools (Table 21, Appendix D) indicated no significant differences.

Treatment of Choice for Obesity

As seen in Table 9 a regimen of both exercise and diet was the treatment of choice for over three-fourths (77.3 percent) of the adolescents, whereas exercise alone was preferred by 17.6 percent and diet alone by 5.1 percent of the subjects. For both races and sexes and for all five schools and all three classes of body fatness, the greatest percentage of subjects chose the treatment combination of diet and exercise; exercise alone was chosen more frequently than diet alone.

In order to determine if the subjects selecting a particular treatment modality were significantly different for races, sexes, schools, or body fatness classes, chi-square values were computed. As noted in Table 9 no significant differences existed for races, schools, or fatness; however, the sexes were significantly different ($p < 0.05$).

Definition of "Calorie"

The 98 different definitions for Calorie which were recorded for the 211 respondents were collapsed into the following six categories: weight/fat, energy-related, nutrition/health, scientifically correct, food, and

Table 9

Seventh-Grade Students' (Percent) Choice of Treatment Method

Treatment Modality	Total Sample N=216	Race[a]		Sex[b]		School[c]					Body Fatness Class[d]		
		White n=159	Black n=56	Male n=102	Female n=114	I n=30	II n=28	III n=58	IV n=49	V n=51	"Lean" n=61	"Middle" n=75	"Fat" n=68
Diet	5.1	3.8	8.9	4.9	5.3	3.3	0.0	0.0	10.2	9.8	5.0	2.9	7.5
Exercise	17.6	17.6	16.1	24.5	11.4	20.0	14.3	20.7	12.2	19.6	15.0	23.5	14.9
Both	77.3	78.6	75.0	70.6	83.3	76.7	85.7	79.3	77.6	70.6	80.0	73.5	77.6

[a]Chi-square value of 2.28 with 2 degrees of freedom, not significant.

[b]Chi-square value of 6.40 with 2 degrees of freedom, significantly different ($p < 0.05$).

[c]Chi-square value of 11.39 with 8 degrees of freedom, not significant.

[d]Chi-square value of 3.34 with 4 degrees of freedom, not significant.

miscellaneous. Few of the adolescents were able to give a scientifically correct definition for Calorie. As seen in Table 10 most of the subjects (55.3 percent) defined Calorie in terms of weight and/or fat. Percentages of subjects' definitions for Calorie falling into the other five categories in descending order were: food (12.4); nutrition/health (11.5); energy related (6.2); scientifically correct (5.3); and miscellaneous (2.7). No responses were recorded on 6.6 percent of the subjects.

Other investigations supported the poor understanding of the term "Calorie." Bass (1972), in a study of food intakes among 94 women on the Standing Rock Reservation in North and South Dakota, found that only 20 percent could correctly identify a Calorie, whereas 51 percent believed it was "something in food that made one fat." In a study of 185 high school students in Knoxville, Tennessee, Wodarski (1976) showed that among the most commonly held food and nutrition misconceptions was "Calorie is a substance found in food which causes weight gain"; this misconception was subscribed to by 53 percent of all respondents.

Scientifically correct answers more often were given by the white (6.7 percent) than the black (0.0 percent) subjects and by the males (8.2 percent) than the females (2.6 percent). With regard to schools, none of the adolescents at Schools II and IV provided scientifically correct answers. The highest percentage of correct answers (12.3 percent) were written by students from School V, the school with the highest mean years of parental education and highest fraternal occupational scores.

Table 10

Seventh-Grade Students' (Percent) Definition of "Calorie"

Definition	Total Sample N=226	Race[a]		Sex[b]		School[c]					Body Fatness Class[d]		
		White n=165	Black n=59	Male n=110	Female n=116	I n=30	II n=28	III n=60	IV n=51	V n=57	"Lean" n=61	"Middle" n=75	"Fat" n=68
Weight/fat	55.3	53.9	61.0	52.7	57.8	46.7	78.6	48.3	66.7	45.6	63.9	50.7	50.0
Energy-related	6.2	7.3	3.4	4.5	7.8	10.0	0.0	8.3	3.9	7.0	8.2	5.3	5.9
Nutrition/health	11.5	11.5	11.9	11.8	11.2	16.7	7.1	13.3	9.8	10.5	11.5	9.3	14.7
Scientifically correct	5.3	6.7	0.0	8.2	2.6	3.3	0.0	6.7	0.0	12.3	4.9	4.0	5.9
Food	12.4	13.3	8.5	10.9	13.8	16.7	10.7	13.3	2.0	19.3	6.6	18.7	11.8
Miscellaneous	2.7	3.6	0.0	1.8	3.4	3.3	3.6	6.7	0.0	0.0	0.0	2.7	4.4
No response	6.6	3.6	15.3	10.0	3.4	3.3	0.0	3.3	17.6	5.3	4.9	9.3	7.4

[a]Chi-square value of 34.71 with 12 degrees of freedom, significantly different ($p < 0.001$).

[b]Chi-square value of 9.14 with 6 degrees of freedom, not significant.

[c]Chi-square value of 47.23 with 24 degrees of freedom, significantly different ($p < 0.01$).

[d]Chi-square value of 9.46 with 10 degrees of freedom, not significant.

In order to determine if the subjects' definitions for Calories by categories were significantly different for the races, sexes, schools, or body fatness classes, chi-square values were computed. As can be noted in Table 10 no significant differences existed for sex or fatness. However, the races were significantly different ($p < 0.001$) as were the schools ($p < 0.01$).

III. Perceived Food Preferences

The frequencies of choice for 84 foods are given in Table 22, Appendix E. The 10 foods receiving the highest and lowest total preference scores derived by summing the responses (1 to 5) of students for the total sample and each race, sex, and body fatness class are shown in Table 11. Thirty-three foods are included here, 17 as high preference foods and 16 as low preference foods. Hamburgers, pork chops, bacon, rolls, and fresh apples consistently appeared among the 10 high preference foods for both races and sexes and for the three body fatness classes. Likewise, there were five foods, buttermilk, English peas, carrot-raisin salad, yellow squash, and cauliflower, which consistently were among the 10 low preference foods for sexes, races, and body fatness classes. It is interesting that the consistently preferred foods included two meats, one fat, one bread, one fruit, and no vegetables whereas the consistently low preference foods included one dairy food and four vegetables. French fried potatoes were the only vegetable making any high preference list. Only four fruits, fresh oranges, apples, strawberries, and orange juice, made the high preference lists.

Table 11

Foods Receiving Highest and Lowest Total Preference Scores[a] by Seventh-Grade Students

Total Sample	Race		Sex		Body Fatness Class		
	White	Black	Male	Female	"Lean"	"Middle"	"Fat"
			High Preference Foods[b]				
Pizza	Pizza	†Fresh apples	Steak	Pizza	†Hamburger	†Rolls	Pizza
†Hamburger	Steak	Milk	†Hamburger	†Hamburger	French fried potatoes	Fresh oranges	†Hamburger
Steak	†Hamburger	†Hamburger	†Pork chops	French fried potatoes	Steak	Spaghetti	†Pork chops
†Rolls	†Pork chops	Chicken/dressing	Pizza	†Rolls	Pizza	†Pork chops	Steak
†Pork chops	Spaghetti	Fried chicken	Hot chocolate	Spaghetti	†Bacon	Steak	Spaghetti
†Bacon	†Rolls	†Rolls	†Bacon	†Bacon	†Fresh apples	†Fresh apples	Soda pop
Spaghetti	†Bacon	Orange juice	†Rolls	†Pork chops	†Rolls	†Bacon	†Rolls
French fried potatoes	French fried potatoes	†Bacon	†Fresh apples	Steak	Fresh oranges	Pizza	†Fresh apples
†Fresh apples	Fresh oranges	Soda pop	Spaghetti	Fresh strawberries	Milk	†Hamburger	French fried potatoes
Fresh oranges	†Fresh apples	†Pork chops	Fresh oranges	†Fresh apples	†Pork chops	Milk	†Bacon
			Low Preference Foods[c]				
†English peas	Collards	†Yellow squash	Collards	†English Peas	†English peas	†English peas	Neck bones
Collards	Neck bones	†Cauliflower	†English peas	Neck bones	Collards	†Buttermilk	Collards
†Buttermilk	†English peas	†English peas	†Cauliflower	Collards	†Carrot-raisin salad	Neck bones	†English peas
Neck bones	†Buttermilk	†Buttermilk	†Buttermilk	†Buttermilk	†Yellow squash	Collards	†Carrot-raisin salad
†Yellow squash	†Carrot-raisin salad	Hominy	†Yellow squash	†Carrot-raisin salad	†Cauliflower	†Yellow squash	†Yellow squash
†Carrot-raisin salad	†Yellow squash	Black-eyed peas	Neck bones	†Yellow squash	†Buttermilk	†Cauliflower	†Cauliflower
†Cauliflower	†Cauliflower	†Carrot-raisin salad	†Carrot-raisin salad	†Cauliflower	Neck bones	Coffee	†Buttermilk
Hominy	Liver	Cottage cheese	Hominy	Coffee	Hominy	†Carrot-raisin salad	Hominy
Liver	Turnip greens	Cooked carrots	Cabbage slaw	Butter beans	Cabbage slaw	Hominy	Liver
Coffee	Coffee	Butter beans	Black-eyed peas	Liver	Coffee	Black-eyed peas	Cabbage slaw

[a]Scores derived by summing responses (1-5) for each food with higher sums denoting greater preference.

[b]In descending order of greatest preference.

[c]In descending order of least preference.

†Foods consistently preferred or disliked by all races, sexes, and body fatness classes.

The combined ranked frequencies of "everytime" and "most of the time" choices as well as "seldom" and "never" choices, respectively, by 50 percent or more of the students are shown in Table 12. There are 32 foods included here, 38 percent of all foods in the preference list. Hamburgers, pizza, and steak were chosen "everytime" or "most of the time" by at least 70 percent of the students. Rolls, French fried potatoes, and chicken were the three most preferred foods in studies of high school students by McConnell (1974) in Hancock County, Tennessee, and by Carlisle (1975) in Shelby County, Alabama, whereas rolls, hamburgers and fresh fruit were the favorite foods in the study by Garton and Bass (1974).

Rolls were the favorite bread chosen 68.6 percent of the time compared to biscuits and cornbread chosen 56.2 and 52.2 percent of the time, respectively. The hierarchy of bread choices was the same as that reported by Carlisle (1975). Rolls were the most preferred food and consequently the most preferred bread in a study of 12- to 20-year-old students from Tennessee School for the Deaf, Knoxville, Tennessee (Garton and Bass, 1974).

A number of meat entrees were given high preference ratings by 50 percent or more of the students. Most preferred was the ever popular hamburger (71.7) followed closely by the pizza (71.2). Other meats in order of preference were steak, pork chops, fried chicken, chicken and dressing, chicken and dumplings, turkey, and sausage. Carlisle (1975) reported fried chicken and the hamburger to be the favorite meats of teenagers followed by preferences similar to those found in the present study. Hamburgers also were favorite foods in studies by Zunich and

Table 12

Foods Chosen by More Than 50 Percent of Seventh-Grade Students as the Most[a] and Least[b] Preferred Foods

Food Item	Percent	Food Item	Percent
	Most Preferred Foods		
Hamburger	71.7	Chicken and dressing	60.2
Pizza	71.2	Chocolate cake	60.2
Steak	70.4	Watermelon	60.2
Spaghetti	69.9	Mashed potatoes	59.8
Fresh apples	69.1	Chocolate ice cream	59.3
Rolls	68.6	Apple pie	58.0
Milk	68.6	Biscuits	56.2
Pork chops	67.3	Chicken and dumplings	55.8
Fried chicken	66.4	Turkey	54.0
French fried potatoes	66.4	Kool-Aid	53.1
Bacon	66.3	Sausage	52.6
Fresh oranges	65.5	Cornbread	52.2
Hot chocolate	64.2	Scrambled eggs	52.2
Corn	64.2	Iced tea	51.3
Soda pop	62.4	Chili	50.8
Fresh strawberries	62.0	Vanilla ice cream	50.4
	Least Preferred Foods		
Buttermilk	72.5	Cabbage slaw	59.8
Black-eyed peas	68.2	Yellow squash	59.7
Cooked carrots	66.4	Butter beans	56.6
Liver	65.5	Cottage cheese	52.7
Coffee	65.4	Cauliflower	52.2
Turnip greens	60.2	Broccoli	50.9

[a]Based on combined frequencies of "everytime" and "most of the time."

[b]Based on combined frequencies of "seldom" and "never."

Fults (1969) and Garton and Bass (1974). Liver was the only meat to be chosen "seldomly" or "never" by over 50 percent (65.4 percent) of the students. Several studies have reported a dislike among subjects for liver (Leverton and Coggs, 1951; Schorr et al., 1972; Carlisle, 1975).

Of the 15 nonstarchy vegetables and seven starchy vegetables in the preference list, none of the former were chosen "everytime" or "most of the time" by 50 percent or more of the students and only three of the latter, French fried potatoes (66.4 percent), corn (64.2 percent), and mashed potatoes (59.8 percent), were so chosen. Mashed potatoes, French fried potatoes, and corn were reported as preferred foods in several studies (Law et al., 1972; Garton and Bass, 1974; McConnell, 1974; Carlisle, 1975). Eight vegetables (black-eyed peas, cooked carrots, turnip greens, cabbage slaw, yellow squash, butter beans, cauliflower, and broccoli) were chosen "seldomly" or "never" by 50 percent or more of the students.

Several other investigations also found low preferences for vegetables. Carlisle (1975) reported low preference for turnip greens, black-eyed peas, and butter beans among high school students. Zunich and Fults (1969) reported cooked and raw vegetables among the most disliked foods in a population of sixth graders from lower socioeconomic backgrounds. McConnell (1974) found vegetables as a whole to be the least preferred food group among teenagers also from lower socioeconomic backgrounds. Deaf students in the study by Garton and Bass (1974) preferred meats, fruits, and desserts over vegetables.

Five of the 10 fruits on the preference list were favorites of 50 percent or more of the students. These fruits in order of preference

were fresh apples, fresh oranges, fresh strawberries, watermelon, and fresh peaches. These preferred fruits also were favorites of teenagers in preference studies by Leverton and Coggs (1951), Zunich and Fults (1969), McConnell (1974), and Carlisle (1975).

Milk, hot chocolate, soda pop, Kool-Aid, and iced tea were the favorite beverages with "everytime" and "most of the time" responses of 68.6, 64.2, 62.4, 53.1, and 51.3 percent, respectively. Einstein and Hornstein (1970) reported iced tea as the preferred beverage of college students in the South. Carlisle (1975) found iced tea, soda pop, milk, and hot chocolate, in that order, were the favorite beverages of high school students in Alabama. Studies by Kennedy (1952), Schuck (1961), Schorr et al. (1972), and McConnell (1974) cited milk or soda pop as the preferred beverage of teenagers.

Two beverages, buttermilk and coffee, were chosen "seldomly" or "never" by 72.5 and 65.5 percent of the students, respectively, establishing these two beverages as the first and fifth least preferred foods of the 84. In the study by McConnell (1974) coffee was preferred 39.2 percent of the time, whereas in the present study the beverage was preferred only 15.9 percent of the time. Several studies reported a strong dislike for two dairy products, buttermilk and cottage cheese (Leverton and Coggs, 1951; Kennedy, 1952; Schuck, 1961; McConnell, 1974; Carlisle, 1975). In the present study cottage cheese was chosen "seldomly" or "never" by over half (52.7 percent) of the students.

From the nine desserts on the preference list chocolate cake was chosen 60.2 percent of the time. Chocolate ice cream, apple pie, vanilla ice cream, and chocolate pie were preferred 59.3, 58.0, 50.4, and 50.0

percent of the time, respectively. Carlisle (1975) also found apple pie, chocolate cake, and chocolate ice cream to be high preference foods. The desserts preferred by teenagers in the study by McConnell (1974) included strawberry, vanilla, and chocolate ice creams and chocolate cake.

The means, standard deviations, and modes of respondents' food preference scores for the total sample and by race and sex are presented in Table 23 (Appendix E). The races differed significantly in their preferences for 26 of the 84 foods. According to a table of binomial expansion, however, approximately 5 of these 84 foods could be anticipated to differ significantly at the 5 percent significance level and one at the 1 percent significance level on the basis of chance alone (Beyer, 1968).

The blacks preferred a greater variety of foods than did the whites, a finding also reported by Carlisle (1975). Those foods preferred more by the blacks than the whites in this study included orange juice, cabbage slaw, iced tea, balogna, buttermilk, carrot-raisin salad ($p < 0.05$); rice, corn flakes, coffee, liver, potato salad ($p < 0.01$); applesauce, hot tea, grits, sweet potatoes, turnip greens, collards, spinach, and neck bones ($p < 0.001$). The following foods were more often preferred by the whites than the blacks: turkey, okra, chicken and dumplings, spaghetti ($p < 0.05$); pizza ($p < 0.01$); steak and chocolate pie ($p < 0.001$).

Except for okra the foods traditionally associated with the South or blacks such as buttermilk, grits, turnip greens, collards, sweet potatoes, and neck bones (Cussler and deGive, 1952; Jerome, 1969; Pangborn and Bruhn, 1971) were more often preferred by blacks than

whites in the present study. Similar findings with regard to racial preferences for grits, turnip greens, collards, and okra were reported by Carlisle (1975). Several foods traditionally associated with the South, buttermilk, black-eyed peas, turnip greens, and butter beans (Cussler and deGive, 1952; Jerome, 1969; Pangborn and Bruhn, 1971), were among those foods least preferred by the total sample of seventh graders. Carlisle (1975) also found several traditional foods of the South to be low in preference for the total sample of Alabama high school students.

As seen in Table 23 (Appendix E) males and females differed significantly in their preferences for 20 of the 84 foods with the males having the greater preference for all 20 foods. As previously indicated, approximately five of these differences could be anticipated at the 5 percent significance level and one at the 1 percent significance level on the basis of chance alone (Beyer, 1968).

Those foods preferred more by males than females included hot dogs, applesauce, jello, cooked carrots, steak, yellow squash, spinach, scrambled eggs, neck bones, hot chocolate, apple pie ($p < 0.05$); butter beans, rice, corn flakes, strawberry ice cream, coffee, oatmeal, vanilla ice cream, English peas ($p < 0.01$); and baked beans ($p < 0.001$). Carlisle (1975) also reported males to prefer a greater variety of foods than females; however, the males in her study did not have greater preferences for all foods which were significantly different as was the case in the present study.

Table 13 presents the number of foods categorized with regard to relative caloric density which received more or less than 50 percent

Table 13

Foods by Relative Caloric Density Receiving More and Less Than 50 Percent "Everytime" and "Most of the Time" Responses for Seventh-Grade Students

Categories[a]	Number of Foods in Category	50-100%	0-49%
		Number of Foods	
Fats	1	1[b]	0
Sweets	9	5	4
Meats/Eggs/Cheese	18	10	8
Starches[c]	20	8	12
Fruits	10	5	5
Vegetables	15	0	15

[a]Categories of foods, adapted from Weinser (1976), are listed in descending order of relative caloric density.

[b]Underlining denotes the higher number of foods in each category.

[c]Includes starchy vegetables.

"everytime" and "most of the time" responses. As seen here, of the 28 foods in the three categories of highest caloric density (fats, sweets, and meats/eggs/cheese) 16 foods or 57 percent received more than 50 percent "everytime" and "most of the time" responses whereas 12 foods, representing 43 percent of all foods, received less than 50 percent of these high preference responses. On the other hand, of the 45 foods in the three categories of lower caloric density (starches, fruits, and vegetables) only 13 foods (29 percent) received more than 50 percent "everytime" and "most of the time" responses; 32 foods (71 percent), including all of the nonstarchy vegetables, were chosen less than 50 percent of the time. These findings seem to suggest that students in the present study had a greater preference for foods of higher versus lower caloric density with vegetables being the least preferred food group.

Means, standard deviations, and modes of respondents' food preference scores by body fatness class are shown in Table 24, Appendix E. The "lean" and "fat" students as identified by triceps fatfolds differed significantly in their preferences for only 5 of the 84 foods. All five of the foods were preferred more by the "lean" than the "fat" subjects and included bananas, cantaloupe, hominy, Tang, and neck bones ($p < 0.05$). All of these foods with the exception of neck bones were among the foods of relatively lower caloric density (Weinseir, 1976). According to a table of binomial expansion, however, this number of foods could be anticipated to differ significantly at the 5 percent significance level on the basis of chance alone (Beyer, 1968).

As shown in Table 11 (p. 62) the relative caloric densities of the 10 high preference and 10 low preference foods (determined by ranking the sums of the total responses for each food) were similar for the "lean" and "fat" subjects. High preference foods for both the "lean" and "fat" students included four foods from the meat group, one food from the fat group, and no foods from the sweet and vegetable groups. Low preference foods for both groups included six foods from the meat group and no foods from the fat, sweet, or fruit groups. As seen in Figures 1 and 2, mean preference scores for the consistently most preferred and least preferred foods were similar for all three body fatness classes. Comparison of mean preference scores for the nine desserts indicated that the "lean" had a slightly higher preference than the "fat" for eight of the sweet foods and identical preference scores for the ninth one.

Weinseir (1976) observed that leaner population groups emphasize vegetables, fruits, and starches in their diets whereas fatter population groups emphasize meats, sweets, and fats; therefore, more significant differences in food preferences of the "lean" and "fat" subjects were anticipated. Findings from the present study, however, seem to indicate that for seventh-grade students there are greater differences in food preferences between sexes and between races than between relative leanness and fatness.

VI. Sucrose Taste Preferences

The reliability coefficients for the duplicate samples of the four Kool-Aid solutions, varying in sucrose concentration, were 0.68 for

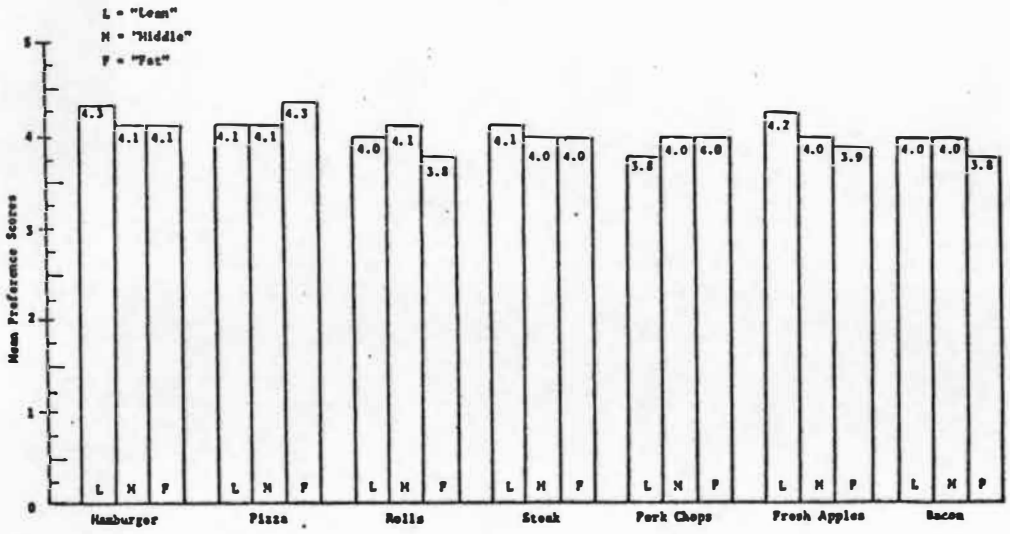


Figure 1. Mean preference scores for most preferred foods by body fatness classes.

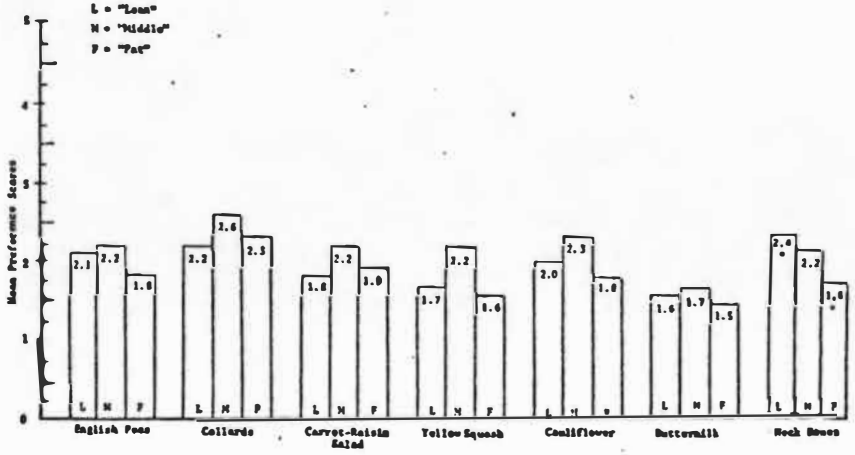


Figure 2. Mean preference scores for least preferred foods by body fatness classes.

*Significantly different ($p < 0.05$) by t-test).

preference and 0.69 for taste. Although perhaps minimally adequate for other population groups, this reliability was considered surprisingly high for a group of seventh-grade students encountering their first experience with sensory testing.

Means, standard deviations, and modes of respondents' scores for preference and taste of Kool-Aid solutions by total sample, race, sex, and body fatness class are presented in Table 14. Across the board the order of preference for the four solutions was directly related to sucrose concentration with the sweetest solution (2.0 times the recommended amount of sucrose) being the most preferred and the solution with no sucrose being the least preferred. Mean taste scores substantiated the students' ability to rank the solutions with regard to sweetness in that across the board the sweetest (2.0 sucrose level) solution received the highest score ("very sweet") followed by the 1.0 solution, the 0.5 solution, and lastly the unsweetened 0.0 solution with the lowest score ("not at all sweet").

As seen in Table 14 mean preference scores for all solutions except for the 0.5 sucrose level were similar for whites and blacks. The whites' mean score (3.0 ± 0.9) for the 0.5 solution was significantly different ($p < 0.05$) from the blacks' mean score (2.7 ± 1.0) as determined by the t-test. For the 0.5 solution the mean scores of the males and females (3.0 ± 0.8 and 2.8 ± 1.0, respectively) also were significantly different ($p < 0.05$). In addition, the mean scores of the males (4.1 ± 1.2) and females (3.7 ± 1.3) differed significantly ($p < 0.05$) for the 2.0 solution. With regard to taste or sweetness perception mean scores for the sexes and races were similar except for the 0.5 solution

Table 14

Preference[a] and Taste[b] Scores for Kool-Aid Solutions for Seventh-Grade Students

Sucrose Level[c] of Kool-Aid Solutions	Total Sample			Race						Sex						Body Fatness Class								
				White			Black			Male			Female			"Lean"			"Middle"			"Fat"		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Preference																								
0.0	1.2	0.5	1.0	1.2	0.5	1.0	1.2[d]	0.5	1.0	1.2	0.5	1.0	1.2[d]	0.6	1.0	1.2	0.5	1.0	1.3	0.7	1.0	1.2	0.4	1.0
0.5	2.9	0.9	2.5	3.0[*d]	0.9	2.5	2.7[*d]	1.0	2.5	3.0[*d]	0.8	2.5	2.8[d]	1.0	3.0	2.9	1.0	2.5	3.0	0.9	2.5	2.7	0.9	3.0
1.0	3.5	1.0	3.0	3.6	1.0	4.0	3.4	1.0	3.0	3.5	1.0	3.0	3.5	1.0	3.0	3.6	0.9	3.0	3.4	1.0	3.0	3.6	1.0	4.0
2.0	3.9	1.2	5.0	3.8	1.3	5.0	4.1	1.1	5.0	4.1[*d]	1.2	5.0	3.7[*d]	1.3	5.0	4.0	1.2	5.0	3.9	1.2	5.0	3.7	1.3	5.0
Taste																								
0.0	1.2	0.6	1.0	1.3	0.6	1.0	1.2	0.5	1.0	1.2[d]	0.4	1.0	1.3[d]	0.7	1.0	1.2	0.5	1.0	1.3	0.6	1.0	1.2	0.5	1.0
0.5	2.7	0.8	2.5	2.7	0.8	2.5	2.6	0.9	3.0	2.8[*d]	0.8	2.5	2.6[*d]	0.8	3.0	2.8	0.8	2.5	2.8	0.9	3.0	2.6	0.8	2.5
1.0	3.4	0.9	4.0	3.3	0.8	4.0	3.4	1.1	4.0	3.4	0.9	4.0	3.3	0.9	4.0	3.4	0.9	3.0	3.4	0.9	3.5	3.4	0.9	4.0
2.0	4.5	0.8	5.0	4.5	0.8	5.0	4.5	0.8	5.0	4.6	0.6	5.0	4.4	1.0	5.0	4.6	0.8	5.0	4.5	0.9	5.0	4.4	0.8	5.0

[a]Numerical values ranged from 5 (like extremely) to 1 (dislike extremely).

[b]Numerical values ranged from 5 (very sweet) to 1 (not at all sweet).

[c]Levels reflect 0, 0.5, 1.0, and 2.0 times the recommended amount of sucrose by weight as indicated on package directions.

[d]Means based on a pooled variance estimate.

[*]Significantly different ($p < 0.05$) by t-test.

which was given a significantly higher ($p < 0.05$) mean score by males (2.8 ± 0.8) than by females (2.6 ± 0.8). According to a table of binomial expansion, however, one of these four solutions in each race or sex comparison for preference and taste could be anticipated to differ significantly at the 5 percent level of significance on the basis of chance alone (Beyer, 1968).

With respect to body fatness classes mean scores for preference and taste were similar as determined by the t-test (Table 14 and Figure 3). As shown in Figure 3, the "lean," "middle," and "fat" students were able to correctly rank four Kool-Aid solutions via mean scores for sucrose concentration indicating that each group did perceive the relative sweetness. Studies regarding sucrose thresholds have reported no differences between obese and normal weight adult subjects or among obese adults differing in age at onset of obesity (Grinker et al., 1972).

Grinker et al. (1976) showed that the taste preferences of obese subjects for sucrose solutions were inversely related to concentration. In studies with children Grinker and co-workers (1976) found that sucrose aversion appeared in obese children as early as 8 years; moreover, the extent of the aversion appeared to be directly related to the degree of overweight. Grinker et al. (1976) also reported children and adolescents' preferences for Kool-Aid to be related to the degree of overweight with the more overweight children having the least preference for the sweeter solutions. These findings were reported to hold true for different populations in different locations, the nearest to the present study being North Carolina.

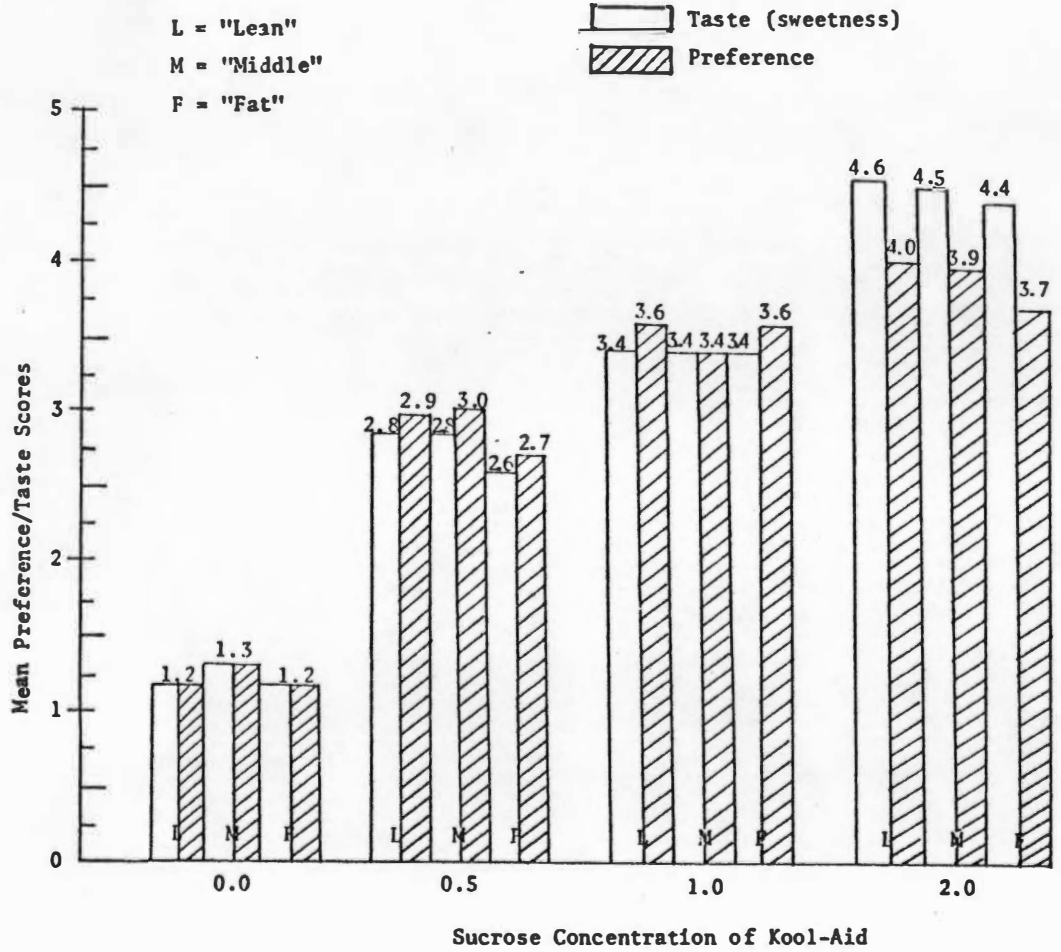


Figure 3. Mean preference and taste scores for Kool-Aid solutions by body fatness classes.

Results from the present study do not support those of Grinker et al. (1976) even though similar methodologies were employed as previously discussed; neither do the findings support the popular a priori reasoning that the obese have a "sweet tooth" (Nordsiek, 1972). Earlier work by Pangborn and Simone (1958) also reported no significant differences in preferences for fruits and ice cream of differing sugar concentrations which could be attributed to variation in body size as determined by height and weight among 1250 individuals including children. Phillips (1975) in a study of 30 4- to 5-year-old children found that the child's preference for presweetened cereals decreased as his or her ability to differentiate cereal flavors increased indicating that when flavor perception was low, factors aside from flavor possibly influenced the child's preference for presweetened cereals. For the present population sucrose preference appears not to be a significant factor in the perpetuation of obesity, at least under the conditions of this study.

V. Connotative Meanings of Food

The number of responses for each step of the scale for the 32 foods for each of the three Calorie-related polar terms are given in Table 26, Appendix G. Many of the responses fell near the center or space marked "both"; however, some of the foods solicited differentiated meanings for each of the three polar terms. The means, standard deviations, and modes of respondents' scores for the three polar terms are shown in Table 27, Appendix G. In contrast to the finding of McConnell (1974), observation of the modes did not reveal a predominance of the score of

4.0 ("both" response) but rather a varying distribution ranging from 2.0 to 7.0 suggesting that the instrument did evoke strong feeling.

In Table 28, Appendix G, the means, standard deviations, and modes of respondents' scores by race are presented. The most differences between means as determined by the t-test came from the "slimming/fattening" (15) scales followed by "low Calorie/high Calorie" (14) and "losing/gaining" (11) scales. According to a table of binomial expansion, however, 4 of these 32 foods in each set of polar scales could be anticipated to differ significantly at the 5 percent significance level on the basis of chance alone (Beyer, 1968).

For nine foods (pizza, soda pop, steak, French fried potatoes, hamburger, roast beef, chocolate chip cookie, chocolate pudding, and spaghetti) there were significant differences between the races on all three Calorie-related scales. Whites associated more foods with "high Calorie," "fattening," and "gaining" polar terms than blacks. Mean scores for blacks showed a central tendency toward the "both" category indicating that the foods did not evoke a strong reaction. Carlisle (1975) also found that whites associated more high Calorie foods with the polar terms "high Calorie" and "fattening" than blacks. The ethnic differences in meaning could be due to the significantly greater desire ($p < 0.01$) of the black adolescents to gain weight which was discussed earlier. In other words, perhaps the whites were more Calorie conscious than the blacks.

Means, standard deviations, and modes of respondents' scores for the three polar terms by sex are shown in Table 29, Appendix G. The mean scores of only five foods were significantly different as determined

by the t-test for the sexes, whereas the mean scores of 40 foods significantly differed for the races. Males associated broccoli, cabbage slaw, rolls ($p < 0.05$) and corn flakes ($p < 0.01$) more often with "low Calorie" and grits ($p < 0.05$) more often with "losing" than females. All of these significant differences at the 5 percent significance level, however, could be anticipated on the basis of chance alone according to a table of binomial expansion (Beyer, 1968).

Carlisle (1975) also found more differences in connotative meanings for a similar list of foods between blacks and whites than between males and females. Using a similar instrument Carlisle (1975) reported the mean scores for the sexes to be significantly different for 14 of 31 foods for the polar terms "slimming/fattening" and "low Calorie/high Calorie"; the girls associated more foods with "fattening" and "high Calorie" polar terms than did boys. Carlisle (1975) proposed that a partial explanation for this trend was the greater weight consciousness of the girls.

In Table 30, Appendix G, means, standard deviations, and modes of respondents' scores for the three polar terms by body fatness classes are presented. As determined by the t-test the means of only three foods were significantly different for the fatter and leaner students. The fatter students associated soda pop and spaghetti more often with "gaining" and fried chicken more often with "high Calorie" than leaner students ($p < 0.05$). According to a table of binomial expansion, however, this small number of foods could be anticipated to differ significantly at the 5 percent significance level on the basis of chance alone (Beyer, 1968).

Semantic differential profiles for selected foods of lower, intermediate, and higher caloric density based on similar mean ratings by the three body fatness classes are shown in Figures 4, 5, and 6, respectively. More significant differences in food connotative meanings of the leaner and fatter subjects were anticipated. However, the findings of the present study seemed to indicate that as with food preferences there were greater differences in food connotative meanings of seventh-grade students between races than between relative leanness and fatness.

It is possible that these fatter students on the brink or in the midst of the adolescent growth "spurt" still were expected to outgrow their obesity and as yet had not become victims of societal and familial prejudices against them as obese individuals (Bruch, 1971). Therefore possibly these fatter adolescents, although recognizing themselves as overweight ($p < 0.001$) and wishing to lose weight ($p < 0.001$), as yet had not become Calorie conscious. Perhaps the low percentage (5.9) of fat subjects correctly defining "Calorie" as well as the low percentage (7.5) of fat subjects selecting diet as a treatment modality provide additional evidence of their disinterest in the energy dimension of food.

These findings did indicate that students had begun to develop food meanings by the seventh grade. McConnell (1974) and Carlisle (1975) documented the even greater presence of food meanings among ninth- to twelfth-grade students.

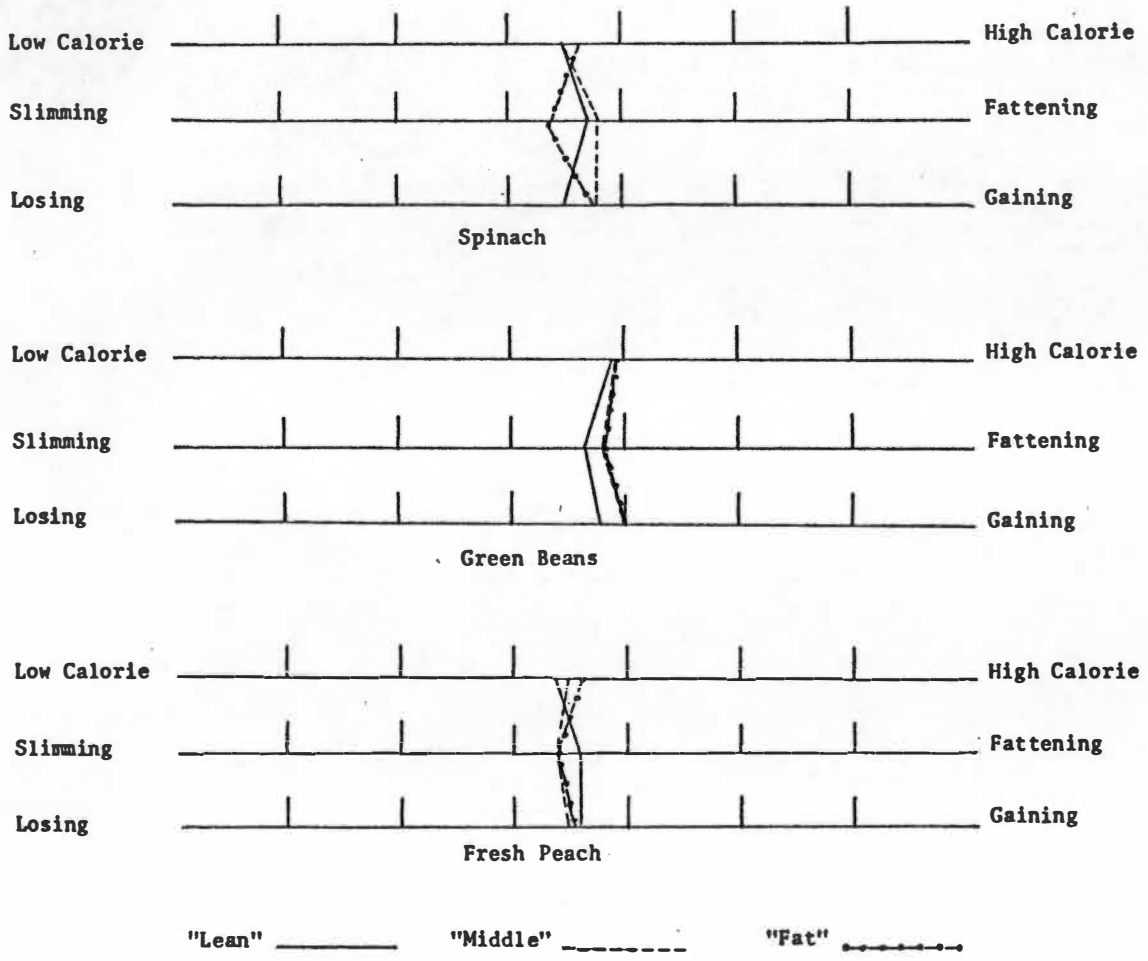


Figure 4. Semantic differential profile for foods of lower caloric density based on mean ratings by body fatness classes.

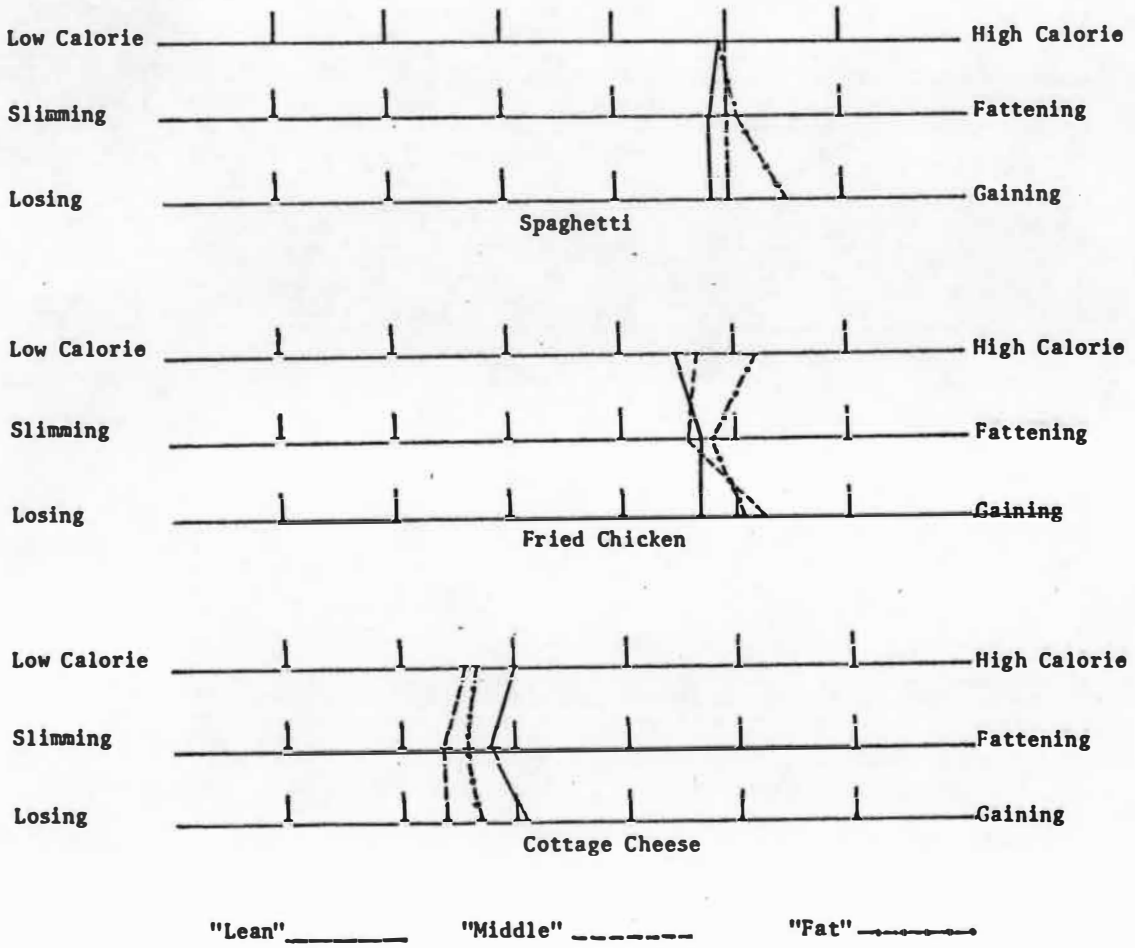


Figure 5. Semantic differential profile for foods of intermediate caloric density based on mean ratings by body fatness classes.

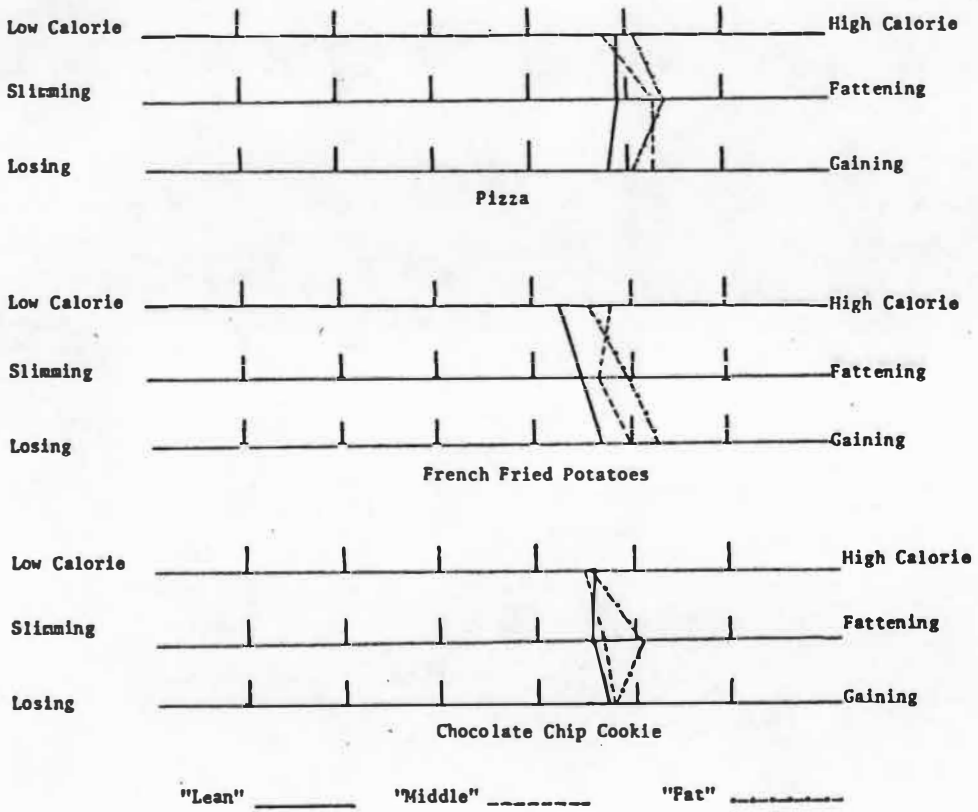


Figure 6. Semantic differential profile for foods of higher caloric density based on mean ratings by body fatness classes.

VI. Knowledge of Energy Values of Food and Activity

Means and standard deviations of respondents' scores for knowledge of energy values of food and activity by total sample, race, sex, and body fatness class are presented in Table 15. Mean scores on energy values of both food and activity for "lean" and "fat" body fatness classes were similar as determined by the t-test.

Food

The mean score on knowledge of energy values of food for 226 seventh-grade students was 10.6 ± 3.6 with scores ranging from 0 to 22 out of a possible 32 points (Table 15). The mean scores for whites (11.0 ± 3.7) and blacks (9.7 ± 3.4) were significantly different ($p < 0.05$). The mean scores of females (11.0 ± 3.1) was somewhat higher than for males (10.2 ± 4.0), but the difference was not statistically significant. The mean scores for the three body fatness classes were similar as determined by the t-test.

Knowledge of the caloric content of food was low with the students as a whole correctly answering only 33 percent of the items. Dwyer et al. (1967) reported that twelfth-grade girls answered correctly approximately 60 percent of the questions regarding Calories and weight reduction. These workers assessed this level of nutrition knowledge with regard to Calories as "low." In another study with teenage boys and girls Dwyer et al. (1970) found the adolescents were interested in weight loss and dieting but lacked interest in Calories and nutrient composition of foods. Wodarski (1976) reported that in a sample of

Table 15

Scores for Knowledge of Energy Values of Food and Activity for Seventh-Grade Students

Knowledge of Energy Values	Total Sample		Race				Sex				Body Fatness Class					
			White		Black		Male		Female		"Lean"		"Middle"		"Fat"	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Food[a]	10.6	3.6	11.0*[b]	3.7	9.7*[b]	3.4	10.2	4.0	11.0	3.1	10.6	3.1	10.3	3.7	10.8	3.8
Activity[a]	11.2	3.6	12.1**[b]	3.2	8.8**[b]	3.5	11.6	3.7	10.8	3.4	11.4	3.6	11.2	3.3	11.0	4.2

[a]Perfect score = 32.

[b]Means based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

**Significantly different ($p < 0.01$) by t-test.

185 Knoxville, Tennessee, high school students 70 to 80 percent agreed that such topics as "exercise and food needs" and "gaining and losing weight" were "extremely" or "very interesting." It is possible that the low knowledge of caloric content of food among the seventh graders in the present study is reflective of their present developmental/ chronological ages and can be expected to improve.

Means, standard deviations, and modes of respondents' scores by total sample, race, and sex for energy values of the 32 foods are presented in Table 31, Appendix H. Mean caloric scores for the two races for 15 foods were significantly different as determined by the t-test. According to a table of binomial expansion, however, 4 of these 32 foods could be anticipated to differ significantly at the 5 percent significance level on the basis of chance alone (Beyer, 1968). The whites scored round steak, hamburger patty, roast beef ($p < 0.05$); corn-bread ($p < 0.01$); hot dog, pizza, soda pop, French fried potatoes, fried chicken, chocolate pudding, and spaghetti ($p < 0.001$) as higher in Calories than the blacks. On the other hand, the blacks had higher caloric scores for cottage cheese, orange juice, broccoli ($p < 0.05$); and carrot-raisin salad ($p < 0.01$). Mean scores for the males and females were similar with applesauce being the only food with significantly different means ($p < 0.05$). As previously indicated, this single significant difference could be expected by chance alone at the 5 percent significance level (Beyer, 1968).

In Table 32, Appendix H, means, standard deviations, and modes of respondents' scores by body fatness classes for energy values of the 32 foods are shown. The "fat" and "lean" students' mean scores were

similar as determined by the t-test for all but two of the foods. The differences between the means for French fried potatoes and spaghetti were significant ($p < 0.05$). As many as four foods could be anticipated to differ significantly at the 5 percent significance level on the basis of chance alone, however, according to a table of binomial expansion (Beyer, 1968).

More significant differences in the food energy knowledge of the "lean" and "fat" students were anticipated. Dwyer et al. (1967) in their study of twelfth-grade girls reported that the obese and dieters had significantly higher mean scores than the nonobese and nondieters on a questionnaire designed to test understanding of the caloric content of foods. Perhaps here as with connotative meanings these fatter seventh-grade students as yet have not developed a Calorie consciousness which usually accompanies overweight or obesity and dieting. In retrospect, it would have been desirable to have inquired into the subjects' present and past history of dieting.

The similar mean scores of the three body fatness classes for energy values of selected foods are compared with correct relative energy values in Figure 7. All body fatness classes underestimated the energy values of spaghetti and cottage cheese and overestimated the energy values of spinach, green beans, fresh peach, chocolate chip cookie, fried chicken, pizza, and French fried potatoes.

The correct answers (percent) for the energy value of each of 32 foods by total sample, race, sex, and body fatness class are given in Table 33, Appendix H. For the total sample applesauce received the greatest number of correct responses (56.2 percent) and carrot-raisin

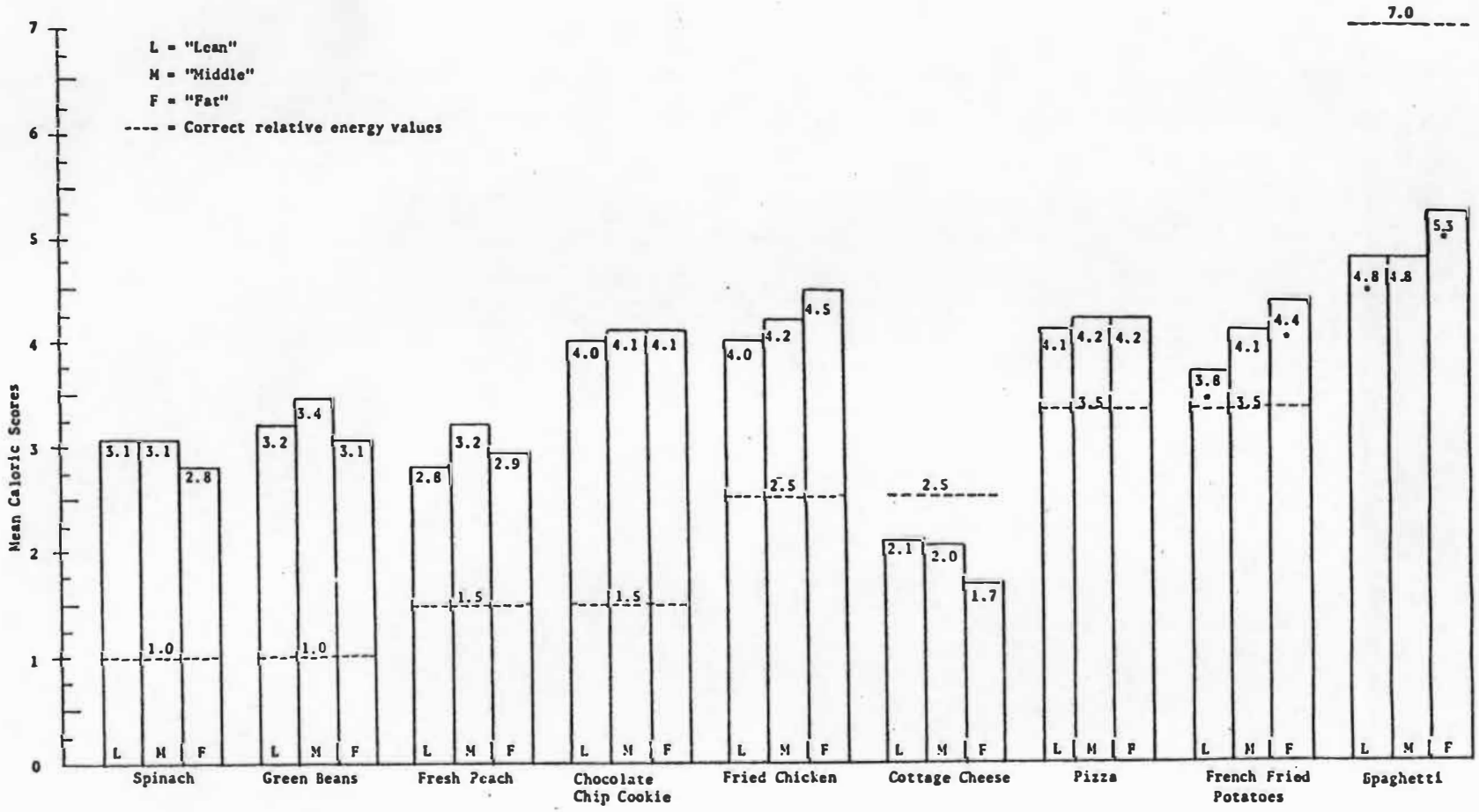


Figure 7. Mean scores for energy values of foods by body fatness classes.

*Significantly different ($p < 0.05$) by t-test.

salad the fewest (6.6 percent). Correct responses for most of the 32 foods ranged from 20 to 40 percent for the total sample; only nine foods received greater than 40 percent correct responses and only six foods received less than 20 percent correct responses. No food except applesauce received more than 50 percent correct responses.

Carrot-raisin salad received the lowest percentage of correct scores for all the 32 foods; only the black and the "lean" students did not give the food their lowest scores. The consistently low scores on carrot-raisin salad possibly are due to the students' oversight of the high Calorie salad dressing contained therein. On the other hand, applesauce received the highest percentage of correct scores ranging from 44.1 to 69.8 percent with only the black and male students scoring higher on other foods.

The correct energy values of few foods other than applesauce were given by 50 percent or more of the students. Those few foods and their corresponding high scoring respondents included: banana (51.5 percent of whites); orange juice, cornflakes, and hamburger patty (55.2, 51.7, and 50.9 percent of females, respectively); orange juice (54.1 percent of "leans"); and rolls (50.0 percent of "fats"). It is interesting that all of these foods except hamburger patties are fruits or starches with correct answers in columns two and three of the questionnaire (50 to 150 kilocalories).

Comparison was made of the number of foods in each of five categories of relative caloric density (sweets, meats/eggs/cheese, starches, fruits, and vegetables) receiving more than 40 percent and less than 20 percent correct responses for energy value by total

sample, race, sex, and body fatness class. Across the board, the students had better knowledge of the energy values of the meat/egg/cheese, starch, and fruit groups and strikingly less knowledge of the low caloric density vegetable group which, as indicated earlier, was the least preferred food group.

Activity

The mean score on knowledge of energy values of activities for the total sample was 11.2 ± 3.6 (Table 15, p. 85). Scores on activity energy knowledge ranged from 0 to 22 out of a possible 32. The mean scores for whites (12.1 ± 3.2) and blacks (8.8 ± 3.5) were significantly different ($p < 0.001$). Whereas the females had somewhat higher although not significantly different mean scores on food Calorie knowledge, the males had higher although again not significantly different mean scores than the females (11.6 ± 3.7 versus 10.8 ± 3.4) on activity Calorie knowledge. The mean scores for the three body fatness classes again were very similar as determined by the t-test.

As was the case with food Calorie knowledge, the knowledge of energy values of activity was low. The students in the total sample correctly identified the relative caloric value of only 35 percent of the activities.

Means, standard deviations, and modes of respondents' scores by total sample, race, and sex for energy values of the 32 activities are presented in Table 34, Appendix H. As determined by the t-test mean caloric scores for 15 activities were significantly different for the whites and blacks. Four of these 15 significant differences could be

expected at the 5 percent significance level on the basis of chance alone according to a binomial expansion table (Beyer, 1968). The whites scored field hockey ($p < 0.05$); gymnastics, touch football, swimming, water skiing, walking rapidly ($p < 0.01$); football, lawn mowing with a power mower, and soccer ($p < 0.001$) as more strenuous with regard to energy expenditure than the blacks. Conversely, the blacks scored lawn mowing with a power mower and cooking ($p < 0.05$); typing ($p < 0.01$); sitting quietly reading, watching television, and playing cards ($p < 0.001$) as requiring more energy than the whites. It is interesting that all of the activities scored higher by the blacks were from the lowest energy category except for cooking which belonged in the next to lowest category.

Mean scores for the males and females were similar for all except three activities. Females scored typing, horseback riding, and social dancing as requiring greater caloric expenditure than the males ($p < 0.05$). Both sexes overrated typing and horseback riding, whereas the males underrated social dancing with regard to energy expenditures. According to a table of binomial expansion, however, this small number of differences could be anticipated at the 5 percent significance level on the basis of chance alone (Beyer, 1968).

In Table 35, Appendix H, means, standard deviations, and modes of respondents' scores by body fatness classes for energy values of the 32 activities are shown. The "fat" and "lean" adolescents' mean scores were similar for all but three activities as determined by the t-test. The "fat" students scored touch football higher and field hockey and typing lower ($p < 0.05$) with regard to energy output than did the "lean"

students. Both body fatness classes underestimated field hockey and overestimated typing. Again, this number of significant differences at the 5 percent significance level could be expected on the basis of chance alone (Beyer, 1968).

As with food energy knowledge, more significant differences in the energy knowledge of activity of the "lean" and "fat" students were hypothesized. Bullen et al. (1963) reported that obese adolescents believe that food is primarily responsible for obesity. Another investigation by Bullen et al. (1964) indicated that obese adolescents lack knowledge regarding the relationship of exercise to weight, and furthermore, fail to recognize their disinterest in physical activity. Studies by Johnson et al. (1956), Stefanik et al. (1959), Bullen et al. (1963, 1964), Huenemann et al. (1966b, 1967, 1974), and Hammar et al. (1972) suggested that the attitudes of obese adolescents regarding physical activity are reflected in their being less physically active and more interested in sedentary pursuits than their nonobese counterparts.

The similar mean scores of the three body fatness classes for energy values of selected activities are compared with correct relative energy values in Figure 8. The students of all body fatness classes underestimated the energy values of football and basketball and overestimated the energy values of sitting quietly reading, watching television, typing, bicycling, volleyball, and walking rapidly.

The correct answers (percent) for the energy values of each of 32 activities by total sample, race, sex, and body fatness class are presented in Table 36, Appendix H. The relative energy values of two

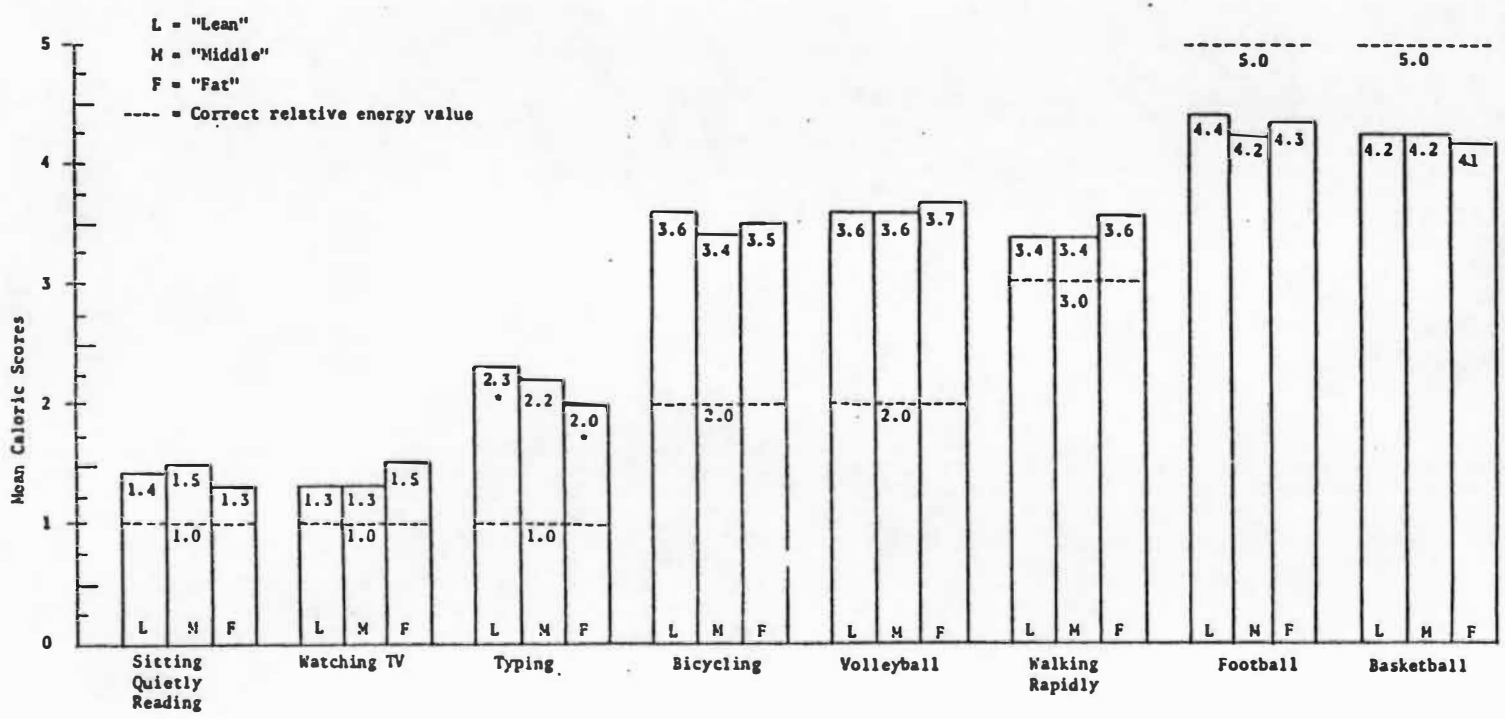


Figure 8. Mean scores for energy values of activities by body fatness classes.

*Significantly different ($p < 0.05$) by t-test.

activities, watching television and sitting quietly reading, were correctly identified by over 70 percent of the total respondents. Volleyball and bicycling received the fewest correct responses, less than 10 percent. Correct responses for most of the 32 activities ranged from 20 to 60 percent for the total sample.

Watching television received the greatest percentage of correct responses for the total sample, both races and sexes, and all three body fatness classes. On the other hand, bicycling received the lowest percentage of correct scores. Only the total sample, whites, and "fat" adolescents did not score the lowest on bicycling; interestingly enough, all three groups scored the lowest on volleyball.

The correct relative energy values of several activities, in addition to watching television and sitting quietly reading, were given by 50 percent or more of the students. These activities and their corresponding high scoring respondents included: ironing (whites, males, "leans," "middles"); basketball (blacks, males, "leans"); gymnastics (whites, "fats"); wrestling (total sample, whites, males, "middles," "fats"); cooking (whites, "middles"); football (all except blacks); playing cards (all except blacks and "fats"); and walking slowly ("fats"). Interestingly enough, all of these high scoring activities were either relatively high or low (extremes) in energy value.

CHAPTER V

SUMMARY AND IMPLICATIONS

I. Summary

Food behaviors relative to adiposity were studied in 226 seventh-grade students from a selected sample of Knoxville, Tennessee, junior high schools. Height, weight, and triceps fatfold thickness were obtained for each subject. Based on triceps fatfolds the 12- and 13-year-old students were divided as equally as possible into three groups and designated as "lean," "middle," and "fat." A questionnaire was designed and administered to obtain specific demographic information and to investigate differences between the "lean" and "fat" with regard to certain food behaviors.

The prevalence of obesity was relatively high; however, an even greater percentage of the adolescents indicated that they considered themselves "overweight." Seventy percent of the self-declared overweight students reported the age of onset as after 9 years. More students expressed a desire to lose weight than to gain weight. The method of choice for losing weight was a combination of diet and exercise; exercise alone was chosen more frequently than diet alone.

Contrary to the original hypotheses, no meaningful significant differences were observed between the "lean" and "fat" adolescents for perceived food preferences, sucrose taste preferences, food connotative meanings, and knowledge of energy values of food and activity. Several

differences were observed between the whites and blacks and between the males and females, especially the former. These differences between races and sexes must be interpreted cautiously, however, in that compounding factors of race, sex, and socioeconomic status were inherent within race and sex groupings.

Among those foods most highly preferred by all the students were hamburgers, pizza, steak, spaghetti, fresh apples, rolls, and milk; least preferred foods included buttermilk, black-eyed peas, cooked carrots, liver, coffee, and turnip greens. Findings suggested a general preference for foods of higher versus lower caloric density. The two races and two sexes differed in their perceived preferences for a substantial proportion of the foods investigated with the blacks and males preferring a wider variety of foods than their counterparts. The races also differed significantly in their mean scores for several foods on three connotative meaning scales with the whites associating more foods with "high Calorie," "fattening," and "gaining" polar terms than blacks.

For both races and sexes and all three body fatness classes the order of preference for the four Kool-Aid solutions was directly related to sucrose concentration. Concerning taste the students demonstrated ability to rank the solutions with respect to sweetness. Sucrose preference or aversion did not appear to be a significant factor in the perpetuation of fatness or leanness under the condition of this study.

Knowledge of energy values of both food and activity was low for the seventh-grade students as a whole. Whites scored significantly

higher than blacks on both knowledge tests. Only a small percentage of the adolescents were able to correctly define "Calorie."

II. Implications

Obesity is recognized as the "major public health problem confronting the United States and other developed nations" (Bray, 1974). Moreover, obesity is identified as the most frequent nutritional disturbance of childhood (Winick, 1974). The increasing prevalence of adolescent obesity is suggested by this study and others (Seltzer and Mayer, 1970).

In this study seventy percent of the self-declared overweight students reported the age of onset from ages 10 through 12 years. Obesity of juvenile onset (before age 12 years) appears to be primarily a hyperplastic disorder (increased cell number) resistent to change. Weight reduction can produce a decrease in cell size but not in cell number. Among the behavioral disturbances observed during and following weight reduction of juvenile onset obesity are symptoms of depression, fatigue and anxiety, and distortions in body image and timing perception (Grinker and Hirsch, 1974).

Despite the magnitude of the obesity problem and its long history of research, actually little undisputed knowledge is available regarding its etiology and even less with respect to its effective long-term treatment (Stunkard and McLaren-Hume, 1959; Winick, 1974). It is well established, however, that body weight is an equilibrium state accomplished by the balance between food intake and energy output and that this equilibrium is subject to a variety of controlling forces. Moreover,

to date the application of behavioral modification techniques to certain of these controlling forces appears the most potentially effective treatment modality (Stuart and Davis, 1972; Grinker and Hirsch, 1974; Ferguson, 1975).

Among these forces potentially controlling the equilibrium state of body weight are food preferences, food meanings, and food and nutrition knowledge with regard to energy intake and expenditure. Therefore it stands to reason that food behavior modification would be aided by knowing and understanding what food means to people.

Excessive caloric intake and inactivity seem to be associated with habits which are partially developed early in life and appear more resistent to change with growth and development (Grinker and Hirsch, 1974). As shown in this study with seventh graders, perceived food preferences were evidenced with differences observed between sexes and races. Moreover, foods were beginning to evoke Calorie or weight meanings for these adolescents. By high school age the adolescents could be anticipated to embrace from their culture more and stronger food meanings (McConnell, 1974; Carlisle, 1975). Additionally, the adolescents in this study evidenced a low knowledge of both energy values of food and activity. Significant differences in food behaviors (preferences, meanings, and knowledge) of the "lean" and "fat," however, did not appear manifest by age 12 years, at least under the conditions of this study. These findings raise a number of questions as well as point to a unique opportunity for food and nutrition education as part of an effective treatment program.

Some of the questions raised are: (1) Do the "fat" simply eat more of the same foods eaten by the "lean?" (2) Do the "fat" in actuality prefer and eat different foods from those they indicated as preferences? (3) Are the "fat" less physically active than the "lean?" (4) Are the "fat" more efficient in energy utilization? (5) Do the "fat" represent fat cell hyperplasia? (6) By what age can "fat" and "lean" adolescents be expected to differ in food preferences and food connotative meanings? (7) If the "fat" remain obese, will they learn more about caloric values of food and activity as a by-product of attempts at dieting? If the "lean" remain lean, will they do so by learning more about the energy values of food and activity? (8) Is sucrose aversion really a function of body fatness? Perhaps these and other questions are worthy of further investigation.

Hammar et al. (1972) recommended an interdisciplinary approach to the treatment of health problems of adolescents, particularly obesity, eliciting cooperation from the nutritionist/dietitian, physician, nurse, and social worker. In the public school system this interdisciplinary model could be translated into Seltzer and Mayer's (1970) proposed program for effective weight control by soliciting the cooperation of those involved in nutrition and health education including the home economics teachers, athletic coaches, and teachers of health, physical education, and various science courses as well as the school guidance counselors.

Findings from this study and others (Dwyer et al., 1967) suggested that some adolescents, especially girls, who are not obese by the criterion of triceps fatfold perceive themselves as obese and wish to

lose weight. Perhaps many children have body builds characterized by breadth of bone and muscle which they erroneously attribute to fatness rather than other components of body composition. If these girls as well as boys were taught in their health and physical education classes about body types and what constitutes obesity, they might become more realistic in trying to change characteristics of body build.

Adolescents in this study reported a combination of diet and exercise as their treatment of choice for losing weight. Exercise alone was preferred over diet alone. Health and physical education teachers and home economics teachers could take advantage of the students' cognitive recognition of activity by presenting graphic information on exercise equivalents of foods and relative caloric expenditure for various activities. Hammar (1965) recommended special physical education classes and activities for the obese in order that they might feel more comfortable with regard to their appearance and participation.

In this study findings suggested a greater perceived preference for foods of higher versus lower caloric density. In view of the low scores on knowledge of energy values of food and the low percentage of students correctly defining "Calorie," perhaps creative instruction with regard to the roles of food in our culture and food composition would be helpful. Instead of "preaching" Calories health and home economics educators could emphasize principles of relative caloric density. Home economics teachers, with classes now including boys, could make a significant contribution by introducing the students to new, lower caloric density foods (vegetables, for example) and exploring with them new ways to make "old" foods of lower caloric density more acceptable.

The school guidance counselor could work with health, physical education, and home economics teachers in the application of simple and benign principles of behavior modification (Stuart and Davis, 1972; Ferguson, 1975) to the food and activity behaviors of obese and potentially obese adolescents.

Further investigation of adolescents' food and taste preferences, food connotative meanings, and current level of knowledge regarding energy values of food and activity, would seem helpful in the planning of any prevention or intervention program for effective weight control in our public school system. Interdisciplinary cooperation would appear to be a key factor in reversing or hopefully preventing juvenile onset obesity before it becomes an essentially irreversible medical, social, and psychological problem.

REFERENCES

REFERENCES

Adams, C. F. 1975. Nutritive Value of American Foods in Common Units. Agriculture Handbook No. 456, U.S.D.A. Agri. Res. Serv., Washington, D.C.

Amerine, M. A., Pangborn, R. M. and Roessler, E. B. 1965. "Principles of Sensory Evaluation of Food," Academic Press, New York, N.Y.

Axler, B. H. and Schwarz, A. 1972. Selling students. School Foodservice J. 26(3): 45.

Babcock, C. G. 1961. Attitudes and the use of food. J. Am. Diet. Assoc. 38: 546.

Bandura, A. 1969. "Principles of Behavior Modification," Holt, Rinehart, and Winston, New York, N.Y.

Bass, M. A. 1972. Food and nutrient intake patterns on the Standing Rock Reservation, North and South Dakota. Ph.D. thesis, Kansas State University, Manhattan, Kan.

Bellack, A. S. 1976. A comparison of self-reinforcement and self-monitoring in a weight reduction program. Behav. Ther. 7: 68.

Berg, H. W., Filipello, F., Hinreiner, E. and Webb, A. D. 1955. Evaluation of thresholds and minimum difference concentrations for various constituents of wines. I. Water solutions of pure substances. Food Technol. 9: 23.

Beyer, W. H. 1968. "CRC Handbook of Tables for Probability and Statistics," 2nd ed. The Chemical Rubber Co., Cleveland, Ohio.

Bleibtreu, H. K. 1973. An anthropologist views the nutrition profession. J. Nutr. Educ. 5: 11.

Bradfield, R. B., Paulos, J. and Grossman, L. 1971. Energy expenditure and heart rate of obese high school girls. Am. J. Clin. Nutr. 24: 1482.

Bray, G. A. 1974. Fogarty conference on obesity. Am. J. Clin. Nutr. 27: 423.

Brozek, J. 1961. Body measurements including skinfold thickness as indicators of body composition. In "Techniques for Measuring Body Composition," Ed. Brozek, J. and Henschel, A. National Academy of Sciences, National Research Council, Washington, D.C.

Bruch, H. 1971. Family transactions in eating disorders. Compr. Psychiatry 12: 238.

Bruch, H. 1973a. "Eating Disorders: Obesity, Anorexia Nervosa, and the Person Within," Basic Books, Inc., New York, N.Y.

Bruch, H. 1973b. Psychological aspects of obesity. Med. Insight 5(7): 23.

Bullen, B. A., Monello, L. F., Cohen, H. and Mayer, J. 1963. Attitudes towards physical activity, food and family in obese and nonobese adolescent girls. Am. J. Clin. Nutr. 12: 1.

Bullen, B. A., Reed, R. B. and Mayer, J. 1964. Physical activity of obese and nonobese adolescent girls appraised by motion picture sampling. Am. J. Clin. Nutr. 14: 211.

Canning, H. and Mayer, J. 1966. Obesity—its possible effect on college acceptance. New Engl. J. Med. 275: 1172.

Carlisle, J. C. 1975. Food intake practices of high school students in Shelby County, Alabama. Ph.D. thesis, University of Tennessee, Knoxville, Tenn.

Cartwright, L. C., Snell, C. T. and Kelly, P. H. 1952. Organoleptic panel testing as a research tool. Anal. Chem. 24:503.

Center for Disease Control. 1972. Ten-State Nutrition Survey in the United States, 1968-1970. III. Clinical, Anthropometry, Dental. DHEW Publ. No. (HSM) 72-8131. Health Services and Mental Health Administration, Atlanta, Ga.

Champion, D. J. 1970. "Basic Statistics for Social Research," Chandler Publishing Co., Scranton, Pa.

Christie, E. M. 1956. Some theoretical and practical aspects of the planning and conduct of tasting tests. Food Nutr. Notes Revs. 13: 21.

Church, C. F. and Church, H. N. 1975. "Food Values of Portions Commonly Used," J. B. Lippincott Co., Philadelphia, Pa.

Corbin, C. B. 1969. Standards of subcutaneous fat applied to percentile norms for elementary school children. Am. J. Clin. Nutr. 22: 836.

Cunningham, D. A., Montoye, H. J., Metzner, H. L. and Keller, J. B. 1970. Active leisure activities as related to occupation. J. Leisure Res. 2: 104.

Cussler, M. T. and deGive, M. L. 1952. "Twixt the Cup and the Lip," Twayne Publ. Co., New York, N.Y.

Dorsey, J. L. 1976. An investigation of the hepatic cytochrome P-450 levels of normal and obese (ob/ob) mice. Ph.D. thesis, University of Tennessee, Knoxville, Tenn.

Duddleston, A. K. and Bennion, M. 1970. Effect of diet and/or exercise on obese college women. J. Am. Diet. Assoc. 56: 126.

Durnin, J. V. G. A. and Passmore, R. 1967. "Energy, Work, and Leisure," Heinemann Educational Books, London.

Dwyer, J. T., Feldman, J. J. and Mayer, J. 1967. Adolescent dieters: Who are they? Am. J. Clin. Nutr. 20: 1045.

Dwyer, J. T., Feldman, J. J. and Mayer, J. 1970. Nutritional literacy of high school students. J. Nutr. Educ. 2: 59.

Dwyer, J. T., Feldman, J. J., Seltzer, C. C. and Mayer, J. 1969. Adolescent attitudes toward weight and appearance. J. Nutr. Educ. 1: 14.

Dwyer, J. and Mayer, J. 1968-69. Psychological effects of variations in physical appearance during adolescence. Adolescence 3: 353.

Dwyer, J. T. and Mayer, J. 1971. Psychological effects of variations in physical appearance during adolescence. In "Adolescent Behavior and Society: A Book of Readings," pp. 67-81. Ed. Muuss, R. E. Random House, New York, N.Y.

Edwards, D. A. W., Hammond, W. H., Healy, M. J. R., Tanner, J. M. and Whitehouse, R. H. 1955. Design and accuracy of caliper for measuring subcutaneous tissue thickness. Br. J. Nutr. 9: 133.

Einstein, M. A. and Hornstein, I. 1970. Food preferences of college students and nutritional implications. J. Food Sci. 35: 429.

Eppright, E. S. 1947. Factors influencing food acceptance. J. Am. Diet. Assoc. 23: 579.

Faber, H. K. 1929. A weight range table for children from 5 to 15 years of age. Am. J. Dis. Child. 38: 758.

Falkner, F. 1962. The physical development of children. Pediatrics 29: 448.

Faterson, H. F. and Witkin, H. A. 1970. Longitudinal study of development of the body concept. Dev. Psychol. 2: 429.

Ferguson, J. M. 1975. "Learning to Eat: Behavior Modification for Weight Control," Bull Publ. Co., Palo Alto, Calif.

Ferster, C. B., Nurnberger, J. I. and Levitt, E. B. 1962. The control of eating. J. Mathetics 1: 87.

Fewster, W. F., Bostian, L. R. and Powers, R. D. 1973. Measuring the connotative meanings of foods. Home Econ. Res. J. 2: 44.

Franzen, R. 1929. Physical measures of growth and nutrition. Transactions of the American Child Health Association, Sixth Annual Meeting 1929: 265.

Garn, S. M. 1972. The measurement of obesity. Ecol. Food Nutr. 1: 133.

Garn, S. M. and Clark, D. C. 1974. Economics and fatness. Ecol. Food Nutr. 3: 19.

Garn, S. M. and Clark, D. C. 1975. Nutrition, growth, development, and maturation: Findings from the Ten-State Nutrition Survey of 1968-1970. Pediatrics 56: 306.

Garn, S. M., Clark, D. C. and Guire, K. E. 1975a. Growth, body composition, and development of obese and lean children. In "Childhood Obesity," Ch. 2, pp. 23-46. Ed. Winick, M. John Wiley & Sons, New York, N.Y.

Garn, S. M., Clark, D. C. and Ullman, B. M. 1975b. Does obesity have a genetic basis in man? Ecol. Food Nutr. 4: 57.

Garton, N. B. and Bass, M. A. 1974. Food preferences and nutrition knowledge of deaf children. J. Nutr. Educ. 6: 60.

Gates, J. C., Huenemann, R. L. and Brand, R. J. 1975. Food choices of obese and non-obese persons. J. Am. Diet. Assoc. 67: 339.

Gaul, D. J., Craighead, W. E. and Mahoney, M. J. 1975. Relationship between eating rates and obesity. Consult. Clin. Psychol. 43: 123.

Gifft, H. H., Washbon, M. B. and Harrison, G. G. 1972. "Nutrition, Behavior and Change," Prentice-Hall, Inc., Englewood Cliffs, N.J.

Goldblatt, P. B., Moore, M. E. and Stunkard, A. 1965. Social factors in obesity. J.A.M.A. 192: 1039.

Goldman, R., Jaffa, M. and Schachter, S. 1968. Yom Kippur, Air France, dormitory food, and the eating behavior of obese and normal persons. J. Pers. Soc. Psychol. 10: 117.

Green, L. W. 1970. Manual for scoring socioeconomic status for research on health behavior. Public Health Rep. 85: 815.

Grinker, J. A. 1975. Symposium: Chemical senses and nutrition. 3. Taste factors and obesity. Food Technol. 29: 76.

Grinker, J. and Hirsch, J. 1974. Metabolic and behavioral correlates of obesity. In "Physiology, Emotion, and Psychosomatic Illness," pp. 349-374. Ed. Knight, J. CIBA Foundation, Amsterdam.

Grinker, J., Hirsch, J. and Smith, D. V. 1972. Taste sensitivity and susceptibility to external influences in obese and normal weight subjects. J. Pers. Soc. Psychol. 22: 320.

Grinker, J. A., Price, J. M. and Greenwood, M. R. C. 1976. Studies of taste in childhood obesity. In "Hunger: Basic Mechanisms and Clinical Implications," pp. 441-457. Ed. Novin, D., Wyrwicka, W. and Bray, G. A. Raven Press, New York, N.Y.

Hagen, R. L. 1974. Group therapy versus bibliotherapy in weight reduction. Behav. Ther. 5: 222.

Hammar, S. L. 1965. The obese adolescent. J. School Health 35: 246.

Hammar, S. L., Campbell, M. M., Campbell, V. A., Moores, N. L., Sareen, C., Gareis, F. J. and Lucas, B. 1972. An interdisciplinary study of adolescent obesity. J. Pediatr. 80: 373.

Hammond, W. H. 1955. Measurement and interpretation of subcutaneous fat with norms for children and young adult males. Br. J. Prev. Soc. Med. 9: 201.

Hampton, M. C., Huenemann, R. L., Shapiro, L. R., Mitchell, B. W. and Behnke, A. R. 1966. A longitudinal study of gross body composition and body conformation and their association with food and activity in a teen-age population. 2. Anthropometric evaluation of body build. Am. J. Clin. Nutr. 19: 422.

Harmatz, M. G. and Lapuc, P. 1968. Behavior modification of overeating in a psychiatric population. J. Consult. Clin. Psychol. 32: 583.

Harper, R. 1949. Food grading and its study. Food 18: 207.

Harris, M. B. 1969. Self-directed program for weight control: A pilot study. J. Abnorm. Psychol. 74: 263.

Hashim, S. A. and Van Itallie, T. B. 1965. Studies in normal and obese subjects with a monitored food dispensing device. Ann. N.Y. Acad. Sci. 131: 654.

Heald, F. P. 1975. Juvenile obesity. In "Childhood Obesity," Ch. 6, pp. 81-88. Ed. Winick, M. John Wiley & Sons, New York, N.Y.

Hill, S. W. and McCutcheon, N. B. 1975. Eating responses of obese and nonobese humans during dinner meals. Psychosom. Med. 37: 395.

Hirsch, J. and Knittle, J. L. 1970. Cellularity of obese and nonobese human adipose tissue. Fed. Proc. 29: 1516.

Huenemann, R. L., Hampton, M. C., Behnke, A. R., Shapiro, L. R. and Mitchell, B. W. 1974. "Teenage Nutrition and Physique," Charles C. Thomas Publ., Springfield, Ill.

Huenemann, R. L., Hampton, M. C., Shapiro, L. R. and Behnke, A. R. 1966a. Adolescent food practices associated with obesity. Fed. Proc. 25: 4.

Huenemann, R. L., Shapiro, L. R., Hampton, M. C. and Mitchell, B. W. 1966b. A longitudinal study of gross body composition and body conformation and their association with food and activity in a teen-age population. 1. Views of teen-age subjects on body conformation, food and activity. Am. J. Clin. Nutr. 18: 325.

Huenemann, R. L., Shapiro, L. R., Hampton, M. C. and Mitchell, B. W. 1967. Teenagers' activities and attitudes toward activity. J. Am. Diet. Assoc. 51: 433.

Huenemann, R. L., Shapiro, L. R., Hampton, M. C. and Mitchell, B. W. 1968. Food and eating practices of teen-agers. J. Am. Diet. Assoc. 53: 17.

Jackson, R. L. and Kelly, H. G. 1945. Growth charts for use in pediatric practice. J. Pediatr. 27: 215.

Jerome, N. W. 1969. Northern urbanization of food consumption patterns of southern born Negroes. Am. J. Clin. Nutr. 22: 1667.

Johnson, M. L., Burke, B. S. and Mayer, J. 1956. Relative importance of inactivity and overeating in the energy balance of obese high school girls. Am. J. Clin. Nutr. 4: 37.

Johnson, R. E., Mastropaolo, J. A. and Wharton, M. A. 1972. Exercise, dietary intake, and body composition. J. Am. Diet. Assoc. 61: 399.

Jones, H. E. 1972. The fat child. Practitioner. 208: 212.

Jordan, H. A. and Levitz, L. S. 1973. Behavior modification in a self-help group. J. Am. Diet. Assoc. 62: 27.

Kennedy, B. M. 1952. Food preferences of pre-army age California boys. Food Technol. 6: 93.

Keys, A. 1956. Recommendations concerning body measurements for the characterization of nutrition status. In "Body Measurements and Human Nutrition," Ed. Brozek, J. Wayne State University Press, Detroit, Mich.

Keys, A. and Brozek, J. 1953. Body fat in adult man. Physiol. Rev. 33: 245.

Knoxville School Administration. 1976. Request Board Approval of 1976-77. PL 93-380, Title I, Project 77.01, Federal aid income survey. Federal Programs Application.

Kozlowski, L. T. and Schachter, S. 1975. Effects of cue prominence and palatability on the drinking behavior of obese and normal humans. J. Pers. Soc. Psychol. 32: 1055.

Krech, D., Crutchfield, R. and Ballachey, E. 1962. "Individual in Society," pp. 279-281. McGraw-Hill, New York, N.Y.

Krogman, W. M. 1972. "Child Growth," pp. 28-48. The University of Michigan Press, Ann Arbor, Mich.

Laird, D. A. and Breen, W. J. 1939. Sex and age alterations in taste preferences. J. Am. Diet. Assoc. 15: 549.

Lange, K. O. and Brozek, J. 1961. A new model of skinfold caliper. Am. J. Phys. Anthropol. 19 (New Series): 98.

Larmand, E. 1967. Methods for sensory evaluation of food. Publ. 1284, Canada Dept. Agric., Ottawa.

Law, H. M., Lewis, H. F., Grant, V. C. and Bachemin, D. S. 1972. Sophomore high school students' attitudes toward school lunch. J. Am. Diet. Assoc. 60: 38.

Lerner, R. M. and Gellert, E. 1969. Body build identification, preference, and aversion in children. Dev. Psychol. 1: 456.

Leverton, R. M. and Coggs, M. C. 1951. Food choices of Nebraska children. J. Home Econ. 43: 176.

Levitz, L. S. 1973. Behavior therapy in treating obesity. J. Am. Diet. Assoc. 62: 22.

Levitz, L. S. and Stunkard, A. J. 1974. A therapeutic coalition for obesity: Behavior modification and patient self-help. Am. J. Psychiatry 131: 423.

Mahoney, M. J. 1974. Self-reward and self-monitoring techniques for weight control. Behav. Ther. 5: 48.

Malina, R. M. 1966. Patterns of development in skinfolds of Negro and White Philadelphia children. Hum. Biol. 38: 89.

Malina, R. M. 1971. Skinfolds in American Negro and White children. J. Am. Diet. Assoc. 59: 34.

Manuel, H. T. 1934. Physical measurements of Mexican children in American schools. Child Dev. 5: 237.

Mayer, J. 1975. Obesity during childhood. In "Childhood Obesity," Ch. 5, pp. 73-88. Ed. Winick, M. John Wiley & Sons, New York, N.Y.

McConnell, S. 1974. Selected food preferences and some connotative meanings of foods by high school students in Hancock County, Tennessee. M.S. thesis, University of Tennessee, Knoxville, Tenn.

McKenna, R. J. 1972. Some effects of anxiety level and food cues on the eating behavior of obese and normal subjects: A comparison of the Schachterian and psychosomatic conceptions. J. Pers. Soc. Psychol. 22: 311.

Miller, D. C. 1964. "Handbook of Research Design and Social Measurement," David McKay Co., Inc., New York, N.Y.

Mobbs, J. 1970. Childhood obesity. Int. J. Nurs. Stud. 7: 3.

Monello, L. F. and Mayer, J. 1963. Obese adolescent girls: An unrecognized "minority" group. Am. J. Clin. Nutr. 13: 35.

Montoye, H. J. 1975. "Physical Activity and Health: An Epidemiologic Study of an Entire Community," Prentice-Hall, Inc., Englewood Cliffs, N.J.

Montoye, H. J., Huss, W. D. V., Olson, H. W., Pierson, W. R. and Hudec, A. J. 1957. "The Longevity and Morbidity of College Athletes," Phi Epsilon Kappa, Indianapolis, Ind.

Moore, H. B. 1957. The meaning of food. Am. J. Clin. Nutr. 5: 77.

Moore, M. E., Stunkard, A. and Srole, L. 1962. Obesity, social class, and mental illness. J.A.M.A. 181: 962.

Nathan, S. 1973. Body image in chronically obese children as reflected in figure drawings. Pers. Assess. 37: 456.

Nathan, S. and Pisula, D. 1970. Psychological observations of obese adolescents during starvation treatment. J. Am. Acad. of Child Psychiatry 9: 722.

National Center for Health Statistics. 1970. Height and Weight of Children, United States. Vital and Health Statistics. Series 11-No. 104. PHS Publ. No. 1000-Series 11-No. 104. Health Services and Mental Health Administration. U.S. Gov. Print. Off., Washington, D.C.

National Center for Health Statistics. 1972. Skinfold Thickness of Children 6-11 Years, United States. Vital and Health Statistics. Series 11-No. 120. DHEW Publ. No. (HSM) 73-1602. Health Services and Mental Health Administration, U.S. Gov. Print. Off., Washington, D.C.

National Center for Health Statistics. 1973. Height and Weight of Youths 12-17 Years, United States. Vital and Health Statistics. Series 11-No. 124. DHEW Publ. No. (HSM) 73-1606. Health Services and Mental Health Administration, U.S. Gov. Print. Off., Washington, D.C.

National Center for Health Statistics. 1974. Skinfold Thickness of Youths 12-17 Years, United States. Vital and Health Statistics. Series 11-No. 132. DHEW Publ. No. (HRA) 74-1614. Health Resources Administration, U.S. Gov. Print. Off., Washington, D.C.

National Center for Health Statistics. 1975. Preliminary Findings of the First Health and Nutrition Examination Survey, United States, 1971-1972: Anthropometric and Clinical Findings. PHS, DHEW Publ. No. (HRA) 75-1229. Health Resources Administration. U.S. Gov. Print. Off., Washington, D.C.

Nisbett, R. E. 1968a. Determinants of food intake in obesity. Science 159: 1254.

Nisbett, R. E. 1968b. Taste, deprivation, and weight determinants of eating behavior. J. Pers. Soc. Psychol. 10: 107.

Nisbett, R. E. and Gurwitz, S. B. 1970. Weight, sex, and the eating behavior of human newborns. J. Comp. Physiol. Psychol. 73: 245.

Nisbett, R. E. and Kanouse, D. 1969. Obesity, food deprivation, and supermarket shopping behavior. J. Pers. Soc. Psychol. 12: 289.

Nordsiek, F. W. 1972. The sweet tooth. Am. Sci. 60: 41.

Osgood, C. E., Suci, G. J. and Tannenbaum, P. H. 1957. "The Measurement of Meaning," University of Illinois Press, Urbana, Ill.

Pangborn, R. M. and Bruhn, C. M. 1971. Concepts of food habits of 'other' ethnic groups. J. Nutr. Educ. 3: 106.

Pangborn, R. M. and Simone, M. 1958. Body size and sweetness preference. J. Am. Diet. Assoc. 34: 924.

Passmore, R. and Durnin, J. V. G. A. 1955. Human energy expenditure. Physiol. Rev. 35: 801.

Paulsen, B. K., Lutz, R. N., McReynolds, W. T. and Kohrs, M. B. 1976. Behavior therapy for weight control: Long-term results of two programs with nutritionists as therapists. Am. J. Clin. Nutr. 29: 880.

Penick, S. B., Filion, R., Fox, S. and Stunkard, A. J. 1971. Behavior modification in the treatment of obesity. Psychosom. Med. 33: 49.

Peryam, D. R. and Girardot, N. F. 1952. Advanced taste-test method. Food Eng. 24, Pt. 2: 58.

Pett, L. B. and Ogilvie, G. F. 1956. The Canadian weight-height survey. Hum. Biol. 28: 177.

Phillips, D. E. 1975. Presweetened cereal patterns of older sib families and no older sib families: Child's preference, mother's perception of child's preference, and family purchase. Ph.D. thesis, University of Tennessee, Knoxville, Tenn.

Pomerleau, O., Bass, F. and Crown, V. 1975. Role of behavior modification in preventive medicine. N. Engl. J. Med. 292: 1277.

Price, J. M. and Grinker, J. 1973. Effects of degree of obesity, food deprivation, and palatability on eating behavior of humans. J. Comp. Physiol. Psychol. 85: 265.

Pumpian-Mindlin, E. 1954. The meanings of food. J. Am. Diet. Assoc. 30: 576.

Rauh, J. L. and Schumsky, D. A. 1969. Relative accuracy of visual assessment of juvenile obesity. J. Am. Diet. Assoc. 55: 459.

Reiff, G. G., Montoye, H. J., Remington, R. D., Napier, J. A., Metzner, H. L. and Epstein, F. H. 1967. Assessment of physical activity by questionnaire and interview. J. Sports Med. Phys. Fitness 7: 135.

Robson, J. R. K., Bazin, M. and Soderstrom, R. 1971. Ethnic differences in skinfold thickness. Am. J. Clin. Nutr. 24: 864.

Ruffer, W. A. 1970. Two simple indexes for identifying obesity compared. J. Am. Diet. Assoc. 57: 326.

Sallade, J. 1973. A comparison of the psychological adjustment of obese versus nonobese children. J. Psychosom. Res. 17: 89.

Schachter, S. 1968. Obesity and eating. Science 161: 753.

Schachter, S. 1971a. "Emotion, Obesity, and Crime," Academic Press, New York, N.Y.

Schachter, S. 1971b. Some extraordinary facts about obese humans and rats. Am. Psychol. 26: 129.

Schachter, S., Goldman, R. and Gordon, A. 1968. Effects of fear, food deprivation, and obesity on eating. J. Pers. Soc. Psychol. 10: 91.

Schachter, S. and Gross, L. P. 1968. Manipulated time and eating behavior. J. Pers. Soc. Psychol. 10: 98.

Schafer, R. and Yetley, E. A. 1975. Social psychology of food faddism. J. Am. Diet. Assoc. 66: 129.

Schorr, B. C., Sanjur, D. and Erickson, E. C. 1972. Teen-age food habits. J. Am. Diet. Assoc. 61: 415.

Schuck, C. 1961. Food preferences of South Dakota college students. J. Am. Diet. Assoc. 39: 595.

Seltzer, C. C., Goldman, R. F. and Mayer, J. 1965. The triceps skinfold as a predictive measure of body density and body fat in obese adolescent girls. Pediatrics 36: 212.

Seltzer, C. C. and Mayer, J. 1965. A simple criterion of obesity. Postgrad. Med. 38: A101.

Seltzer, C. C. and Mayer, J. 1967. Greater reliability of the triceps skinfold over the subscapular skinfold as an index of obesity. Am. J. Clin. Nutr. 20: 950.

Seltzer, C. C. and Mayer, J. 1970. An effective weight control program in a public school system. Am. J. Pub. Health 60: 679.

Sheldon, J. 1970. Obesity: Some current views regarding its aetiology. Postgrad. Med. J. 46: 613.

Stanley, E. J., Glaser, H. H., Levin, D. G., Adams, P. A. and Coley, I. L. 1970. Overcoming obesity in adolescents: A description of a promising endeavor to improve management. Clin. Pediatr. 9: 29.

Steelman, V. P. 1974. The cultural context of food: A study of food habits and their social significance in selected areas of Louisiana. Bull. 681, Louisiana State Univ. Agric. Exp. Stn., Baton Rouge, La.

Stefanik, P. A., Heald, F. P. and Mayer, J. 1959. Caloric intake in relation to energy output of obese and non-obese adolescent boys. Am. J. Clin. Nutr. 7: 55.

Steggerda, M. and Densen, P. 1936. Height, weight, and age tables for homogenous groups: With particular reference to Navaho Indians and Dutch whites. Child Dev. 7: 115.

Stuart, H. C. and Meredith, H. V. 1946. Use of body measurements in the school health program. Am. J. Pub. Health 36: 1365.

Stuart, R. B. 1967. Behavioral control of overeating. Behav. Res. & Ther. 5: 357.

Stuart, R. B. 1971. A three-dimensional program for the treatment of obesity. Behav. Res. & Ther. 9: 177.

Stuart, R. B. and Davis, B. 1972. "Slim Chance in a Fat World: Behavioral Control of Obesity," Research Press Co., Champaign, Ill.

Stunkard, A. J. 1958. The results of treatment for obesity. N.Y. State J. Med. 58: 79.

Stunkard, A. J. 1972. New therapies for the eating disorders: Behavior modification of obesity and anorexia nervosa. Arch. Gen. Psychiatry 26: 391.

Stunkard, A. J. 1976. "The Pain of Obesity," Bull Publ. Co., Palo Alto, Calif.

Stunkard, A. and Burt, V. 1967. Obesity and the body image: II. Age at onset of disturbances in the body image. Am. J. Psychiatry 123: 11.

Stunkard, A., d'Aquile, E., Fox, S. and Filion, R. D. L. 1972. Influence of social class on obesity and thinness in children. J.A.M.A. 221: 579.

Stunkard, A. and McLaren-Hume, M. 1959. The results of treatment for obesity. Arch. Intern. Med. 103: 79.

Stunkard, A. and Mendelson, M. 1967. Obesity and the body image: I. Characteristics of disturbances in the body image of some obese persons. Am. J. Psychiatry 123: 1296.

Tannenbaum, P. 1959. Selected applications of the semantic differential. Public Opinion Q. 23: 435.

Tanner, J. M. and Whitehouse, R. H. 1955. The Harpenden skinfold caliper. Am. J. Phys. Anthropol. 13: 743.

Tanner, J. M. and Whitehouse, R. H. 1962. Standards for subcutaneous fat in British children: Percentiles for thickness of skinfolds over triceps and below scapula. Br. Med. J. 1: 446.

Todhunter, E. N. 1972. Food is more than nutrients. Food Nutr. News 43(6-7): 1.

U.S. Department of Agriculture. 1971. Nutritive value of foods. Home and Garden Bull. No. 72. Consumer and Food Economics Institute, Agric. Res. Serv., Washington, D.C.

Van Itallie, T. B. and Campbell, R. G. 1972. Multidisciplinary approach to the problem of obesity. J. Am. Diet. Assoc. 61: 385.

Wagner, M. and Hewitt, M. I. 1975. Oral satiety in the obese and nonobese. J. Am. Diet. Assoc. 67: 344.

Wakefield, L. M. and Miller, M. C. 1971. Several factors affecting college coeds' food preferences, habits and intake. J. Home Econ. 63: 45.

Weinseir, R. 1976. Nutritional considerations in the treatment of obesity. Presented at Child Nutrition Workshop, November 30, 1976, Birmingham, Ala.

Weisenberg, M. and Fray, E. 1974. What's missing in the treatment of obesity by behavior modification? J. Am. Diet. Assoc. 65: 410.

Wetzel, N. C. 1941. Physical fitness in terms of physique development and basal metabolism. J.A.M.A. 12: 1187.

Winick, M. 1974. Childhood obesity. Nutr. Today 9(3): 6.

Winick, M. 1975. "Childhood Obesity," John Wiley & Sons, New York, N.Y.

Wodarski, L. A. 1976. Food and nutrition misconceptions, knowledge, related interests, and information sources of Knoxville, Tennessee, high school students. Ph.D. thesis, University of Tennessee, Knoxville, Tenn.

Wollersheim, J. P. 1970. Effectiveness of group therapy upon learning principles in the treatment of overweight. Abnorm. Psychol. 76: 462.

Wooley, O. W., Wooley, S. C. and Dunham, R. B. 1972. Can calories be perceived and do they affect hunger in obese and nonobese humans? J. Comp. Physiol. Psychol. 80: 250.

Wooley, S. C. 1972. Physiologic versus cognitive factors in short term food regulation in the obese and nonobese. Psychosom. Med. 34: 62.

Zunich, M. and Fults, A. C. 1969. Food preferences of children from lower-socioeconomic groups—a geographic study. J. Home Econ. 61: 47.

APPENDIXES

APPENDIX A

HUMAN RIGHTS COMMITTEE APPROVAL

THE UNIVERSITY OF TENNESSEE. KNOXVILLE.
KNOXVILLE 37916

OFFICE OF THE VICE CHANCELLOR FOR
GRADUATE STUDIES AND RESEARCH

404 ANDY HOLT TOWER

AREA 615
TELEPHONE: 974-3466

May 17,. 1976

Dr. Hilton A. Smith
Vice Chancellor for Graduate
Studies and Research
404 Andy Holt Tower
The University of Tennessee
CAMPUS

Dear Dr. Smith:

The Committee on Research Participation has reviewed a research project by Dr. Mary A. Bass entitled "Multidimensional Profile of Hypertension Precursors," CRP #215. On May 13, 1976, the Committee approved the proposal subject to agreement by the project investigator that the subject (child) also sign the consent form.

It was also suggested that Dr. Bass should consult with Dr. Lawler on her hypertensive studies.

The responsibility of the project director includes the following:

1. Prior approval from the Committee must be obtained before any changes in protocol are instituted.

2. Signed consent statements from each experimental subject must be kept for the duration of the project and for at least three years thereafter.

3. The Committee must be informed of any physical or psychological effects on subjects for re-evaluation of the protocol approval.

4. A statement must be submitted (Form D) at 12-month intervals attesting to the current status of the project (protocol is still in effect, project is terminated, etc.)

The Committee wishes Dr. Bass success in her research endeavors.

Sincerely,

William Konnert

William Konnert, Chairperson
Committee on Research Participation

WK:pak

cc: Dr. Mary A. Bass

CONSENT STATEMENT

_____
Child's Name

I give permission for my child to participate in a school activity involving the answering of questions about food preferences and knowledge of calories and tasting samples of Kool-Aid of varying degrees of sweetness.. Names will not be used on the questionnaire to insure confidentiality.

_____ _____
Date Parent or Guardian

MAB/KC:nke
FSNFSA
10/1/76

Knoxville City Schools

Division of Instruction

101 East Fifth Avenue - Knoxville, Tennessee 37917 - Telephone (615) 546-2251

JAMES A. NEWMAN, Superintendent
PAUL KELLEY, ED. D, Director of Instruction
THOMAS R. UNDERWOOD, Director of Elementary Education
EARL W. HENRY, ED. D, Director of Secondary Education

MEMORANDUM

Date: August 16, 1976

To: Principals of Bearden Jr, South Jr., Whittle Springs Jr., Christenberry Jr., and Vine Jr. High Schools

From: Paul Kelley, Director of Instruction

Paul Kelley

Subject: Permission

Mrs. Kitty Coffey of the Department of Food Science, College of Home Economics, U.T., has permission to talk with you about a research project in nutrition knowledge and, if you agree, to conduct a portion of her study in your school.

APPENDIX B

DESCRIPTION OF POPULATION SAMPLE

Table 16

Composition of Total Sample by School, Race, and Sex

School	Total Sample N = 226	White			Black			Other		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
I	30	12	17	29	0	1	1	0	0	0
II	28	11	16	27	1	0	1	0	0	0
III	60	22	35	57	1	2	3	0	0	0
IV	51	1	0	1	26	24	50	0	0	0
V	57	31	20	51	3	1	4	2[a]	0	2
Total	226	77	88	165	31	28	59	2	0	2

[a]One American-born Oriental; one subject's race not identified.

Table 17

Composition of Total Sample by Age, Race, and Sex

Age	Total Sample N = 226	Race			Sex		Sex/Race Combination				
		White	Black	Other	Male	Female	White Males	Black Males	White Females	Black Females	Other
11.0-11.99	17	15	2	0	5	12	4	1	11	1	
12.0-12.99	166	126	38	2[a]	76	90	58	16	68	22	2[a]
13.0-13.99	40	24	16	0	26	14	15	11	9	5	
14.0-15.0	3	0	3	0	3	0	0	3	0	0	

[a]One American-born Oriental; one subject's race not identified.

APPENDIX C

QUESTIONNAIRES AND DIRECTIONS TO STUDENTS

Questionnaire

Directions to Students

Count your pages; you should have 11.

1. Page 1
   a. In most instances you will mark your answers by placing an "X" in the appropriate boxes.
   b. Ignore the numbers in parentheses along the sides; they are for computer use only.
   c. You are number ___ ___ ___.
   d. Place an "X" over your school (cite school) _____.
   e. Sex
   f. Race
   g. Birthdate: Write the number of the month, the day of the month, and year. (Have months with corresponding numbers on the blackboard.)
   h. Age: Years-months
      (Count the months since your last birthday.)
   i. Are you overweight?
      If you answered "yes" to above, how many pounds?
      If you answered "no" to above, skip this.
   j. Would you like to lose weight?
      If you answered "yes" to above, how many pounds?
      If you answered "no" to above, skip this.
2. Page 2
   a. Would you like to gain weight?
   b. If you answered "yes" to above, how many pounds?
      If you answered "no," skip this.
   c. Write what you think a Calorie is. (Just do your best. You're not being graded.)
   d. In order to lose weight, would you diet, exercise, or both?
      Place an "X" in the box of your choice.
   e. Last grade your mother attended?
      Write "DK" if you don't know.
      Write "DE" if deceased.
   f. Occupation of your mother?
      (Same as above.)
   g. Last grade your father attended?
      (Same as above.)
   h. Job/Occupation of your father?
      (Same as above.)
   i. This space is for the recording of your height, weight, and skinfold.
      These two gentlemen _____ and _____ will be measuring and weighing you.

They will demonstrate a skinfold measurement now. . . .
When you are tapped, please go to be measured.

3. Page 3
   a. When you return from being measured, you will be given a tray of eight Kool-Aid samples.
   b. Turn to page 3 of your questionnaire.
   c. You will note that the cups have numbers corresponding to the numbers on this page.
   d. Your cups will be arranged from left to right in the order that they are on this page.
   e. Before you begin tasting, drink all of one of your two cups of water.
   f. Then begin tasting your samples working from left to right.
   g. As you taste each, indicate how much you like it by checking on this five-space scale:
   (Demonstrate on blackboard.)

like extremely |___|___|___|___|___| dislike extremely

If you like extremely, check here.

If you dislike extremely, check here.

If neither like nor dislike, check here

If you like or dislike, but not extremely, check here.

   h. Do the same for how sweet you think the Kool-Aid is.
   i. Repeat your like-dislike and sweetness judgments for all eight samples.
   j. You may go back and taste again.
   k. The second cup of water is for you to sip between Kool-Aid samples to clear your mouth of the taste of the other samples. Raise your hand when you are finished with your tasting, and one of us will pick up your tray.

4. Page 4
   For each of these 32 foods, mark how many Calories that you think this amount of food would have.

5. Page 5
   Rate each of the following activities with regard to the amount of energy used. The higher the number, the greater the amount of energy used.

6. Pages 6, 7, 8
   If you could choose your food, how often would you choose each of these foods when available—every time, some of the time, seldom, never? If you have never tasted the food, check that column. If you do not know the food, check that column.
   There are three pages of foods to evaluate in this manner.

7. Page 9
   Do you think of the food listed below as one that is low in Calories or high in Calories?
   Do you think the food is extremely, moderately, or slightly low Calorie? Do you think it is both high and low Calorie? Do you think it is slightly, moderately, or extremely high Calorie? If you think it is neither high nor low Calorie, check that column. If you do not know the food, check that column.
8. Pages 10, 11
   Follow the same directions for page 10 indicating whether you think the food is more slimming or more fattening—and for page 11 indicating whether you think the food is one for someone who wants to lose weight or gain weight.

Are there any questions?

K.R. Coffey
M.A. Bass
Fall, 1976

Food Science, Nutrition, and Food
Systems Administration
College of Home Economics
University of Tennessee, Knoxville

Directions: Please mark the correct response by placing an "X" [X] in the appropriate box. Ignore the numbers in parenthesis; their purpose is for computer coding only.

You are number [ ][ ][ ][A] (1-4)

Write this number in the boxes on the upper right-hand corner of each page. KC BASS (5-10)

Name of School [ ] Whittle Springs (1a) [ ] Christen-berry (1b) [ ] South (02) [ ] Vine (03) [ ] Bearden (04) (11-12)

Sex [ ] Male (1) [ ] Female (2) (13)

Race [ ] White (1) [ ] Black (2) [ ] Other (3) (14)

Birthdate [ ][ ] Month [ ][ ] Day [1][9][ ][ ] Year (15-22)

Age [ ][ ] Years [ ][ ] Months (23-26)

Do you consider yourself overweight? [ ] Yes (1) [ ] No (2) (27)

If yes, how old were you when you became overweight? [ ][ ] Years (28-29)

Would you like to lose weight? [ ] Yes (1) [ ] No (2) (30)

If yes, how much would you like to lose? [ ][ ][ ] Pounds (31-33)

KC A BASS continued

Would you like to gain weight? ☐ Yes (1) ☐ No (2) (34)

If yes, how much would you like to gain? ☐☐☐ Pounds (35-37)

Write what you think a Calorie is:

_____ (38-39)

_____

☐☐

In order to lose weight would you: ☐ diet (1) ☐☐☐ exercise (2) ☐ both (3) (40)

Last school grade your mother attended ☐☐ (41-42)

Occupation of your mother _____ ☐☐ (43-44)

Last school grade your father attended ☐☐ (45-46)

Occupation of your father_____ ☐☐ (47-48)

Height ☐☐☐☐ mm (49-52)

Weight ☐☐☐ (53-55)

Triceps skinfold ☐☐ mm (56-57)

			A	continued	
KC			BASS		

Show your reaction by checking on the scale.

Sample				Code
521	like extremely	: : : : :	dislike extremely	58
	very sweet	: : : : :	not at all sweet	59
961	like extremely	: : : : :	dislike extremely	60
	very sweet	: : : : :	not at all sweet	61
852	like extremely	: : : : :	dislike extremely	62
	very sweet	: : : : :	not at all sweet	63
117	like extremely	: : : : :	dislike extremely	64
	very sweet	: : : : :	not at all sweet	65
775	like extremely	: : : : :	dislike extremely	66
	very sweet	: : : : :	not at all sweet	67
314	like extremely	: : : : :	dislike extremely	68
	very sweet	: : : : :	not at all sweet	69
090	like extremely	: : : : :	dislike extremely	70
	very sweet	: : : : :	not at all sweet	71
631	like extremely	: : : : :	dislike extremely	72
	very sweet	: : : : :	not at all sweet	73

KC		BASS		B				(1-4) (5-10)

How many calories do these foods have?

		0-50	50-100	100-150	151-200	200-250	250-300	300-350	Code	
1	hot dog									(11)
½ cup	cottage cheese									(12)
½ cup	watermelon									(13)
1 cup	jello									(14)
1 cup	whole milk									(15)
1 cup	hot tea, no sugar									(16)
1/8 medium	pizza									(17)
½ cup	applesauce									(18)
½ cup	spinach									(19)
1 bottle	soda pop									(20)
1 cup	orange juice									(21)
3 ounces	round steak									(22)
1 piece	cornbread									(23)
½ cup	mashed potatoes									(24)
1 medium	banana									(25)
½ cup	carrot-raisin salad									(26)
½ cup	grits									(27)
1 cup	coffee, black									(28)
10	French fried potatoes									(29)
½ cup	green beans									(30)
1	hamburger patty									(31)
1 slice	roast beef									(32)
½ cup	broccoli									(33)
½ cup	cabbage slaw									(34)
1	chocolate chip cookie									(35)
1 medium	fresh peach									(36)
1	roll									(37)
1 drumstick	fried chicken									(38)
1 cup	cornflakes									(39)
½ cup	chocolate pudding									(40)
1 cup	spaghetti (with meat balls and tomato sauce)									(41)
1 cup	Kool-Aid									(42)

		B	continued
KC		BASS	

Rate the following activities with regard to amount of energy used. The higher the number, the greater the energy required.

	1	2	3	4	5	Code	
Sitting quietly reading							(43)
Tennis							(44)
Ironing							(45)
Golfing							(46)
Lawn mowing with power mower							(47)
Basketball							(48)
Gymnastics							(49)
Touch football							(50)
Wrestling							(51)
Cooking							(52)
Typing							(53)
Bicycling							(54)
Vacuuming							(55)
Swimming							(56)
Horseback riding							(57)
Football							(58)
Sewing							(59)
Watching television							(60)
Playing cards							(61)
Bowling							(62)
Walking slowly, 2 mph							(63)
Lawn mowing with push mower							(64)
Water skiing							(65)
Soccer							(66)
Badminton							(67)
Social Dancing							(68)
Volley ball							(69)
Walking rapidly, 4.0 mph							(70)
Garden work							(71)
Softball or baseball							(72)
Field hockey							(73)
Roller skating							(74)

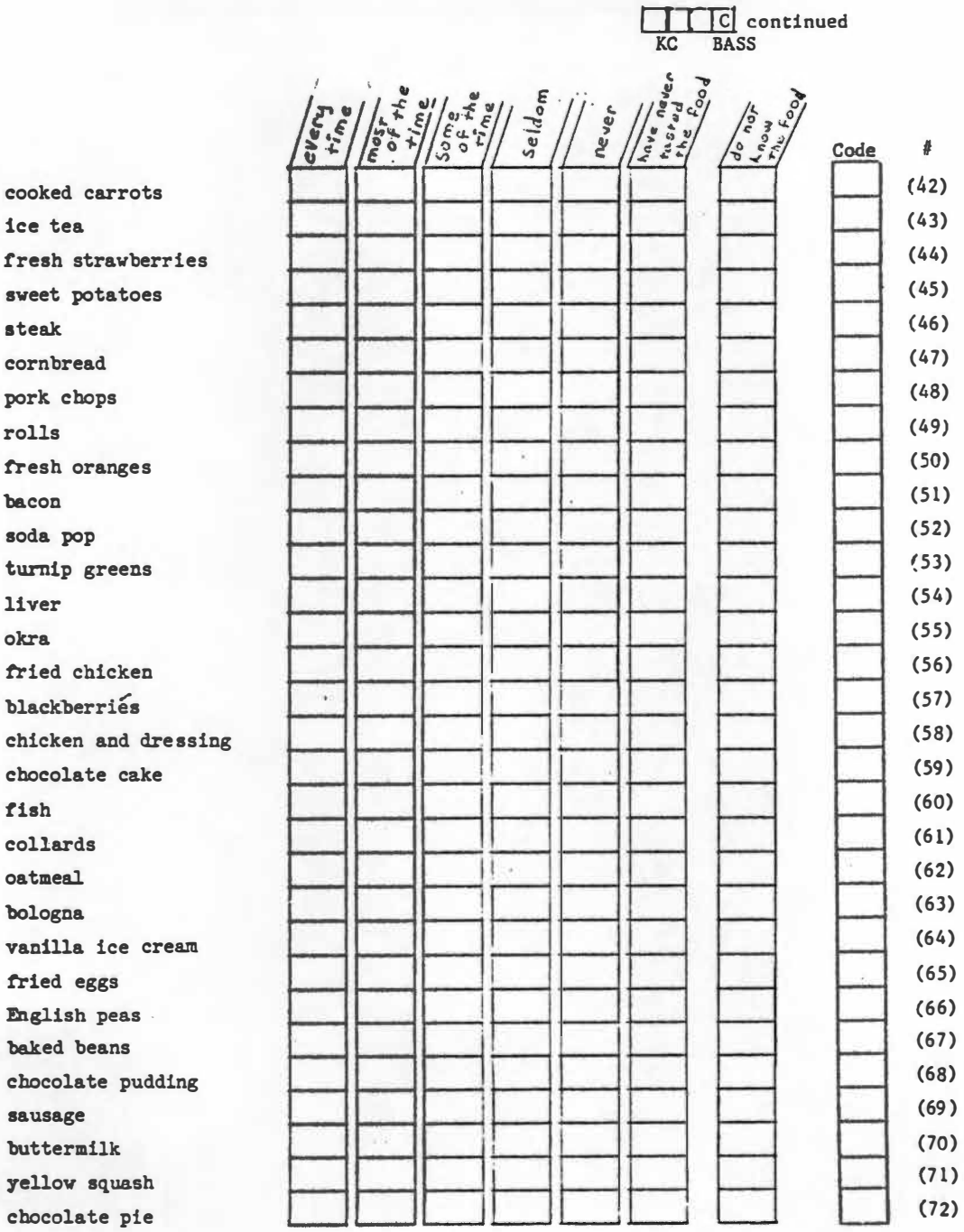
				C	
				KC	BASS

(1-4)
(5-10)

FOOD PREFERENCES

If you could choose your food, how often would you choose this food when it is available?

	every time	most of the time	some of the time	seldom	never	have never tasted the food	do not know the food	Code	
hot dogs									(11)
applesauce									(12)
orange juice									(13)
roast beef									(14)
macaroni and cheese									(15)
butter beans									(16)
milk									(17)
cottage cheese									(18)
bananas									(19)
turkey									(20)
green beans									(21)
black-eyed peas									(22)
chili									(23)
rice									(24)
fresh peaches									(25)
corn flakes									(26)
French fried potatoes									(27)
peanut butter cookies									(28)
broccoli									(29)
pizza									(30)
jello									(31)
hot tea									(32)
Kool-Aid									(33)
mashed potatoes									(34)
watermelon									(35)
strawberry ice cream									(36)
cabbage slaw									(37)
coffee									(38)
grits									(39)
hamburger									(40)
biscuits									(41)


C
KC BASS
continued
every time
most of the time
Some of the time
Seldom
never
have never tasted the food
do not know the food
Code
#
cooked carrots (42)
ice tea (43)
fresh strawberries (44)
sweet potatoes (45)
steak (46)
cornbread (47)
pork chops (48)
rolls (49)
fresh oranges (50)
bacon (51)
soda pop (52)
turnip greens (53)
liver (54)
okra (55)
fried chicken (56)
blackberries (57)
chicken and dressing (58)
chocolate cake (59)
fish (60)
collards (61)
oatmeal (62)
bologna (63)
vanilla ice cream (64)
fried eggs (65)
English peas (66)
baked beans (67)
chocolate pudding (68)
sausage (69)
buttermilk (70)
yellow squash (71)
chocolate pie (72)

No. [ ][ ][ ][D] (1-4)
KC BASS (5-10)

	every time	most of the time	some of the time	seldom	never	have never tasted the food	do not know the food	Code	#
fresh apples									(11)
spinach									(12)
chicken and dumplings									(13)
cantaloupe									(14)
scrambled eggs									(15)
carrot strips									(16)
hominy									(17)
Tang									(18)
banana pudding									(19)
potato salad									(20)
chocolate ice cream									(21)
cheddar cheese									(22)
vegetable soup									(23)
pinto beans									(24)
cauliflower									(25)
neck bones									(26)
carrot-raisin salad									(27)
tomatoes									(28)
spaghetti									(29)
hot chocolate									(30)
corn									(31)
apple pie									(32)

					(1-4)
			E		
KC				BASS	(5-10)

Do you think of the food listed below as one that is low calories or high calorie?

	Extremely	Moderately	Slightly	Both	Slightly	Moderately	Extremely	Neither	Do not know food	Code	
hot dog	low calorie	:	:	:	:	:	:	high calorie	:		(11)
cottage cheese	low calorie	:	:	:	:	:	:	high calorie	:		(12)
watermelon	low calorie	:	:	:	:	:	:	high calorie	:		(13)
jello	low calorie	:	:	:	:	:	:	high calorie	:		(14)
whole milk	low calorie	:	:	:	:	:	:	high calorie	:		(15)
hot tea	low calorie	:	:	:	:	:	:	high calorie	:		(16)
pizza	low calorie	:	:	:	:	:	:	high calorie	:		(17)
applesauce	low calorie	:	:	:	:	:	:	high calorie	:		(18)
spinach	low calorie	:	:	:	:	:	:	high calorie	:		(19)
soda pop	low calorie	:	:	:	:	:	:	high calorie	:		(20)
orange juice	low calorie	:	:	:	:	:	:	high calorie	:		(21)
steak	low calorie	:	:	:	:	:	:	high calorie	:		(22)
cornbread	low calorie	:	:	:	:	:	:	high calorie	:		(23)
mashed potatoes	low calorie	:	:	:	:	:	:	high calorie	:		(24)
banana	low calorie	:	:	:	:	:	:	high calorie	:		(25)
carrot-raisin salad	low calorie	:	:	:	:	:	:	high calorie	:		(26)
grits	low calorie	:	:	:	:	:	:	high calorie	:		(27)
coffee	low calorie	:	:	:	:	:	:	high calorie	:		(28)
French fried potatoes	low calorie	:	:	:	:	:	:	high calorie	:		(29)
green beans	low calorie	:	:	:	:	:	:	high calorie	:		(30)
hamburger	low calorie	:	:	:	:	:	:	high calorie	:		(31)
roast beef	low calorie	:	:	:	:	:	:	high calorie	:		(32)
broccoli	low calorie	:	:	:	:	:	:	high calorie	:		(33)
cabbage slaw	low calorie	:	:	:	:	:	:	high calorie	:		(34)
chocolate chip cookie	low calorie	:	:	:	:	:	:	high calorie	:		(35)
fresh peach	low calorie	:	:	:	:	:	:	high calorie	:		(36)
roll	low calorie	:	:	:	:	:	:	high calorie	:		(37)
fried chicken	low calorie	:	:	:	:	:	:	high calorie	:		(38)
corn flakes	low calorie	:	:	:	:	:	:	high calorie	:		(39)
chocolate pudding	low calorie	:	:	:	:	:	:	high calorie	:		(40)
spaghetti	low calorie	:	:	:	:	:	:	high calorie	:		(41)
Kool-Aid	low calorie	:	:	:	:	:	:	high calorie	:		(42)

				E
KC		BASS		

continued

Do you think of the food listed below as that is slimming or fattening?

	Extremely	Moderately	Slightly	Both	Slightly	Moderately	Extremely	Neither	Do not know food	Code	
hot dog	slimming							fattening			(43)
cottage cheese	slimming							fattening			(44)
watermelon	slimming							fattening			(45)
jello	slimming							fattening			(46)
whole milk	slimming							fattening			(47)
hot tea	slimming							fattening			(48)
pizza	slimming							fattening			(49)
applesauce	slimming							fattening			(50)
spinach	slimming							fattening			(51)
soda pop	slimming							fattening			(52)
orange juice	slimming							fattening			(53)
steak	slimming							fattening			(54)
cornbread	slimming							fattening			(55)
mashed potatoes	slimming							fattening			(56)
banana	slimming							fattening			(57)
carrot-raisin salad	slimming							fattening			(58)
grits	slimming							fattening			(59)
coffee	slimming							fattening			(60)
French fried potatoes	slimming							fattening			(61)
green beans	slimming							fattening			(62)
hamburger	slimming							fattening			(63)
roast beef	slimming							fattening			(64)
broccoli	slimming							fattening			(65)
cabbage slaw	slimming							fattening			(66)
chocolate chip cookie	slimming							fattening			(67)
fresh peach	slimming							fattening			(68)
roll	slimming							fattening			(69)
fried chicken	slimming							fattening			(70)
corn flakes	slimming							fattening			(71)
chocolate pudding	slimming							fattening			(72)
spaghetti	slimming							fattening			(73)
Kool-Aid	slimming							fattening			(74)

													F	(1-4)	
														(5-10)	
												KC		BASS	

Do you think of the food listed below as one for someone who wants to lose weight or gain weight?

	Extremely	Moderately	Slightly	Both	Slightly	Moderately	Extremely		Neither	Do not know food	Code	
hot dog	losing							gaining				(11)
cottage cheese	losing							gaining				(12)
watermelon	losing							gaining				(13)
jello	losing							gaining				(14)
whole milk	losing							gaining				(15)
hot tea	losing							gaining				(16)
pizza	losing							gaining				(17)
applesauce	losing							gaining				(18)
spinach	losing							gaining				(19)
soda pop	losing							gaining				(20)
orange juice	losing							gaining				(21)
steak	losing							gaining				(22)
cornbread	losing							gaining				(23)
mashed potatoes	losing							gaining				(24)
banana	losing							gaining				(25)
carrot-raisin salad	losing							gaining				(26)
grits	losing							gaining				(27)
coffee	losing							gaining				(28)
French fried potatoes	losing							gaining				(29)
green beans	losing							gaining				(30)
hamburger	losing							gaining				(31)
roast beef	losing							gaining				(32)
broccoli	losing							gaining				(33)
cabbage slaw	losing							gaining				(34)
chocolate chip cookie	losing							gaining				(35)
fresh peach	losing							gaining				(36)
roll	losing							gaining				(37)
fried chicken	losing							gaining				(38)
corn flakes	losing							gaining				(39)
chocolate pudding	losing							gaining				(40)
spaghetti	losing							gaining				(41)
Kool-Aid	losing							gaining				(42)

APPENDIX D

DEMOGRAPHIC DATA

Table 18

Education (Yr) of Parents of Seventh-Grade Students

Group	Father						Mother					
	n	Mean	S.D.	Mode	Minimum	Maximum	n	Mean	S.D.	Mode	Minimum	Maximum
Population Sample	117	13.3	2.9	12.0	7.0	20.0	146	12.6	2.5	12.0	2.0	20.0
Race												
White	99	13.4	3.0	12.0	7.0	20.0	113	12.8*[a]	2.5	12.0	5.0	20.0
Black	16	12.4	1.7	12.0	9.0	16.0	31	11.7*[a]	2.2	12.0	2.0	16.0
School												
I	24	12.2	2.0	12.0	8.0	17.0	22	11.7	2.1	12.0	5.0	17.0
II	9	11.8	1.6	12.0	8.0	14.0	16	11.8	2.1	12.0	6.0	17.0
III	34	12.4	2.3	12.0	7.0	17.0	39	12.1	1.9	12.0	8.0	16.0
IV	13	12.1	1.2	12.0	9.0	14.0	27	11.7	2.2	12.0	2.0	14.0
V	37	15.6	3.2	16.0	7.0	20.0	41	14.5	2.4	16.0	7.0	20.0

[a]Means based on pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

Table 19

Occupational Scores[a] by Category[b] for Seventh-Grade Students

Group	Father					Mother				
	n	Mean	S.D.	Median	Mode	n	Mean	S.D.	Median	Mode
Population Sample	174	3.9	1.0	3.9	4.0	108	3.6	1.1	3.7	4.0
Race										
White	145	4.0*[c]	1.0	4.0	4.0	82	4.0***	0.8	4.0	4.0
Black	27	3.5*[c]	0.9	3.3	3.0	24	2.3***	1.1	2.7	3.0
School										
I	30	3.6	1.0	3.7	4.0	18	3.8	0.7	3.8	4.0
II	24	3.6	0.9	3.7	4.0	16	3.7	0.8	3.5	3.0
III	46	3.9	0.9	3.9	4.0	23	3.9	0.8	3.9	4.0
IV	21	3.3	0.8	3.2	3.0	19	2.1	1.1	2.0	1.0
V	53	4.5	0.9	4.6	5.0	32	4.2	0.9	4.3	4.0

[a]Standardized scores for specific occupations (Green, 1970).

[b]Scores 20-29 = 1; scores 30-39 = 2; scores 40-49 = 3; scores 50-59 = 4; scores 60-69 = 5; scores 70-79 = 6; scores 80-89 = 7.

[c]Means based on separate variance estimate. Those means without a superscript are based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

***Significantly different ($p < 0.001$) by t-test.

Table 20

Age (Yr) of First Self-Perception as Overweight for Seventh-Grade Students

Age (Yr)	N N=71	Race		Sex		School					Body Fatness Class		
		White n=57	Black n=14	Male n=28	Female n=43	I n=11	II n=8	III n=25	IV n=12	V n=15	"Lean" n=7	"Middle" n=14	"Fat" n=41
1	1	1			1			1					1
5	3	3		1	2	2		1					3
6	3	3		2	1		1	1		1			3
7	4	4		4		1		2		1		1	3
8	2	1	1		2		1		1				1
9	7	6	1	3	5	1	2	4	1		2	1	3
10	22	18	4	9	13	1	3	8	4	6	1	5	10
11	17	12	5	5	12	5		4	3	5	1	5	11
12	11	8	3	4	7	1	1	4	3	2	3	2	6
Mean	9.7	9.5*[a]	10.6*[a]	9.5	9.9	9.4	9.2	9.4	10.5	10.1	10.7	10.4	9.3
S.D.	2.1	2.2	1.2	2.0	2.2	2.5	1.8	2.5	1.2	1.6	1.4	1.3	2.5
Mode	10.0	10.0	11.0	10.0	10.0	11.0	10.0	10.0	10.0	10.0	12.0	11.0	11.0

[a]Means based on separate variance estimate.

*Significantly different ($p < 0.05$) by t-test.

Table 21

Analysis of Variance for Age (Yr) of First Self-Perception as Overweight for Seventh-Grade Students in Five Schools

Source of Variation	Sum of Squares	d.f.	Mean Squares	F	P
Between Groups	16.2500	4	4.0625	0.910	0.465
Within Groups	294.5430	66	4.4628		
Total	310.7930	70			

APPENDIX E

FOOD PREFERENCE DATA

Table 22

Frequencies of Choice for 84 Foods by Seventh-Grade Students

Food	Every Time	Most of the Time	Some of the Time	Seldom	Never	Have Never Tasted the Food	Do Not Know the Food	Missing	Patterned
Hot dogs	29	56	108	29	3	0	0	0	1
Applesauce	23	34	55	78	30	0	2	3	1
Orange juice	58	51	60	44	10	0	0	2	1
Roast beef	51	51	71	36	9	0	2	5	1
Macaroni and cheese	44	54	56	36	27	1	1	6	1
Butter beans	13	20	39	43	85	7	13	5	1
Milk	89	66	27	20	17	1	1	4	1
Cottage cheese	24	21	44	37	82	9	1	7	1
Bananas	45	56	77	28	13	0	1	5	1
Turkey	58	64	63	26	8	0	1	5	1
Green beans	31	39	67	45	35	2	1	5	1
Black-eyed peas	13	22	26	44	110	5	3	2	1
Chili	55	60	65	19	21	0	1	4	1
Rice	27	42	56	35	54	3	1	7	1
Fresh peaches	51	62	54	37	13	2	0	6	1
Corn flakes	35	51	59	49	24	1	0	6	1
French fried potatoes	86	64	53	12	4	0	0	6	1
Peanut butter cookies	63	41	57	36	22	1	1	4	1
Broccoli	18	40	37	25	90	8	2	5	1
Pizza	121	40	41	13	6	0	0	4	1
Jello	50	51	66	40	12	0	0	6	1
Hot tea	33	38	48	42	56	3	0	5	1
Kool-Aid	62	58	65	25	10	0	0	5	1
Mashed potatoes	70	65	53	19	13	1	0	4	1
Watermelon	78	58	48	27	9	1	0	4	1
Strawberry ice cream	57	42	44	36	36	0	0	10	1
Cabbage slaw	13	17	39	42	93	12	7	2	1
Coffee	10	26	24	41	107	9	0	8	1
Grits	28	20	52	36	73	10	3	3	1
Hamburger	101	61	50	6	2	0	0	5	1
Biscuits	62	65	65	19	7	2	0	5	1
Cooked carrots	17	20	34	51	99	0	1	1	2
Iced tea	60	56	61	25	21	0	0	1	2
Fresh strawberries	96	44	40	20	21	1	0	2	2
Sweet potatoes	48	35	46	35	56	2	0	2	2

Table 22 (continued)

Food	Every Time	Most of the Time	Some of the Time	Seldom	Never	Have Never Tasted the Food	Do Not Know the Food	Missing	Patterned
Steak	108	51	37	18	7	0	0	3	2
Cornbread	59	59	62	37	7	0	0	0	2
Pork chops	91	61	52	17	3	0	0	0	2
Rolls	85	70	53	12	4	0	0	0	2
Fresh oranges	86	62	50	16	7	0	0	3	2
Bacon	90	60	52	15	7	0	0	0	2
Soda pop	84	57	50	23	6	1	0	3	2
Turnip greens	19	23	29	38	98	11	3	3	2
Liver	18	16	27	32	116	12	1	2	2
Okra	45	35	34	20	69	8	5	8	2
Fried chicken	82	68	48	7	14	0	0	5	2
Blackberries	63	47	43	35	31	1	0	4	2
Chicken and dressing	87	49	53	16	12	2	0	5	2
Chocolate cake	85	51	54	23	6	0	0	5	2
Fish	54	57	56	22	23	3	2	7	2
Collards	13	19	17	33	42	30	61	9	2
Oatmeal	31	41	65	37	43	2	1	4	2
Balogna	40	66	69	29	15	0	2	3	2
Vanilla ice cream	66	48	66	25	13	0	0	6	2
Fried eggs	42	45	63	31	34	2	2	5	2
English peas	11	10	24	24	67	32	47	9	2
Baked beans	47	33	48	38	44	3	3	8	2
Chocolate pudding	63	40	64	31	22	1	0	3	2
Sausage	67	52	51	17	24	0	0	13	2
Buttermilk	11	12	12	22	142	15	2	8	2
Yellow squash	13	11	22	29	106	19	9	15	2
Chocolate pie	78	35	53	25	28	0	0	5	2
Fresh apples	93	63	37	18	8	1	0	5	1
Spinach	30	30	42	24	89	5	0	5	1
Chicken and dumplings	75	51	41	29	20	2	0	7	1
Cantaloupe	61	48	35	31	37	1	2	10	1
Scrambled eggs	50	68	46	28	26	2	1	4	1
Carrot strips	34	41	37	46	57	4	2	4	1
Hominy	25	21	22	30	59	21	39	8	1
Tang	58	36	50	30	28	10	5	8	1
Banana pudding	63	44	47	36	27	1	1	6	1
Potato salad	48	40	34	35	53	6	1	8	1
Chocolate ice cream	86	48	45	22	13	0	1	10	1
Cheddar cheese	49	37	40	26	52	7	4	10	1

Table 22 (continued)

	Every Time	Most of the Time	Some of the Time	Seldom	Never	Have Never Tasted the Food	Do Not Know the Food	Missing	Patterned
Vegetable soup	60	40	60	28	29	0	1	7	1
Pinto beans	36	37	46	43	48	2	0	13	1
Cauliflower	21	17	14	21	97	18	28	9	1
Neck bones	17	12	27	22	73	29	36	9	1
Carrot-raisin salad	17	13	21	30	81	25	26	12	1
Tomatoes	42	56	52	17	47	3	0	8	1
Spaghetti	96	62	44	9	6	0	2	6	1
Hot chocolate	87	58	51	15	7	0	0	7	1
Corn	80	65	43	20	8	0	0	9	1
Apple pie	91	40	33	25	23	1	0	12	1

Table 23

Perceived Food Preference Scores[a] for Seventh-Grade Students by Race and Sex

Food	Total Sample			Race						Sex					
				White			Black			Male			Female		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Hot dogs	3.4	0.9	3.0	3.3	0.9	3.0	3.5	1.0	3.0	3.5*	0.8	3.0	3.2*	1.0	3.0
Applesauce	2.7	1.2	2.0	2.6***	1.1	2.0	3.2***	1.2	3.0	2.9*	1.2	2.0	2.6*	1.1	2.0
Orange juice	3.5	1.2	3.0	3.4*	1.2	3.0	3.8*	1.3	5.0	3.5	1.1	3.0	3.4	1.3	5.0
Roast beef	3.4	1.1	3.0	3.5	1.1	3.0	3.2	1.3	2.0	3.3	1.2	3.0	3.6	1.1	3.0
Macaroni and cheese	3.2	1.3	3.0	3.3	1.3	4.0	3.2	1.2	3.0	3.1	1.3	3.0	3.4	1.3	3.0
Butter beans	2.2	1.3	1.0	2.2	1.2	1.0	2.2	1.4	1.0	2.4**	1.3	1.0	1.9**	1.2	1.0
Milk	3.9	1.3	5.0	3.8	1.2	5.0	4.1	1.3	5.0	4.0	1.2	5.0	3.8	1.4	5.0
Cottage cheese	2.4	1.4	1.0	2.4	1.4	1.0	2.2	1.4	1.0	2.4	1.4	1.0	2.4	1.4	1.0
Bananas	3.4	1.1	3.0	3.5	1.1	3.0	3.3	1.2	3.0	3.4	1.1	3.0	3.4	1.2	3.0
Turkey	3.6	1.1	4.0	3.7*[b]	1.0	3.0	3.3*[b]	1.3	4.0	3.7	1.0	4.0	3.5	1.2	3.0
Green beans	2.9	1.3	3.0	2.9	1.2	3.0	3.1	1.3	3.0	3.0	1.3	3.0	2.9	1.3	3.0
Black-eyed peas	2.0	1.3	1.0	2.0	1.3	1.0	1.8	1.1	1.0	2.1	1.2	1.0	1.9	1.3	1.0
Chili	3.5	1.2	3.0	3.5	1.2	3.0	3.6	1.3	5.0	3.6	1.2	4.0	3.4	1.2	3.0
Rice	2.8	1.4	3.0	2.6**	1.4	1.0	3.2**	1.2	2.0	3.0**	1.3	4.0	2.5**	1.4	1.0
Fresh peaches	3.5	1.2	4.0	3.4	1.2	3.0	3.5	1.2	4.0	3.4	1.2	4.0	3.5	1.2	5.0
Corn flakes	3.1	1.2	3.0	3.0**	1.2	3.0	3.6**	1.2	4.0	3.3**	1.2	3.0	2.9**	1.2	3.0
French fried potatoes	4.0	1.0	5.0	4.0	1.0	5.0	3.9	1.1	5.0	3.9	1.0	5.0	4.0	1.0	5.0
Peanut butter cookies	3.4	1.3	5.0	3.5	1.3	5.0	3.1	1.3	4.0	3.4	1.2	3.0	3.4	1.4	5.0
Broccoli	2.4	1.4	1.0	2.3	1.4	1.0	2.6	1.4	1.0	2.4	1.4	1.0	2.3	1.4	1.0
Pizza	4.2	1.1	5.0	4.3**[b]	1.0	5.0	3.8**[b]	1.2	5.0	4.1	1.1	5.0	4.2	1.1	5.0
Jello	3.4	1.2	3.0	3.3	1.2	3.0	3.5	1.2	5.0	3.6*	1.1	3.0	3.2*	1.2	3.0
Hot tea	2.8	1.4	1.0	2.5***	1.4	1.0	3.4***	1.3	3.0	2.9	1.4	1.0	2.7	1.4	1.0
Kool-Aid	3.6	1.1	3.0	3.5	1.1	4.0	3.8	1.1	5.0	3.7	1.2	5.0	3.5	1.1	3.0
Mashed potatoes	3.7	1.2	5.0	3.8	1.2	5.0	3.6	1.2	5.0	3.8	1.2	5.0	3.7	1.2	4.0
Watermelon	3.8	1.2	5.0	3.8	1.2	5.0	3.6	1.2	4.0	3.7	1.2	5.0	3.8	1.2	5.0
Strawberry ice cream	3.2	1.4	5.0	3.2	1.4	5.0	3.3	1.6	5.0	3.5**	1.4	5.0	2.9**	1.4	1.0

Table 23 (continued)

Food	Total Sample			Race						Sex					
				White			Black			Male			Female		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Cabbage slaw	2.1	1.2	1.0	2.0*	1.2	1.0	2.4*	1.2	2.0	2.2	1.3	1.0	2.0	1.2	1.0
Coffee	2.0	1.2	1.0	1.8**	1.2	1.0	2.4**	1.4	1.0	2.2**	1.3	1.0	1.8**	1.1	1.0
Grits	2.5	1.4	1.0	2.3***	1.3	1.0	3.0***	1.4	3.0	2.6	1.4	1.0	2.4	1.3	1.0
Hamburger	4.2	0.9	5.0	4.2	0.8	5.0	4.0	1.1	5.0	4.2	0.9	5.0	4.1	1.0	5.0
Biscuits	3.7	1.1	3.0	3.8	1.1	3.0	3.6	1.1	3.0	3.7	1.0	3.0	3.7	1.1	5.0
Cooked carrots	2.1	1.3	1.0	2.1	1.3	1.0	2.1	1.4	1.0	2.3*	1.3	1.0	1.9*	1.2	1.0
Iced tea	3.5	1.3	3.0	3.4*	1.3	3.0	3.8*	1.2	5.0	3.5	1.2	3.0	3.5	1.3	5.0
Fresh strawberries	3.8	1.3	5.0	3.8	1.3	5.0	3.7	1.4	5.0	3.7	1.3	5.0	3.9	1.4	5.0
Sweet potatoes	2.9	1.5	1.0	2.7***	1.5	1.0	3.5***	1.4	5.0	3.1	1.4	3.0	2.8	1.5	1.0
Steak	4.1	1.1	5.0	4.2***	1.1	5.0	3.6***	1.3	5.0	4.2*	1.1	5.0	3.9*	1.2	5.0
Cornbread	3.6	1.1	3.0	3.6	1.1	3.0	3.5	1.3	5.0	3.6	1.2	5.0	3.5	1.1	3.0
Pork chops	4.0	1.0	5.0	4.0	1.0	5.0	3.8	1.2	5.0	4.1	0.9	5.0	3.9	1.1	5.0
Rolls	4.0	1.0	5.0	4.0	1.0	5.0	3.9	1.1	4.0	4.0	1.0	5.0	4.0	1.0	5.0
Fresh oranges	3.9	1.1	5.0	4.0	1.1	5.0	3.8	1.2	5.0	3.9	1.1	5.0	3.9	1.1	5.0
Bacon	3.9	1.1	5.0	4.0	1.1	5.0	3.8	1.2	5.0	4.0	1.0	5.0	3.9	1.2	5.0
Soda pop	3.9	1.1	5.0	3.9	1.1	5.0	3.9	1.2	5.0	3.8	1.2	5.0	3.9	1.1	5.0
Turnip greens	2.2	1.4	1.0	1.9***b	1.2	1.0	2.8***b	1.5	1.0	2.3	1.4	1.0	2.0	1.3	1.0
Liver	2.0	1.3	1.0	1.8**b	1.2	1.0	2.5**b	1.6	1.0	2.2	1.4	1.0	1.8	1.3	1.0
Okra	2.8	1.6	1.0	3.0*	1.6	1.0	2.4*	1.5	1.0	2.8	1.6	1.0	2.8	1.6	1.0
Fried chicken	3.9	1.1	5.0	3.9	1.2	5.0	4.0	1.1	5.0	3.9	1.1	4.0	3.9	1.2	5.0
Blackberries	3.4	1.4	5.0	3.4	1.4	5.0	3.2	1.4	5.0	3.4	1.4	5.0	3.3	1.4	5.0
Chicken and dressing	3.8	1.2	5.0	3.8	1.2	5.0	4.0	1.1	5.0	3.8	1.2	5.0	3.8	1.2	5.0
Chocolate cake	3.8	1.1	5.0	3.8	1.1	5.0	3.9	1.2	5.0	3.9	1.1	5.0	3.8	1.2	5.0
Fish	3.5	1.3	4.0	3.4	1.3	4.0	3.6	1.2	5.0	3.4	1.3	3.0	3.5	1.2	4.0
Collards	2.4	1.4	1.0	2.0***	1.2	1.0	3.1***	1.3	4.0	2.5	1.4	1.0	2.3	1.3	1.0
Oatmeal	2.9	1.3	3.0	2.8	1.2	3.0	3.2	1.5	5.0	3.1**	1.3	3.0	2.7**	1.3	3.0
Bologna	3.4	1.1	3.0	3.3*	1.1	3.0	3.7*	1.2	4.0	3.4	1.1	3.0	3.4	1.2	3.0

Table 23 (continued)

Food	Total Sample			Race						Sex					
				White			Black			Male			Female		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Vanilla ico cream	3.6	1.2	3.0	3.6	1.1	3.0	3.5	1.4	5.0	3.8**	1.1	5.0	3.4**	1.2	3.0
Fried eggs	3.1	1.3	3.0	3.1	1.3	3.0	3.1	1.4	3.0	3.2	1.3	3.0	3.1	1.3	3.0
English peas	2.1	1.3	1.0	1.9	1.2	1.0	2.4	1.5	1.0	2.4**	1.4	1.0	1.8**	1.2	1.0
Baked beans	3.0	1.4	3.0	3.0	1.4	3.0	2.9	1.5	1.0	3.3***	1.4	5.0	2.7***	1.4	1.0
Chocolate pudding	3.4	1.3	3.0	3.5	1.3	5.0	3.1	1.4	3.0	3.6	1.2	3.0	3.3	1.4	5.0
Sausage	3.6	1.3	5.0	3.6	1.3	5.0	3.5	1.3	4.0	3.7	1.3	5.0	3.5	1.4	5.0
Buttermilk	1.6	1.2	1.0	1.5*	1.1	1.0	1.9*	1.3	1.0	1.8	1.3	1.0	1.5	1.1	1.0
Yellow squash	1.9	1.3	1.0	1.9	1.3	1.0	2.0	1.2	1.0	2.1*b	1.4	1.0	1.7*b	1.1	1.0
Chocolate pie	3.5	1.4	5.0	3.7***	1.3	5.0	3.0***	1.5	1.0	3.6	1.2	5.0	3.4	1.5	5.0
Fresh apples	4.0	1.1	5.0	3.9	1.1	5.0	4.1	1.2	5.0	4.1	1.1	5.0	3.9	1.1	5.0
Spinach	2.5	1.5	1.0	2.3***	1.4	1.0	3.1***	1.5	1.0	2.7*	1.5	1.0	2.3*	1.4	1.0
Chicken and dumplings	3.6	1.3	5.0	3.7*	1.3	5.0	3.3*	1.4	3.0	3.6	1.2	5.0	3.6	1.4	5.0
Cantaloupe	3.3	1.5	5.0	3.3	1.5	5.0	3.2	1.4	4.0	3.2	1.5	4.0	3.4	1.4	5.0
Scrambled eggs	3.4	1.3	4.0	3.4	1.3	4.0	3.4	1.4	4.0	3.6*	1.2	4.0	3.2*	1.3	4.0
Carrot strips	2.8	1.4	1.0	2.8	1.4	1.0	2.6	1.4	1.0	2.8	1.4	1.0	2.7	1.5	1.0
Hominy	2.5	1.5	1.0	2.4	1.5	1.0	2.8	1.6	1.0	2.6	1.5	1.0	2.4	1.5	1.0
Tang	3.3	1.4	5.0	3.2	1.4	3.0	3.5	1.5	5.0	3.4	1.4	5.0	3.3	1.4	5.0
Banana pudding	3.4	1.4	5.0	3.4	1.4	5.0	3.2	1.4	5.0	3.5	1.3	5.0	3.3	1.4	5.0
Potato salad	3.0	1.5	1.0	2.8**	1.5	1.0	3.4**	1.4	5.0	3.2	1.5	4.0	2.8	1.5	1.0
Chocolate ice cream	3.8	1.2	5.0	3.8	1.2	5.0	3.6	1.3	5.0	3.8	1.1	5.0	3.8	1.3	5.0
Cheddar cheese	3.0	1.5	1.0	3.1	1.5	1.0	2.9	1.6	1.0	3.0	1.5	1.0	3.0	1.6	1.0
Vegetable soup	3.3	1.4	3.0	3.4	1.4	3.0	3.3	1.4	5.0	3.3	1.3	3.0	3.4	1.4	5.0
Pinto beans	2.9	1.4	1.0	2.8	1.4	1.0	2.9	1.4	1.0	3.0	1.4	1.0	2.7	1.4	1.0
Cauliflower	2.1	1.5	1.0	2.0	1.4	1.0	2.4	1.7	1.0	2.1	1.5	1.0	2.1	1.5	1.0
Neck bones	2.2	1.4	1.0	1.8***b	1.1	1.0	3.1***b	1.5	5.0	2.4*	1.5	1.0	1.9*	1.2	1.0
Carrot-raisin salad	2.1	1.4	1.0	1.9*b	1.2	1.0	2.6*b	1.7	1.0	2.2	1.4	1.0	2.0	1.3	1.0
Tomatoes	3.1	1.4	4.0	3.1	1.4	4.0	3.3	1.4	4.0	3.0	1.4	3.0	3.3	1.4	4.0

Table 23 (continued)

Food	Total Sample			Race						Sex					
				White			Black			Male			Female		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Spaghetti	4.1	1.0	5.0	4.2*	1.0	5.0	3.8*	1.3	5.0	4.0*b	1.1	5.0	4.1*b	1.0	5.0
Hot chocolate	3.9	1.1	5.0	4.0	1.0	5.0	3.8	1.3	5.0	4.1*b	0.9	5.0	3.8*b	1.2	5.0
Corn	3.9	1.1	5.0	3.9	1.1	5.0	3.8	1.2	5.0	3.9	1.1	5.0	3.8	1.2	5.0
Apple pie	3.7	1.4	5.0	3.7	1.4	5.0	3.6	1.5	5.0	4.0*b	1.2	5.0	3.5*b	1.5	5.0

[a]Choice of everytime = 5; most of the time = 4; some of the time = 3; seldom = 2; never = 1.

[b]Means are based on a separate variance estimate. Those means without a superscript are based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

**Significantly different ($p < 0.01$) by t-test.

***Significantly different ($p < 0.001$) by t-test.

Table 24

Perceived Food Preference Scores[a] for Seventh-Grade Students by Body Fatness Class

Food	Body Fatness Class "Lean" Mean	"Lean" S.D.	"Lean" Mode	"Middle" Mean	"Middle" S.D.	"Middle" Mode	"Fat" Mean	"Fat" S.D.	"Fat" Mode
Hot dogs	3.4	0.9	3.0	3.4	1.0	3.0	3.2	0.8	3.0
Applesauce	2.9	1.2	2.0	2.8	1.9	2.0	2.6	1.2	2.0
Orange juice	3.5	1.3	5.0	3.5	1.2	5.0	3.5	1.2	4.0
Roast beef	3.5	1.2	3.0	3.5	1.2	3.0	3.2	1.2	3.0
Macaroni and cheese	3.3	1.3	4.0	3.4	1.2	3.0	3.2	1.3	4.0
Butter beans	2.2	1.3	1.0	2.3	1.3	1.0	2.0	1.2	1.0
Milk	4.0	1.4	5.0	4.0	1.2	5.0	3.6	1.3	4.0
Cottage cheese	2.6	1.5	1.0	2.4	1.4	1.0	2.1	1.3	1.0
Bananas	3.7*[b]	1.2	4.0	3.3	1.1	3.0	3.3*[b]	1.2	3.0
Turkey	3.6	1.2	5.0	3.6	1.1	3.0	3.6	1.1	4.0
Green beans	3.0	1.2	3.0	2.9	1.2	3.0	2.9	1.3	3.0
Black-eyed peas	2.0	1.3	1.0	2.1	1.4	1.0	1.8	1.1	1.0
Chili	3.7	1.2	4.0	3.5	1.2	3.0	3.4	1.3	3.0
Rice	3.0	1.3	3.0	2.8	1.4	1.0	2.6	1.4	1.0
Fresh peaches	3.5	1.2	3.0	3.4	1.2	4.0	3.4	1.2	3.0
Corn flakes	3.2	1.2	4.0	3.2	1.2	3.0	2.9	1.3	3.0
French fried potatoes	4.2	1.0	5.0	3.9	1.0	5.0	3.9	1.1	5.0
Peanut butter cookies	3.3	1.4	5.0	3.4	1.3	3.0	3.3	1.4	3.0
Broccoli	2.2	1.2	1.0	2.7	1.5	1.0	2.2	1.4	1.0
Pizza	4.1	1.2	5.0	4.1	1.2	5.0	4.3	0.9	5.0
Jello	3.4	1.2	3.0	3.5	1.1	3.0	3.2	1.2	2.0
Hot tea	2.8	1.5	1.0	2.9	1.4	2.0	2.4	1.3	1.0
Kool-Aid	3.7	1.2	4.0	3.6	1.1	3.0	3.4	1.2	3.0
Mashed potatoes	3.9	1.2	5.0	3.7	1.2	4.0	3.5	1.2	4.0
Watermelon	3.8	1.2	5.0	3.8	1.2	5.0	3.6	1.2	5.0

Table 24 (continued)

Food	Body Fatness Class "Lean" Mean	"Lean" S.D.	"Lean" Mode	"Middle" Mean	"Middle" S.D.	"Middle" Mode	"Fat" Mean	"Fat" S.D.	"Fat" Mode
Strawberry ice cream	3.4	1.4	5.0	3.2	1.4	3.0	3.1	1.5	5.0
Cabbage slaw	1.9	1.2	1.0	2.4	1.4	1.0	1.9	1.2	1.0
Coffee	1.9	1.2	1.0	2.1	1.3	1.0	2.0	1.2	1.0
Grits	2.6	1.5	1.0	2.5	1.4	1.0	2.2	1.2	1.0
Hamburger	4.3	0.9	5.0	4.1	1.0	5.0	4.1	0.9	5.0
Biscuits	3.8	1.2	5.0	3.8	1.0	4.0	3.6	1.0	3.0
Cooked carrots	2.2	1.2	1.0	2.1	1.3	1.0	2.1	1.3	1.0
Iced tea	3.3	1.4	3.0	3.6	1.3	5.0	3.6	1.2	4.0
Fresh strawberries	3.9	1.5	5.0	3.8	1.3	5.0	3.6	1.3	5.0
Sweet potatoes	3.2	1.5	5.0	3.0	1.5	5.0	2.6	1.4	1.0
Steak	4.1	1.1	5.0	4.0	1.2	5.0	4.0	1.1	5.0
Cornbread	3.6	1.1	3.0	3.6	1.2	4.0	3.6	1.1	4.0
Pork chops	3.8	1.1	5.0	4.0	1.1	5.0	4.0	0.9	5.0
Rolls	4.0	1.1	5.0	4.1	0.9	5.0	3.8	1.0	3.0
Fresh oranges	4.0	1.1	5.0	4.2	1.0	5.0	3.7	1.1	3.0
Bacon	4.0	1.1	5.0	4.0	1.2	5.0	3.8	1.1	3.0
Soda pop	3.9	1.1	5.0	3.8	1.2	5.0	3.9	1.1	5.0
Turnip greens	2.1	1.4	1.0	2.3	1.5	1.0	2.0	1.2	1.0
Liver	2.0	1.3	1.0	2.2	1.5	1.0	1.7	1.1	1.0
Okra	2.7	1.6	1.0	2.9	1.7	1.0	3.0	1.5	1.0
Fried chicken	4.0	1.1	5.0	3.9	1.2	5.0	3.7	1.2	3.0
Blackberries	3.4	1.4	5.0	3.5	1.4	5.0	3.1	1.4	5.0
Chicken and dressing	4.0	1.1	5.0	3.9	1.1	5.0	3.6	1.3	5.0
Chocolate cake	3.9	1.2	5.0	3.8	1.1	5.0	3.7	1.2	5.0
Fish	3.6	1.2	4.0	3.3	1.3	3.0	3.4	1.3	4.0
Collards	2.2	1.4	1.0	2.6	1.4	1.0	2.3	1.3	1.0
Oatmeal	3.0	1.4	3.0	2.9	1.4	2.0	2.8	1.2	3.0
Bologna	3.4	1.2	3.0	3.3	1.1	3.0	3.4	1.1	4.0

Table 24 (continued)

Food	Body Fatness Class "Lean" Mean	"Lean" S.D.	"Lean" Mode	"Middle" Mean	"Middle" S.D.	"Middle" Mode	"Fat" Mean	"Fat" S.D.	"Fat" Mode
Vanilla ice cream	3.9	1.1	5.0	3.4	1.2	3.0	3.5	1.2	3.0
Fried eggs	3.3	1.4	4.0	3.1	1.3	3.0	2.9	1.2	3.0
English peas	2.1	1.4	1.0	2.2	1.3	1.0	1.8	1.1	1.0
Baked beans	3.2	1.5	5.0	3.0	1.3	3.0	2.8	1.4	1.0
Chocolate pudding	3.6	1.3	5.0	3.2	1.2	3.0	3.4	1.3	3.0
Sausage	3.8	1.3	5.0	3.5	1.4	5.0	3.4	1.4	5.0
Buttermilk	1.6	1.2	1.0	1.7	1.2	1.0	1.5	1.1	1.0
Yellow squash	1.7	1.2	1.0	2.2	1.5	1.0	1.6	0.9	1.0
Chocolate pie	3.8	1.4	5.0	3.2	1.3	3.0	3.5	1.4	5.0
Fresh apples	4.2	1.1	5.0	4.0	1.1	5.0	3.9	1.1	5.0
Spinach	2.4	1.5	1.0	2.6	1.5	1.0	2.3	1.4	1.0
Chicken and dumplings	3.5	1.4	5.0	3.7	1.2	5.0	3.6	1.4	5.0
Cantaloupe	3.4*b	1.5	5.0	3.4	1.4	5.0	2.9*b	1.5	1.0
Scrambled eggs	3.4	1.3	4.0	3.4	1.3	4.0	3.3	1.4	4.0
Carrot strips	2.8	1.4	2.0	2.9	1.5	1.0	2.5	1.4	1.0
Hominy	2.5*b	1.6	1.0	2.9	1.5	1.0	1.9*b	1.2	1.0
Tang	3.6*b	1.4	5.0	3.3	1.4	5.0	3.1*b	1.3	3.0
Banana pudding	3.5	1.6	5.0	3.3	1.3	3.0	3.3	1.3	4.0
Potato salad	3.1	1.6	5.0	3.1	1.4	4.0	2.7	1.5	1.0
Chocolate ice cream	4.0	1.2	5.0	3.6	1.2	3.0	3.8	1.4	5.0
Cheddar cheese	2.9	1.5	1.0	2.9	1.6	1.0	3.2	1.5	5.0
Vegetable soup	3.5	1.2	3.0	3.3	1.4	5.0	3.2	1.4	3.0
Pinto beans	2.9	1.5	1.0	2.8	1.5	1.0	3.0	1.2	3.0
Cauliflower	2.0	1.4	1.0	2.3	1.6	1.0	1.8	1.3	1.0
Neck bones	2.4*b	1.5	1.0	2.2	1.5	1.0	1.8*b	1.1	1.0
Carrot-raisin salad	1.8	1.3	1.0	2.2	1.5	1.0	1.9	1.2	1.0
Tomatoes	3.3	1.4	4.0	3.1	1.4	4.0	3.0	1.4	3.0

Table 24 (continued)

Food	Body Fatness Class "Lean" Mean	"Lean" S.D.	"Lean" Mode	"Middle" Mean	"Middle" S.D.	"Middle" Mode	"Fat" Mean	"Fat" S.D.	"Fat" Mode
Spaghetti	4.1	1.0	5.0	4.0	1.1	5.0	4.1	1.1	5.0
Hot chocolate	4.1	1.0	5.0	3.9	1.2	5.0	3.9	1.1	5.0
Corn	3.9	1.1	4.0	3.9	1.1	5.0	3.8	1.2	5.0
Apple pie	4.0	1.3	5.0	3.6	1.5	5.0	3.6	1.3	5.0

[a]Choice of everytime = 5; most of the time = 4; some of the time = 3; seldom = 2; never = 1.

[b]Means are based on a pooled variance estimate.

*Significantly different ($p < .05$) by t-test.

APPENDIX F

COMPOSITION OF KOOL-AID SOLUTIONS

Table 25

Composition of Kool-Aid Solutions

Solution	Sucrose	Kool-Aid	Water	Total
		(Percent by Weight)		
Standard	9.54	0.31	90.15	100.00
0.5 Standard	5.01	0.32	94.67	100.00
2.0 Standard	17.42	0.28	82.30	100.00
0.0 Standard	0.00	0.34	99.66	100.00

APPENDIX G

FOOD CONNOTATIVE MEANING DATA

Table 26

Frequencies for Polar Connotative Meaning Terms for Seventh-Grade Students

Food	Polar Term	Quantifiers							Polar Term	Negative Responses			
		Extremely	Moderately	Slightly	Both	Slightly	Moderately	Extremely		Neither	Do Not Know the Food	Missing	Patterned
Hot dog	low calorie	12	33	51	29	34	37	17	high calorie	1	1	5	6
Cottage cheese	"	47	64	52	18	14	9	7	"	0	1	8	6
Watermelon	"	23	35	57	34	30	22	8	"	2	1	8	6
Jello	"	23	53	57	29	19	14	9	"	3	3	10	6
Whole milk	"	18	30	41	36	36	28	15	"	0	2	14	6
Hot tea	"	18	43	46	35	40	18	4	"	2	3	11	6
Pizza	"	9	18	22	32	34	46	47	"	3	2	7	6
Applesauce	"	14	53	57	37	28	7	5	"	1	2	16	6
Spinach	"	11	50	53	39	26	13	11	"	2	2	13	6
Soda pop	"	16	20	28	23	28	51	38	"	2	1	13	6
Orange juice	"	22	44	47	34	25	19	11	"	0	2	16	6
Steak	"	13	16	30	34	42	41	29	"	2	0	13	6
Cornbread	"	10	30	27	51	40	31	15	"	3	0	13	6
Mashed potatoes	"	17	25	37	33	27	43	21	"	5	0	12	6
Banana	"	14	47	58	41	17	18	9	"	2	0	14	6
Carrot-raisin salad	"	15	34	36	38	22	11	11	"	4	27	22	6
Grits	"	12	24	37	49	37	31	7	"	2	7	14	6
Coffee	"	25	28	30	47	28	23	15	"	5	1	18	6
French fried potatoes	"	13	18	29	33	34	40	35	"	1	1	16	6
Green beans	"	9	29	52	39	39	26	6	"	3	0	17	6
Hamburger	"	14	20	25	32	41	46	29	"	2	1	10	6

Table 26 (continued)

Food	Polar Term	Quantifiers							Polar Term	Negative Responses			
		Extremely	Moderately	Slightly	Both	Slightly	Moderately	Extremely		Neither	Do Not Know the Food	Missing	Patterned
Roast beef	low calorie	12	18	28	33	39	48	25	high calorie	2	0	15	6
Broccoli	"	15	35	52	38	35	15	8	"	3	0	19	6
Cabbage slaw	"	18	49	40	36	28	15	8	"	2	11	13	6
Chocolage chip cookie	"	14	18	31	28	33	45	33	"	1	1	16	6
Fresh peach	"	19	39	55	43	26	18	6	"	2	0	12	6
Roll	"	13	31	35	36	42	32	9	"	3	0	19	6
Fried chicken	"	11	19	24	22	44	47	36	"	1	0	16	6
Corn flakes	"	15	37	56	42	36	13	5	"	1	1	14	6
Chocolate pudding	"	10	18	21	23	34	53	44	"	2	2	13	6
Spaghetti	"	15	11	25	24	30	55	46	"	3	0	11	6
Kool-Aid	"	17	31	34	47	21	12	29	"	2	2	25	6
Hot dog	slimming	15	17	27	46	32	36	26	fattening	8	1	12	6
Cottage cheese	"	51	56	58	17	9	6	6	"	5	0	12	6
Watermelon	"	22	33	35	47	34	20	11	"	5	0	13	6
Jello	"	27	45	54	33	24	9	5	"	6	1	16	6
Whole milk	"	24	23	30	38	36	28	15	"	7	2	17	6
Hot tea	"	20	31	48	46	27	15	7	"	4	0	20	6
Pizza	"	7	15	20	17	29	44	60	"	7	1	20	6
Applesauce	"	23	45	56	29	27	10	5	"	4	2	19	6
Spinach	"	18	31	47	45	32	15	8	"	4	2	18	6
Soda pop	"	5	14	20	32	37	49	41	"	3	1	18	6
Orange juice	"	26	46	46	38	26	11	12	"	2	0	13	6
Steak	"	10	16	23	25	31	57	38	"	5	0	15	6
Cornbread	"	6	16	25	51	37	39	25	"	5	0	16	6

Table 26 (continued)

Food	Polar Term	Quantifiers							Polar Term	Negative Responses			
		Extremely	Moderately	Slightly	Both	Slightly	Moderately	Extremely		Neither	Do Not Know the Food	Missing	Patterned
Mashed potatoes	slimming	7	18	28	37	36	40	27	fattening	5	0	22	6
Banana	"	26	34	59	33	26	15	9	"	1	1	16	6
Carrot-raisin salad	"	22	36	34	39	20	10	10	"	5	24	20	6
Grits	"	19	27	38	35	49	17	6	"	2	4	23	6
Coffee	"	25	22	40	39	41	20	10	"	2	2	19	6
French fried potatoes	"	8	18	24	26	42	43	32	"	5	1	21	6
Green beans	"	16	30	38	41	44	24	5	"	3	1	18	6
Hamburger	"	7	20	20	27	47	43	31	"	7	1	17	6
Roast beef	"	8	20	26	30	43	36	31	"	7	1	18	6
Broccoli	"	16	36	43	39	35	17	9	"	7	2	16	6
Cabbage slaw	"	25	31	39	36	23	16	8	"	9	9	24	6
Chocolate chip cookie	"	8	21	13	28	45	37	38	"	10	0	20	6
Fresh peach	"	20	35	55	38	23	16	10	"	5	0	18	6
Roll	"	6	32	32	41	37	31	17	"	3	1	20	6
Fried chicken	"	9	22	22	23	45	34	38	"	8	1	18	6
Corn flakes	"	16	39	40	42	30	14	12	"	5	2	20	6
Chocolate pudding	"	3	14	23	28	38	43	45	"	8	1	17	6
Spaghetti	"	9	18	16	28	29	52	47	"	2	2	17	6
Kool-Aid	"	22	32	22	53	21	19	15	"	2	1	33	6
Hot dog	losing	14	16	14	42	34	37	26	gaining	9	0	27	7
Cottage cheese	"	49	47	49	16	15	5	7	"	5	0	26	7
Watermelon	"	22	27	35	43	27	20	13	"	6	0	26	7
Jello	"	29	43	42	33	20	13	6	"	7	1	26	7

Table 26 (continued)

Food	Polar Term	Quantifiers							Polar Term	Negative Responses			
		Extremely	Moderately	Slightly	Both	Slightly	Moderately	Extremely		Neither	Do Not Know the Food	Missing	Patterned
Whole milk	losing	20	18	28	39	36	26	15	gaining	6	1	30	7
Hot tea	"	20	30	35	47	29	15	9	"	4	1	29	7
Pizza	"	8	16	14	16	35	42	50	"	7	1	30	7
Applesauce	"	24	37	53	33	19	10	5	"	6	1	31	7
Spinach	"	18	29	39	43	27	11	15	"	5	2	30	7
Soda pop	"	12	15	20	27	32	40	38	"	5	0	30	7
Orange juice	"	29	28	36	41	31	10	10	"	4	1	29	7
Steak	"	11	16	25	19	26	45	39	"	8	1	29	7
Cornbread	"	8	17	21	41	43	32	19	"	11	0	27	7
Mashed potatoes	"	11	17	21	35	38	37	23	"	9	0	28	7
Banana	"	30	30	50	25	25	16	13	"	2	1	27	7
Carrot-raisin salad	"	21	36	39	36	16	11	7	"	5	21	27	7
Grits	"	15	19	29	48	35	19	12	"	8	4	30	7
Coffee	"	25	23	32	40	39	13	9	"	3	4	31	7
French fried potatoes	"	10	11	19	21	38	50	36	"	5	2	27	7
Green beans	"	10	25	38	46	35	17	11	"	6	1	30	7
Hamburger	"	10	13	18	30	45	38	30	"	6	1	28	7
Roast beef	"	11	18	25	28	30	42	29	"	7	0	29	7
Broccoli	"	18	24	42	46	30	15	7	"	6	4	27	7
Cabbage slaw	"	26	32	45	35	19	9	6	"	8	10	29	7
Chocolate chip cookie	"	10	15	22	22	41	36	38	"	5	2	28	7
Fresh peach	"	18	34	49	31	25	16	10	"	6	2	28	7
Roll	"	8	21	33	41	35	29	15	"	4	4	29	7

Table 26 (continued)

Food	Polar Term	Quantifiers							Polar Term	Negative Responses			
		Extremely	Moderately	Slightly	Both	Slightly	Moderately	Extremely		Neither	Do Not Know the Food	Missing	Patterned
Fried chicken	losing	7	14	15	23	41	41	43	gaining	5	2	28	7
Corn flakes	"	14	30	37	41	34	18	10	"	7	0	28	7
Chocolate pudding	"	9	11	18	18	39	45	45	"	7	2	25	7
Spaghetti	"	9	13	14	27	34	36	54	"	6	2	24	7
Kool-Aid	"	15	18	28	50	34	12	21	"	6	0	35	7

Table 27

Calorie Related Connotative Meaning Scores[a] for Seventh-Grade Students

Food	Connotative Meanings								
	Low/High Calorie			Slimming/Fattening			Losing/Gaining		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Hot dog	4.0	1.7	3.0	4.4	1.8	4.0	4.5	1.8	4.0
Cottage cheese	2.7	1.6	2.0	2.6	1.5	3.0	2.7	1.6	1.0
Watermelon	3.5	1.6	3.0	3.7	1.7	4.0	3.7	1.7	4.0
Jello	3.2	1.6	3.0	3.2	1.5	3.0	3.2	1.6	2.0
Whole milk	3.9	1.7	3.0	3.9	1.8	4.0	4.1	1.8	4.0
Hot tea	3.5	1.5	3.0	3.5	1.5	3.0	3.6	1.6	4.0
Pizza	4.9	1.8	7.0	5.2	1.8	7.0	5.1	1.8	7.0
Applesauce	3.3	1.4	3.0	3.2	1.5	3.2	3.2	1.5	3.0
Spinach	3.5	1.5	3.0	3.6	1.6	3.0	3.7	1.7	4.0
Soda pop	4.6	1.9	6.0	5.0	1.6	6.0	4.8	1.8	6.0
Orange juice	3.5	1.7	3.0	3.4	1.6	2.0	3.5	1.7	4.0
Steak	4.5	1.7	5.0	4.9	1.8	6.0	4.8	1.9	6.0
Cornbread	4.2	1.6	4.0	4.6	1.6	4.0	4.5	1.6	5.0
Mashed potatoes	4.2	1.8	6.0	4.6	1.7	6.0	4.5	1.7	5.0
Banana	3.4	1.5	3.0	3.4	1.6	3.0	3.4	1.8	3.0
Carrot-raisin salad	3.6	1.6	4.0	3.4	1.6	4.0	3.3	1.6	3.0
Grits	4.0	1.5	4.0	3.8	1.6	5.0	4.0	1.6	4.0
Coffee	3.8	1.8	4.0	3.8	1.7	5.0	3.7	1.7	4.0
French fried potatoes	4.6	1.8	6.0	4.7	1.7	6.0	5.0	1.7	6.0
Green beans	3.9	1.5	3.0	3.8	1.6	5.0	3.9	1.5	4.0
Hamburger	4.6	1.8	6.0	4.7	1.7	5.0	4.7	1.7	5.0
Roast beef	4.5	1.7	6.0	4.6	1.7	5.0	4.6	1.8	6.0
Broccoli	3.6	1.5	3.0	3.7	1.6	3.0	3.6	1.5	4.0
Cabbage slaw	3.4	1.6	2.0	3.5	1.7	3.0	3.2	1.6	3.0
Chocolate chip cookie	4.6	1.8	6.0	4.8	1.8	5.0	4.8	1.8	5.0
Fresh peach	3.5	1.5	3.0	3.5	1.6	3.0	3.5	1.6	3.0

Table 27 (continued)

Food	Connotative Meanings								
	Low/High Calorie			Slimming/Fattening			Losing/Gaining		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Roll	4.0	1.6	5.0	4.2	1.6	4.0	4.2	1.6	4.0
Fried chicken	4.7	1.8	6.0	4.7	1.8	5.0	5.0	1.7	7.0
Corn flakes	3.5	1.4	3.0	3.6	1.6	4.0	3.8	1.6	4.0
Chocolate pudding	4.9	1.8	6.0	5.0	1.6	7.0	5.1	1.7	6.0
Spaghetti	4.9	1.8	6.0	5.0	1.8	6.0	5.1	1.8	7.0
Kool-Aid	3.9	1.8	4.0	3.7	1.8	4.0	4.1	1.7	4.0

[a]Numerical values ranged from 1 (extremely for first term) to 7 (extremely for second term).

Table 28

Calorie Related Connotative Meaning Scores[a] for Black and White Seventh-Grade Students

	Race																	
	White									Black								
	Low/High Calorie			Slimming/Fattening			Losing/Gaining			Low/High Calorie			Slimming/Fattening			Losing/Gaining		
Food	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Hot dog	4.1	1.7	3.0	4.4	1.7	4.0	4.6	1.6	6.0	4.0	1.8	3.0	4.3	2.0	7.0	4.3	2.1	4.0
Cottage cheese	2.6	1.5	2.0	2.4^{**b}	1.3	2.0	2.6	1.5	1.0	3.1	1.5	3.0	3.2^{**b}	1.7	3.0	3.0	1.8	3.0
Watermelon	3.4	1.6	3.0	3.6	1.6	4.0	3.8	1.7	4.0	3.9	1.6	3.0	4.0	1.8	3.0	3.5	1.8	2.0
Jello	3.2	1.5	2.0	3.1	1.4	2.0	3.1	1.6	3.0	3.5	1.8	3.0	3.2	1.7	3.0	3.5	1.7	2.0
Whole milk	4.1*	1.7	5.0	4.1	1.7	4.0	4.2	1.7	5.0	3.5*	1.6	4.0	3.5	2.0	1.0	3.7	1.7	4.0
Hot tea	3.4	1.5	2.0	3.6	1.6	3.0	3.6	1.7	4.0	3.8	1.5	3.0	3.5	1.5	3.0	3.6	1.5	5.0
Pizza	5.2***	1.7	7.0	5.4*	1.7	7.0	5.3**	1.7	7.0	4.0***	1.7	2.0	4.6*	1.9	7.0	4.4**	2.0	7.0
Applesauce	3.2	1.3	3.0	3.1	1.4	3.0	3.1	1.4	3.0	3.5	1.6	2.0	3.5	1.7	3.0	3.6	1.8	3.0
Spinach	3.6	1.5	3.0	3.6	1.5	4.0	3.6	1.5	4.0	3.2	1.6	2.0	3.7	1.7	3.0	4.0	2.0	4.0
Soda pop	4.9***	1.9	6.0	5.1^{*b}	1.5	6.0	5.0***	1.7	6.0	3.9***	1.8	3.0	4.5^{*b}	1.9	5.0	4.0***	2.0	2.0
Orange juice	3.4	1.6	2.0	3.3	1.5	2.0	3.3	1.6	4.0	3.8	1.9	3.0	3.6	1.9	3.0	3.9	1.8	4.0
Steak	4.7*	1.7	6.0	5.1**	1.7	6.0	5.0*	1.8	6.0	4.1*	1.8	4.0	4.3**	1.9	6.0	4.2*	2.0	2.0
Cornbread	4.3	1.5	4.0	4.8**	1.5	4.0	4.6^{*b}	1.5	5.0	3.8	1.8	2.0	4.0**	1.7	5.0	4.0^{*b}	1.8	4.0
Mashed potatoes	4.4*	1.8	6.0	4.8**	1.7	6.0	4.6	1.6	6.0	3.7*	1.8	3.0	4.1**	1.6	4.0	4.4	2.0	5.0
Banana	3.3*	1.5	3.0	3.4	1.6	3.0	3.4	1.7	3.0	3.8*	1.6	3.0	3.3	1.7	3.0	3.6	2.0	3.0
Carrot-raisin salad	3.4	1.5	2.0	3.4	1.6	4.0	3.2	1.5	3.0	4.0	2.0	3.0	3.4	1.8	3.0	3.7	1.7	4.0
Grits	3.9	1.5	4.0	3.8	1.6	5.0	4.1	1.5	4.0	4.2	1.6	4.0	3.6	1.6	3.0	3.8	1.8	3.0
Coffee	3.8	1.8	4.0	3.8	1.8	5.0	3.8	1.7	5.0	3.9	1.8	4.0	3.5	1.5	3.0	3.2	1.5	3.0
French fried potatoes	4.8**	1.8	6.0	5.0***	1.6	6.0	5.2^{***b}	1.6	6.0	3.9**	1.8	3.0	3.9***	1.9	2.0	4.1^{***b}	2.0	4.0
Green beans	3.8	1.4	3.0	4.0**	1.5	5.0	3.9	1.4	4.0	4.0	1.7	3.0	3.3**	1.6	3.0	3.9	1.8	4.0
Hamburger	4.8^{*b}	1.6	6.0	4.9**	1.6	5.0	5.0***	1.6	5.0	4.0^{*b}	2.1	2.0	4.1**	1.6	4.0	3.9***	1.8	4.0
Roast beef	4.7**	1.7	6.0	4.8**	1.7	5.0	4.8***	1.8	6.0	4.0**	1.8	4.0	4.0**	1.8	4.0	3.8***	1.8	3.0
Broccoli	3.6	1.5	3.0	3.6	1.6	4.0	3.6	1.4	4.0	3.5	1.7	2.0	3.8	1.7	3.0	4.0	2.0	3.0
Cabbage slaw	3.2	1.4	2.0	3.3	1.6	3.0	3.1	1.5	3.0	4.0	1.8	3.0	3.8	1.8	3.0	3.6	1.8	2.0

Table 28 (continued)

Food	Race: White — Low/High Calorie Mean	S.D.	Mode	Slimming/Fattening Mean	S.D.	Mode	Losing/Gaining Mean	S.D.	Mode	Race: Black — Low/High Calorie Mean	S.D.	Mode	Slimming/Fattening Mean	S.D.	Mode	Losing/Gaining Mean	S.D.	Mode
Chocolate chip cookie	4.8**	1.8	6.0	5.0**	1.7	5.0	5.0*	1.7	5.0	3.9**	1.9	3.0	4.1**	1.9	4.0	4.2*	2.0	4.0
Fresh peach	3.4	1.5	3.0	3.5	1.6	3.0	3.4*b	1.5	3.0	3.8	1.6	4.0	3.5	1.7	3.0	4.2*b	2.0	2.0
Roll	4.1*	1.6	5.0	4.4**	1.6	4.0	4.3	1.6	4.0	3.5*	1.8	4.0	3.7**	1.6	2.0	4.0	1.6	4.0
Fried chicken	5.0***	1.7	6.0	5.1***	1.6	5.0	5.2	1.7	6.0	4.0***	1.8	3.0	3.6***	1.8	2.0	4.7	1.8	5.0
Corn flakes	3.6***	1.4	3.0	3.8	1.6	4.0	3.7	1.6	3.0	3.4	1.4	3.0	3.2	1.8	2.0	4.1	1.8	5.0
Chocolate pudding	5.2***	1.7	6.0	5.3***	1.5	6.0	5.3**	1.6	6.0	4.1***	1.9	2.0	4.0***	1.6	4.0	4.4**	1.9	3.0
Spaghetti	5.2***	1.7	6.0	5.4***	1.6	6.0	5.4***	1.6	7.0	4.1***	1.9	3.0	3.8***	1.9	2.0	4.1***	1.8	4.0
Kool-Aid	3.9	1.8	4.0	3.8	1.7	4.0	4.0	1.6	4.0	3.9	2.0	2.0	3.3	1.9	2.0	4.3	1.9	3.0

[a]Numerical values ranged from 1 (extremely for first term) to 7 (extremely for second term).

[b]Means are based on a separate variance estimate. Those means without a superscript are based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

**Significantly different ($p < 0.01$) by t-test.

***Significantly different ($p < 0.001$) by t-test.

Table 29

Calorie Related Connotative Meaning Scores[a] for Male and Female Seventh-Grade Students

	Sex																	
	Male									Female								
	Low/High Calorie			Slimming/Fattening			Losing/Gaining			Low/High Calorie			Slimming/Fattening			Losing/Gaining		
Food	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Hot dog	4.2	1.8	3.0	4.5	1.8	4.0	4.6	1.8	6.0	3.8	1.6	3.0	4.2	1.7	4.0	4.4	1.7	4.0
Cottage cheese	2.6	1.6	1.0	2.6	1.5	2.0	2.6	1.6	1.0	2.9	1.5	3.0	2.6	1.4	3.0	2.8	1.6	3.0
Watermelon	3.4	1.6	3.0	3.5	1.6	4.0	3.6	1.5	4.0	3.6	1.6	3.0	3.8	1.8	4.0	3.9	1.9	4.0
Jello	3.2	1.6	3.0	3.2	1.5	3.0	3.4	1.5	3.0	3.2	1.6	2.0	3.1	1.5	3.0	3.0	1.7	2.0
Whole milk	3.9	1.7	3.0	3.8	1.9	3.0	4.0	1.7	5.0	3.9	1.7	3.0	4.0	1.7	4.0	4.1	1.8	4.0
Hot tea	3.5	1.6	2.0	3.5	1.6	3.0	3.4	1.6	3.0	3.5	1.4	3.0	3.5	1.4	3.0	3.8	1.6	4.0
Pizza	3.8	1.8	7.0	5.0	1.8	7.0	5.0	1.8	6.0	5.0	1.7	6.0	5.3	1.8	7.0	5.2	1.8	7.0
Applesauce	3.3	1.4	3.0	3.3	1.6	3.0	3.4	1.5	3.0	3.2	1.4	2.0	3.1	1.4	3.0	3.0	1.5	3.0
Spinach	3.4	1.5	2.0	3.6	1.7	3.0	3.5	1.6	3.0	3.6	1.6	3.0	3.6	1.4	4.0	3.9	1.7	4.0
Soda pop	4.7	1.9	6.0	4.9	1.6	6.0	4.6	1.9	6.0	4.5	1.9	6.0	5.1	1.6	6.0	4.9	1.7	7.0
Orange juice	3.3	1.6	2.0	3.3	1.6	2.0	3.5	1.7	3.0	3.7	1.7	3.0	3.4	1.7	2.0	3.4	1.6	4.0
Steak	4.4	1.9	7.0	4.8	1.9	6.0	4.8	1.9	7.0	4.7	1.6	5.0	4.9	1.7	6.0	4.8	1.8	6.0
Cornbread	4.0	1.7	4.0	4.5	1.5	4.0	4.4	1.7	5.0	4.3	1.5	5.0	4.7	1.6	4.0	4.5	1.5	4.0
Mashed potatoes	4.0	1.8	4.0	4.4	1.6	5.0	4.4	1.8	6.0	4.3	1.8	6.0	4.8	1.7	6.0	4.6	1.6	5.0
Banana	3.4	1.5	3.0	3.5	1.6	3.0	3.4	1.6	3.0	3.5	1.6	3.0	3.3	1.6	3.0	3.5	1.9	2.0
Carrot-raisin salad	3.4	1.6	2.0	3.3	1.6	3.0	3.2	1.5	3.0	3.7	1.6	4.0	3.5	1.7	2.0	3.4	1.7	4.0
Grits	3.9	1.6	3.0	3.7	1.7	5.0	3.7[*b]	1.6	4.0	4.1	1.5	4.0	3.8	1.5	4.0	4.2[*b]	1.6	4.0
Coffee	3.6	1.9	2.0	3.6	1.8	3.0	3.6	1.8	3.0	3.9	1.6	4.0	3.9	1.5	4.0	3.8	1.5	4.0
French fried potatoes	4.5	1.9	6.0	4.7	1.7	5.0	4.8	1.7	6.0	4.6	1.8	6.0	4.8	1.8	6.0	5.1	1.7	7.0
Green beans	3.7	1.6	3.0	3.8	1.6	4.0	3.7	1.7	3.0	4.0	1.4	3.0	3.8	1.6	5.0	4.1	1.4	4.0
Hamburger	4.4	1.9	5.0	4.6	1.8	5.0	4.6	1.8	5.0	4.7	1.7	6.0	4.9	1.6	5.0	4.9	1.6	4.0
Roast beef	4.4	1.7	6.0	4.7	1.8	5.0	4.6	1.8	6.0	4.7	1.7	6.0	4.6	1.7	5.0	4.6	1.8	6.0
Broccoli	3.4[*b]	1.4	3.0	3.6	1.5	3.0	3.5	1.5	3.0	3.8[*b]	1.6	3.0	3.7	1.7	3.0	3.8	1.6	4.0
Cabbage slaw	3.2[*b]	1.5	2.0	3.4	1.5	3.0	3.2	1.6	3.0	3.7[*b]	1.7	2.0	3.5	1.8	3.0	3.2	1.5	4.0

Table 29 (continued)

Food	Sex: Male — Low/High Calorie Mean	S.D.	Mode	Slimming/Fattening Mean	S.D.	Mode	Losing/Gaining Mean	S.D.	Mode	Sex: Female — Low/High Calorie Mean	S.D.	Mode	Slimming/Fattening Mean	S.D.	Mode	Losing/Gaining Mean	S.D.	Mode
Chocolate chip cookie	4.7	1.9	6.0	4.8	1.7	5.0	4.9	1.7	5.0	4.4	1.8	6.0	4.8	1.8	5.0	4.7	1.9	7.0
Fresh peach	3.3	1.4	3.0	3.6	1.6	3.0	3.5	1.6	3.0	3.6	1.6	3.0	3.4	1.6	3.0	3.6	1.7	3.0
Roll	3.7*[b]	1.6	3.0	4.0	1.7	2.0	4.1	1.6	5.0	4.2*[b]	1.7	5.0	4.4	1.6	4.0	4.3	1.6	4.0
Fried chicken	4.7	1.8	6.0	4.6	1.9	5.0	5.1	1.6	5.0	4.8	1.7	5.0	4.8	1.7	5.0	5.0	1.8	7.0
Corn flakes	3.2**[b]	1.4	3.0	3.5	1.6	2.0	3.8	1.6	5.0	3.8**[b]	1.4	3.0	3.7	1.6	4.0	3.8	1.6	4.0
Chocolate pudding	4.9	1.8	7.0	5.1	1.6	7.0	5.3	1.6	7.0	4.9	1.8	6.0	5.0	1.6	6.0	4.8	1.9	6.0
Spaghetti	4.8	1.9	6.0	5.0	1.8	6.0	5.1	1.8	7.0	5.0	1.8	6.0	5.0	1.8	7.0	5.1	1.8	7.0
Kool-Aid	4.0	1.9	4.0	3.8	1.8	4.0	4.1	1.8	4.0	3.9	1.8	4.0	3.7	1.7	4.0	4.0	1.6	4.0

[a]Numerical values ranged from 1 (extremely for first term) to 7 (extremely for second term).

[b]Means are based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

**Significantly different ($p < 0.01$) by t-test.

Table 30

Calorie Related Connotative Meaning Scores[a] by Body Fatness Class for Seventh-Grade Students

	Fatness																											
	"Lean"									"Middle"									"Fat"									
	Low/High Calorie			Slimming/Fattening			Losing/Gaining			Low/High Calorie			Slimming/Fattening			Losing/Gaining			Low/High Calorie			Slimming/Fattening			Losing/Gaining		
Food	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Hot dog	3.8	1.7	3.0	4.2	1.7	4.0	4.7	1.8	4.0	4.3	1.9	6.0	4.5	1.9	6.0	4.7	1.9	6.0	4.0	1.6	3.0	4.4	1.8	4.0	4.4	1.5	4.0
Cottage cheese	3.0	1.7	2.0	2.8	1.4	2.0	3.1	1.9	1.0	2.6	1.4	2.0	2.4	1.5	1.0	2.4	1.3	1.0	2.7	1.6	1.0	2.6	1.6	1.0	2.7	1.5	2.0
Watermelon	3.5	1.7	3.0	3.7	1.5	5.0	3.7	1.8	3.0	3.5	1.6	3.0	3.6	1.8	4.0	3.6	1.7	4.0	3.6	1.6	3.0	3.7	1.7	3.0	4.0	1.6	4.0
Jello	3.6	1.8	3.0	3.5	1.4	3.0	3.4	1.7	3.0	3.1	1.6	3.0	2.8	1.5	3.0	3.2	1.6	3.0	3.1	1.6	2.0	3.1	1.5	3.0	3.1	1.6	2.0
Whole milk	3.9	1.9	3.0	3.9	1.8	4.0	4.0	1.9	6.0	3.8	1.7	4.0	3.8	1.8	5.0	4.2	1.7	4.0	4.1	1.7	3.0	4.3	1.7	4.0	4.1	1.6	4.0
Hot tea	3.5	1.5	4.0	3.4	1.5	3.0	3.6	1.6	3.0	3.8	1.6	2.0	3.7	1.6	4.0	3.8	1.7	4.0	3.4	1.6	3.0	3.6	1.5	4.0	3.6	1.6	4.0
Pizza	4.9	1.7	6.0	4.9	1.8	6.0	4.8	2.0	7.0	4.8	1.7	6.0	5.3	1.8	7.0	5.3	1.6	5.0	5.1	1.8	6.0	5.4	1.8	7.0	5.1	1.7	7.0
Applesauce	3.4	1.4	2.0	3.2	1.3	3.0	2.9	1.6	1.0	3.1	1.3	3.0	3.2	1.6	3.0	3.1	1.4	3.0	3.4	1.4	3.0	3.3	1.6	3.0	3.4	1.5	3.0
Spinach	3.5	1.6	4.0	3.7	1.7	4.0	3.5	1.8	3.0	3.5	1.6	3.0	3.8	1.5	4.0	3.8	1.7	4.0	3.6	1.5	2.0	3.4	1.5	3.0	3.8	1.5	4.0
Soda pop	4.6	2.0	7.0	4.8	1.7	6.0	4.5[*b]	2.0	6.0	4.8	1.7	6.0	4.9	1.5	6.0	4.5	1.8	6.0	4.7	2.0	7.0	5.2	1.7	7.0	5.2[*b]	1.6	7.0
Orange juice	3.6	1.7	4.0	3.4	1.8	2.0	3.3	1.6	3.0	3.5	1.8	3.0	3.3	1.6	2.0	3.3	1.7	2.0	3.5	1.6	2.0	3.4	1.6	2.0	3.7	1.7	4.0
Steak	4.5	1.7	4.0	4.5	1.9	6.0	4.5	1.8	3.0	4.6	1.7	5.0	5.1	1.6	6.0	5.1	1.9	6.0	4.6	1.8	3.0	5.1	1.7	6.0	4.9	1.8	6.0
Cornbread	4.1	1.5	4.0	4.3	1.8	6.0	4.4	1.6	5.0	4.4	1.7	4.0	4.7	1.6	4.0	4.7	1.6	4.0	4.1	1.6	4.0	4.8	1.4	4.0	4.5	1.6	4.0
Mashed potatoes	4.1	1.8	4.0	4.4	1.7	5.0	4.3	1.6	4.0	4.2	1.8	3.0	4.6	1.6	6.0	4.7	1.8	6.0	4.4	1.9	6.0	4.7	1.7	4.0	4.7	1.6	5.0
Banana	3.5	1.7	3.0	3.5	1.9	3.0	3.6	2.0	1.0	3.6	1.5	3.0	3.3	1.3	3.0	3.4	1.6	3.0	3.2	1.5	2.0	3.3	1.6	3.0	3.3	1.8	3.0
Carrot-raisin salad	3.8	1.4	4.0	3.5	1.7	2.0	3.2	1.8	3.0	3.7	1.8	2.0	3.1	1.5	4.0	3.3	1.5	4.0	3.3	1.6	4.0	3.5	1.8	4.0	3.4	1.6	3.0
Grits	3.6	1.4	5.0	3.8	1.6	5.0	4.1	1.6	4.0	4.2	1.6	4.0	3.6	1.5	3.0	4.1	1.7	4.0	4.2	1.5	4.0	4.0	1.5	5.0	3.9	1.6	4.0
Coffee	3.7	1.8	4.0	4.1	1.7	5.0	3.9	1.7	5.0	4.0	1.8	4.0	3.7	1.6	3.0	3.5	1.7	4.0	3.8	1.6	4.0	3.6	1.6	4.0	3.7	1.5	4.0
French fried potatoes	4.3	1.6	4.0	4.5	1.6	5.0	4.7	1.7	5.0	4.8	1.8	6.0	4.7	1.8	6.0	5.0	1.8	6.0	4.6	2.0	7.0	5.0	1.6	7.0	5.3	1.5	7.0
Green beans	3.9	1.4	4.0	3.7	1.6	5.0	3.8	1.3	4.0	3.9	1.6	3.0	3.8	1.7	3.0	4.0	1.7	3.0	3.9	1.4	3.0	3.8	1.3	4.0	4.0	1.6	4.0
Hamburger	4.4	1.6	5.0	4.8	1.7	5.0	4.8	1.6	5.0	4.8	1.8	6.0	4.7	1.7	5.0	4.7	1.8	5.0	4.6	1.8	6.0	4.7	1.6	5.0	4.8	1.5	5.0
Roast beef	4.3	1.8	5.0	4.4	1.7	5.0	4.6	1.9	6.0	4.7	1.7	6.0	4.6	1.8	6.0	4.4	1.9	5.0	4.6	1.7	6.0	4.8	1.6	6.0	4.8	1.7	6.0
Broccoli	3.7	1.6	4.0	3.7	1.8	2.0	3.8	1.5	3.0	3.6	1.5	3.0	3.6	1.6	3.0	3.6	1.6	4.0	3.6	1.6	3.0	3.8	1.5	5.0	3.5	1.5	4.0
Cabbage slaw	3.4	1.5	4.0	3.2	1.8	1.0	3.1	1.6	1.0	3.4	1.7	2.0	3.5	1.7	3.0	3.3	1.7	3.0	3.6	1.6	2.0	3.5	1.6	4.0	3.3	1.3	3.0
Chocolate chip cookie	4.6	1.8	6.0	4.6	1.7	5.0	4.7	1.7	6.0	4.5	1.9	6.0	4.7	1.7	5.0	4.8	1.8	5.0	4.6	1.8	5.0	5.1	1.7	7.0	4.8	1.9	7.0

Table 30 (continued)

Food	Fatness																											
	"Lean"									"Middle"									"Fat"									
	Low/High Calorie			Slimming/Fattening			Losing/Gaining			Low/High Calorie			Slimming/Fattening			Losing/Gaining			Low/High Calorie			Slimming/Fattening			Losing/Gaining		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Fresh peach	3.4	1.4	3.0	3.6	1.7	3.0	3.6	1.5	3.0	3.5	1.7	2.0	3.4	1.4	4.0	3.5	1.8	3.0	3.6	1.5	3.0	3.4	1.7	3.0	3.5	1.6	3.0
Roll	3.8	1.6	3.0	4.4	1.6	5.0	4.1	1.6	5.0	4.1	1.6	4.0	4.0	1.6	4.0	4.1	1.5	4.0	4.2	1.6	5.0	4.3	1.6	4.0	4.4	1.7	4.0
Fried chicken	4.5*[b]	1.8	5.0	4.7	1.8	5.0	4.7	1.9	7.0	4.7	1.8	6.0	4.6	1.8	6.0	5.3	1.4	6.0	5.2*[b]	1.7	6.0	4.8	1.8	7.0	5.1	1.8	7.0
Corn flakes	3.7	1.4	3.0	3.6	1.6	2.0	3.8	1.7	5.0	3.5	1.5	4.0	3.4	1.5	4.0	3.6	1.6	4.0	3.5	1.4	3.0	3.9	1.8	3.0	4.1	1.6	4.0
Chocolate pudding	4.9	1.9	6.0	5.2	1.6	7.0	4.8*[b]	1.9	6.0	5.1	1.7	5.0	4.7	1.6	5.0	5.0	1.6	6.0	4.8	1.9	6.0	5.3	1.7	7.0	5.4	1.7	7.0
Spaghetti	4.9	1.7	6.0	4.8	1.8	5.0	4.8*[b]	2.0	7.0	5.0	2.0	7.0	5.0	1.9	6.0	5.0	1.7	5.0	4.9	1.8	6.0	5.2	1.6	7.0	5.5*[b]	1.6	7.0
Kool-Aid	4.1	1.7	4.0	4.0	1.9	4.0	3.9	1.5	4.0	3.8	1.9	4.0	3.6	1.7	4.0	4.2	1.7	5.0	4.0	1.9	3.0	3.6	1.8	4.0	4.1	1.7	4.0

[a]Numerical values ranged from 1 (extremely for first term) to 7 (extremely for second term).

[b]Means are based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

APPENDIX H

FOOD AND ACTIVITY ENERGY KNOWLEDGE DATA

Table 31

Knowledge of Energy Values of Food Scores[a] by Race and Sex for Seventh-Grade Students

Food	Total Sample			Race						Sex					
				White			Black			Male			Female		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D	Mode
Hot dog	2.6	1.3	2.0	2.9***b	1.3	2.0	1.8***b	1.0	1.0	2.7	1.4	2.0	2.6	1.3	2.0
Cottage cheese	1.9	1.2	1.0	1.8*b	1.1	1.0	2.3*b	1.5	1.0	1.9	1.3	1.0	1.9	1.0	1.0
Watermelon	2.8	1.4	2.0	2.8	1.4	2.0	2.8	1.4	2.0	2.8	1.4	3.0	2.8	1.4	2.0
Jello	2.4	1.4	1.0	2.3	1.3	1.0	2.6	1.8	1.0	2.4	1.4	1.0	2.4	1.5	1.0
Whole milk	3.3	1.6	3.0	3.2	1.5	3.0	3.5	1.9	4.0	3.2	1.6	3.0	3.3	1.6	2.0
Hot tea, no sugar	2.4	1.4	1.0	2.4	1.4	2.0	2.6	1.7	1.0	2.5	1.6	1.0	2.4	1.4	2.0
Pizza	4.1	1.6	4.0	4.4***	1.6	4.0	3.4***	1.5	2.0	4.3	1.8	5.0	4.0	1.5	3.0
Applesauce	2.7	1.4	2.0	2.7	1.3	2.0	2.4	1.5	1.0	3.0**b	1.6	2.0	2.4**b	1.0	3.0
Spinach	3.0	1.6	2.0	2.9	1.4	2.0	3.3	1.8	1.0	2.9	1.6	2.0	3.0	1.5	2.0
Soda pop	4.2	1.8	4.0	4.5***	1.6	5.0	3.4***	1.8	4.0	4.3	1.7	5.0	4.2	1.8	4.0
Orange juice	2.9	1.4	2.0	2.7*	1.3	2.0	3.2*	1.6	3.0	3.0	1.6	2.0	2.8	1.3	2.0
Round steak	4.4	1.6	4.0	4.5*	1.5	4.0	3.9*	1.8	3.0	4.5	1.6	3.0	4.3	1.5	4.0
Cornbread	3.7	1.4	4.0	3.9**	1.4	4.0	3.2**	1.5	3.0	3.7	1.4	4.0	3.7	1.5	4.0
Mashed potatoes	3.9	1.6	4.0	4.0	1.5	4.0	3.6	1.8	3.0	3.8	1.5	4.0	3.9	1.6	4.0
Banana	2.8	1.5	2.0	2.7	1.5	2.0	3.1	1.6	1.0	2.9	1.6	2.0	2.8	1.4	3.0
Carrot-raisin salad	3.1	1.6	3.0	2.9**	1.5	3.0	3.6**	1.8	4.0	3.1	1.7	1.0	3.0	1.6	3.0
Grits	3.2	1.5	3.0	3.1	1.4	4.0	3.3	1.7	3.0	3.2	1.5	4.0	3.1	1.4	2.0
Coffee, black	3.1	1.7	3.0	3.1	1.7	3.0	3.1	1.6	3.0	3.2	1.7	1.0	3.0	1.6	3.0
French fried potatoes	4.2	1.6	3.0	4.4***	1.5	3.0	3.3***	1.6	3.0	4.1	1.5	3.0	4.2	1.7	3.0
Green beans	3.2	1.4	4.0	3.3	1.3	4.0	3.0	1.7	2.0	3.1	1.4	3.0	3.3	1.5	2.0
Hamburger patty	4.2	1.4	4.0	4.3*	1.4	4.0	3.8*	1.4	3.0	4.0	1.5	4.0	4.3	1.3	4.0
Roast beef	4.2	1.6	4.0	4.3*	1.5	4.0	3.8*	1.8	3.0	4.1	1.6	4.0	4.2	1.6	3.0
Broccoli	3.0	1.4	3.0	2.8*	1.3	3.0	3.3*	1.6	3.0	2.9	1.4	3.0	3.0	1.4	3.0
Cabbage slaw	2.9	1.5	2.0	2.8	1.5	2.0	3.2	1.7	3.0	2.9	1.6	2.0	3.0	1.5	3.0
Chocolate chip cookie	4.0	1.9	5.0	4.1	1.8	5.0	3.7	2.2	1.0	4.1	2.0	5.0	4.0	1.8	3.0

Table 31 (continued)

Food	Total Sample			Race						Sex					
				White			Black			Male			Female		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Fresh peach	3.0	1.5	2.0	2.9	1.5	2.0	3.0	1.6	1.0	3.0	1.7	3.0	2.9	1.3	2.0
Roll	3.3	1.6	3.0	3.3	1.5	3.0	3.3	1.8	1.0	3.2	1.6	3.0	3.3	1.6	3.0
Fried chicken	4.2	1.6	4.0	4.4***	1.6	4.0	3.6***	1.6	4.0	4.2	1.6	4.0	4.2	1.6	4.0
Cornflakes	3.2	1.5	3.0	3.3	1.4	3.0	2.9***	1.7	1.0	3.2	1.6	3.0	3.1	1.4	3.0
Chocolate pudding	4.5	1.8	6.0	4.8***	1.7	6.0	3.7***	1.9	3.0	4.7	1.8	6.0	4.4	1.8	6.0
Spaghetti	4.9	1.7	7.0	5.3***b	1.5	7.0	4.0***b	1.9	4.0	5.0	1.8	7.0	4.9	1.6	4.0
Kool-Aid	3.3	1.7	3.0	3.4	1.6	3.0	3.1	1.8	2.0	3.5	1.6	3.0	3.2	1.8	2.0

[a]Numerical choices ranged from 1 (0-50 kilocalories) to 7 (300-350 kilocalories).

[b]Means are based on a separate variance estimate. Those means without a superscript are based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

**Significantly different ($p < 0.01$) by t-test.

***Significantly different ($p < 0.001$) by t-test.

Table 32

Knowledge of Energy Values of Food Scores[a] by Body Fatness Class for Seventh-Grade Students

	Fatness								
	"Lean"			"Middle"			"Fat"		
Food	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Hot dog	2.6	1.5	1.0	2.8	1.4	2.0	2.6	1.1	2.0
Cottage cheese	2.1	1.5	1.0	2.0	1.2	1.0	1.7	0.9	1.0
Watermelon	2.7	1.3	2.0	2.7	1.3	2.0	2.8	1.5	3.0
Jello	2.5	1.6	2.0	2.2	1.3	1.0	2.5	1.6	1.0
Whole milk	3.4	1.7	3.0	3.3	1.7	3.0	3.1	1.5	3.0
Hot tea, no sugar	2.3	1.5	1.0	2.7	1.7	1.0	2.3	1.3	2.0
Pizza	4.1	1.7	3.0	4.2	1.7	4.0	4.2	1.5	5.0
Applesauce	2.9	1.4	3.0	2.7	1.6	2.0	2.6	1.1	3.0
Spinach	3.1	1.5	2.0	3.1	1.7	2.0	2.8	1.4	2.0
Soda pop	4.3	1.8	5.0	4.0	1.8	4.0	4.5	1.7	4.0
Orange juice	2.9	1.4	2.0	2.9	1.6	2.0	2.9	1.4	3.0
Round steak	4.2	1.6	4.0	4.3	1.5	4.0	4.5	1.7	3.0
Cornbread	3.8	1.4	4.0	3.7	1.5	3.0	3.6	1.4	4.0
Mashed potatoes	3.8	1.7	3.0	3.9	1.6	4.0	3.9	1.4	4.0
Banana	2.8	1.6	1.0	3.0	1.6	2.0	2.6	1.4	2.0
Carrot-raisin salad	3.2	1.8	1.0	3.1	1.6	3.0	3.0	1.6	3.0
Grits	3.1	1.6	2.0	3.2	1.5	3.0	3.1	1.4	2.0
Coffee, black	3.3	1.8	3.0	3.2	1.6	2.0	2.8	1.6	1.0
French fried potatoes	3.8*[b]	1.7	3.0	4.1	1.7	3.0	4.4*[b]	1.4	4.0
Green beans	3.2	1.5	2.0	3.4	1.5	4.0	3.1	1.3	3.0
Hamburger patty	4.1	1.5	3.0	4.2	1.4	3.0	4.2	1.4	4.0
Roast beef	4.3	1.6	3.0	4.0	1.5	3.0	4.1	1.6	4.0
Broccoli	3.0	1.4	2.0	3.0	1.4	3.0	3.0	1.3	3.0
Cabbage slaw	2.9	1.8	1.0	3.0	1.5	2.0	2.9	1.4	3.0

Table 32 (continued)

Food	Fatness								
	"Lean"			"Middle"			"Fat"		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Chocolate chip cookie	4.0	2.0	6.0	4.1	1.9	5.0	4.1	1.8	4.0
Fresh peach	2.8	1.4	3.0	3.2	1.6	2.0	2.9	1.5	3.0
Roll	3.0	1.7	1.0	3.6	1.6	4.0	3.4	1.4	3.0
Fried chicken	4.0	1.8	3.0	4.2	1.5	4.0	4.5	1.5	4.0
Cornflakes	3.2	1.5	3.0	3.2	1.6	3.0	3.1	1.5	3.0
Chocolate pudding	4.5	2.0	6.0	4.5	1.8	6.0	4.6	1.7	5.0
Spaghetti	4.8*[b]	1.8	4.0	4.8	1.9	7.0	5.3*[b]	1.4	7.0
Kool-Aid	3.5	1.7	2.0	3.2	1.7	3.0	3.2	1.7	3.0

[a]Numerical choices ranged from 1 (0-50 kilocalories) to 7 (300-350 kilocalories).

[b]Means are based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

Table 33

Correct Answers (Percent) for Energy Values of Foods by Seventh-Grade Students

Food	Total Sample N=226	Race		Sex		Body Fatness Class		
		White n=165	Black n=59	Male n=110	Female n=116	"Lean" n=61	"Middle" n=75	"Fat" n=68
Hot dog	37.6	45.5	16.9	37.3	37.9	29.5	38.7	41.2
Cottage cheese	40.7	40.0	44.1	38.2	43.1	36.1	42.7	44.1
Watermelon	19.9	20.0	20.3	22.7	17.2	19.7	17.3	23.5
Jello	27.4	27.9	27.1	27.3	27.6	24.6	28.0	27.9
Whole milk	40.3	41.2	35.6	41.8	38.8	39.3	37.3	41.2
Hot tea	29.6	29.7	30.5	31.8	27.6	36.1	26.7	26.5
Pizza	40.3	41.2	39.0	32.7	47.4	39.3	42.7	39.7
Applesauce	56.2	61.2	44.1	41.8	69.8	59.0	48.0	64.7
Spinach	17.7	16.4	22.0	22.7	12.9	14.8	18.7	19.1
Soda pop	17.3	11.5	32.2	16.4	18.1	18.0	22.7	10.3
Orange juice	47.8	49.1	44.1	40.0	55.2	54.1	41.3	44.1
Round steak	39.4	42.4	30.5	32.7	45.7	44.3	45.3	27.9
Cornbread	41.2	45.5	30.5	41.8	40.5	41.0	40.0	47.1
Mashed potatoes	32.8	30.3	39.0	31.8	33.6	37.7	34.7	26.5
Banana	46.4	51.5	32.2	45.5	47.4	42.6	41.3	52.9
Carrot-raisin salad	6.6	4.2	13.6	6.4	6.9	9.8	8.0	4.4
Grits	34.1	35.2	30.5	31.8	36.2	37.7	32.0	38.2
Coffee	19.0	19.4	18.6	19.1	19.0	19.7	12.0	25.0
French fried potatoes	40.7	38.2	47.5	40.9	40.5	41.0	34.7	42.6
Green beans	11.5	8.5	20.3	14.5	8.6	6.6	13.3	13.2
Hamburger patty	46.5	47.9	40.7	41.8	50.9	41.0	45.3	48.5
Roast beef	39.4	41.2	33.9	34.5	44.0	41.0	38.7	38.2
Broccoli	13.7	14.5	11.9	13.6	13.8	9.8	14.7	14.7
Cabbage slaw	40.7	45.5	28.8	44.5	37.1	49.2	41.3	35.3
Chocolate chip cookie	23.4	21.2	30.5	23.6	23.3	23.0	24.0	22.1

Table 33 (continued)

Food	Total Sample N=226	Race		Sex		Body Fatness Class		
		White n=165	Black n=59	Male n=110	Female n=116	"Lean" n=61	"Middle" n=75	"Fat" n=68
Fresh peach	41.2	43.0	37.3	40.0	42.2	42.6	34.7	41.2
Roll	39.8	44.8	25.4	41.8	37.9	32.8	36.0	50.0
Fried chicken	26.6	26.1	28.8	26.4	26.7	31.1	24.0	23.5
Cornflakes	45.6	47.3	39.0	39.1	51.7	49.2	41.3	44.1
Chocolate pudding	33.2	35.8	25.4	32.7	33.6	29.5	30.7	36.8
Spaghetti	23.0	27.9	8.5	27.3	19.0	19.7	24.0	26.5
Kool-Aid	42.0	43.0	40.7	38.2	45.7	36.1	46.7	42.6

Table 34

Knowledge of Energy Values of Activity Scores[a] by Race and Sex for Seventh-Grade Students

Activity	Total Sample			Race						Sex					
				White			Black			Male			Female		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Sitting quietly, reading	1.4	0.8	1.0	1.2***b	0.6	1.0	1.8***b	1.1	1.0	1.4	0.8	1.0	1.4	0.8	1.0
Tennis	4.0	1.1	5.0	4.1	0.9	5.0	3.9	1.3	5.0	4.1	1.0	5.0	4.0	1.1	5.0
Ironing	2.2	0.8	2.0	2.3	0.7	2.0	2.2	1.1	2.0	2.2	0.8	2.0	2.3	0.8	2.0
Golfing	3.2	1.1	3.0	3.3	1.0	3.0	3.0	1.4	3.0	3.2	1.1	3.0	3.3	1.1	3.0
Lawn mowing with power mower	3.0	1.2	3.0	2.9*	1.2	2.0	3.3*	1.4	5.0	2.8	1.2	2.0	3.1	1.2	3.0
Basketball	4.2	1.0	5.0	4.2	0.9	5.0	4.1	1.2	5.0	4.3	0.9	5.0	4.1	1.1	5.0
Gymnastics	4.2	1.0	5.0	4.3**b	0.8	5.0	3.7**b	1.4	5.0	4.2	1.0	5.0	4.2	1.1	5.0
Touch football	3.9	1.0	4.0	4.0**b	0.9	4.0	3.4**b	1.3	4.0	3.9	1.0	4.0	3.8	1.1	4.0
Wrestling	4.2	1.1	5.0	4.2	1.1	5.0	4.1	1.1	5.0	4.2	1.0	5.0	4.1	1.1	5.0
Cooking	2.2	0.9	2.0	2.1*b	0.8	2.0	2.5*b	1.1	3.0	2.2	0.9	2.0	2.3*	0.9	2.0
Typing	2.1	0.9	2.0	2.1**	0.9	2.0	2.4**	1.1	2.0	2.0*	0.8	2.0	2.3*	1.0	2.0
Bicycling	3.5	1.1	4.0	3.6	1.0	4.0	3.4	1.3	4.0	3.5	1.1	4.0	3.5	1.1	3.0
Vacuuming	2.6	1.0	2.0	2.6	0.9	2.0	2.7	1.4	1.0	2.5	1.0	2.0	2.6	1.1	2.0
Swimming	3.9	1.2	5.0	4.1**b	1.1	5.0	3.5**b	1.5	5.0	3.9	1.2	5.0	4.0	1.2	5.0
Horseback riding	2.9	1.2	3.0	2.9	1.1	3.0	3.0	1.4	2.0	2.8*	1.1	3.0	3.1*	1.2	2.0
Football	4.3	1.1	5.0	4.5***b	0.8	5.0	3.6***b	1.5	5.0	4.4	1.1	5.0	4.2	1.1	5.0
Sewing	2.1	1.0	2.0	2.0	0.9	2.0	2.2	1.1	2.0	1.9	1.0	1.0	2.2	1.0	2.0
Watching television	1.3	0.8	1.0	1.2***b	0.5	1.0	1.8***b	1.3	1.0	1.4	0.9	1.0	1.3	0.7	1.0
Playing cards	1.7	1.0	1.0	1.5***b	0.7	1.0	2.2***b	1.4	1.0	1.8	1.1	1.0	1.6	0.9	1.0
Bowling	3.1	1.0	3.0	3.1	0.9	3.0	3.1	1.2	3.0	3.0	1.0	3.0	3.1	0.9	3.0
Walking slowly, 2 mph	2.5	1.1	2.0	2.5	1.0	2.0	2.6	1.2	3.0	2.5	1.1	2.0	2.5	1.0	2.0
Lawn mowing with push mower	3.9	1.2	5.0	4.1***b	0.9	5.0	3.3***b	1.5	5.0	3.8	1.2	5.0	3.9	1.2	5.0

Table 34 (continued)

Activity	Total Sample			Race						Sex					
				White			Black			Male			Female		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Water skiing	3.6	1.1	4.0	3.7**b	1.0	4.0	3.1**b	1.2	3.0	3.5	1.1	3.0	3.7	1.1	4.0
Soccer	3.7	1.1	5.0	3.9***b	1.0	5.0	3.2***b	1.3	4.0	3.8	1.1	5.0	3.7	1.2	5.0
Badminton	3.2	1.0	3.0	3.2	1.0	3.0	3.0	1.2	3.0	3.1	1.0	3.0	3.2	1.1	3.0
Social dancing	2.8	1.1	2.0	2.8	1.0	2.0	2.8	1.2	3.0	2.6*	1.0	2.0	3.0*	1.1	3.0
Volley ball	3.6	1.0	4.0	3.7	1.0	4.0	3.4	1.1	4.0	3.6	0.9	4.0	3.6	1.0	4.0
Walking rapidly, 4 mph	3.6	1.2	4.0	3.7**	1.1	4.0	3.2**	1.3	2.0	3.4	1.1	3.0	3.7	1.2	5.0
Garden work	3.1	1.1	3.0	3.2	1.0	3.0	3.0	1.2	3.0	3.1	1.0	3.0	3.2	1.1	3.0
Softball or baseball	3.9	1.1	5.0	4.0	1.0	4.0	3.7	1.5	5.0	4.0	1.1	5.0	3.8	1.2	5.0
Field hockey	3.9	1.1	5.0	4.0*b	0.9	5.0	3.6*b	1.4	5.0	3.9	1.2	5.0	3.9	1.0	5.0
Roller skating	3.5	1.1	4.0	3.6	1.0	3.0	3.2	1.4	4.0	3.6	1.1	4.0	3.4	1.1	3.0

[a]Numerical choices ranged from 1 (lowest) to 5 (highest) for energy value of activity.

[b]Means are based on a separate variance estimate. Those means without a superscript are based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

**Significantly different ($p < 0.01$) by t-test.

***Significantly different ($p < 0.001$) by t-test.

Table 35

Knowledge of Energy Values of Activity Scores[a] by Body Fatness Class for Seventh-Grade Students

Activity	Fatness "Lean" Mean	"Lean" S.D.	"Lean" Mode	"Middle" Mean	"Middle" S.D.	"Middle" Mode	"Fat" Mean	"Fat" S.D.	"Fat" Mode
Sitting quietly, reading	1.4	0.8	1.0	1.5	1.0	1.0	1.3	0.7	1.0
Tennis	4.1	1.1	5.0	4.1	1.1	5.0	4.0	1.0	4.0
Ironing	2.1	0.7	2.0	2.4	0.8	2.0	2.3	0.9	2.0
Golfing	3.3	1.1	3.0	3.1	1.1	3.0	3.2	1.0	3.0
Lawn mowing with power mower	3.0	1.2	2.0	2.8	1.2	2.0	3.0	1.3	3.0
Basketball	4.2	1.0	5.0	4.2	1.0	5.0	4.1	1.1	5.0
Gymnastics	4.2	1.0	5.0	4.1	1.2	5.0	4.3	1.0	5.0
Touch football	3.7*[b]	1.1	4.0	3.8	1.0	3.0	4.1*[b]	1.1	4.0
Wrestling	4.0	1.2	5.0	4.1	1.1	5.0	4.2	1.0	5.0
Cooking	2.1	0.9	2.0	2.3	0.9	2.0	2.3	0.9	2.0
Typing	2.3*[b]	1.0	2.0	2.2	1.0	2.0	2.0*[b]	0.9	2.0
Bicycling	3.6	1.0	4.0	3.4	1.1	4.0	3.5	1.1	3.0
Vacuuming	2.7	1.1	2.0	2.5	1.0	2.0	2.7	1.1	3.0
Swimming	4.0	1.2	5.0	3.8	1.3	5.0	4.1	1.0	5.0
Horseback riding	3.0	1.2	3.0	2.9	1.2	3.0	2.9	1.2	2.0
Football	4.4	1.1	5.0	4.2	1.2	5.0	4.3	1.1	5.0
Sewing	2.0	0.9	2.0	2.2	1.2	2.0	2.0	0.9	2.0
Watching television	1.3	0.8	1.0	1.3	0.6	1.0	1.5	1.0	1.0
Playing cards	1.5	0.7	1.0	1.8	1.1	1.0	1.8	1.1	1.0
Bowling	3.0	1.0	3.0	3.2	0.9	3.0	3.1	0.9	3.0
Walking slowly, 2 mph	2.5	1.1	2.0	2.5	1.0	2.0	2.4	1.0	2.0
Lawn mowing with push mower	3.7	1.2	4.0	3.9	1.1	5.0	4.0	1.1	5.0

Table 35 (continued)

Activity	Fatness								
	"Lean"			"Middle"			"Fat"		
	Mean	S.D.	Mode	Mean	S.D.	Mode	Mean	S.D.	Mode
Water skiing	3.7	1.1	4.0	3.4	1.1	3.0	3.6	1.1	4.0
Soccer	3.7	1.2	5.0	3.6	1.2	5.0	3.8	1.1	5.0
Badminton	3.2	1.0	4.0	3.2	1.1	3.0	3.1	1.0	3.0
Social dancing	2.8	1.2	2.0	2.9	1.1	3.0	2.7	1.0	2.0
Volley ball	3.6	0.9	4.0	3.6	1.1	4.0	3.7	0.9	4.0
Walking rapidly, 4 mph	3.4	1.1	4.0	3.4	1.2	3.0	3.6	1.2	5.0
Garden work	3.1	1.0	3.0	3.2	1.1	3.0	3.1	1.0	3.0
Softball or baseball	4.0	1.0	5.0	3.9	1.1	4.0	3.7	1.3	5.0
Field hockey	4.1*[b]	0.9	5.0	3.8	1.1	5.0	3.7*[b]	1.2	5.0
Roller skating	3.5	1.1	3.0	3.6	1.1	4.0	3.3	1.2	4.0

[a]Numerical choices ranged from 1 (lowest) to 5 (highest) for energy value of activity.

[b]Means are based on a pooled variance estimate.

*Significantly different ($p < 0.05$) by t-test.

Table 36

Correct Answers (Percent) for Energy Values of Activities by Seventh-Grade Students

Activity	Total Sample N=226	Race		Sex		Body Fatness Class		
		White n=165	Black n=59	Male n=110	Female n=116	"Lean" n=61	"Middle" n=75	"Fat" n=68
Sitting quietly, reading	70.4	76.4	52.5	72.7	68.1	67.2	72.0	69.1
Tennis	19.9	19.4	22.0	20.0	19.8	26.2	16.0	19.1
Ironing	49.1	56.4	30.5	51.8	46.6	54.1	57.3	36.8
Golfing	35.8	40.6	23.7	39.1	32.8	41.0	34.7	36.8
Lawn mowing (power mower)	25.2	28.5	16.9	27.3	23.3	29.5	30.7	20.6
Basketball	48.2	47.9	50.8	50.9	45.7	50.8	48.0	48.5
Gymnastics	48.7	52.7	39.0	48.2	49.1	49.2	48.0	52.9
Touch football	34.1	37.0	25.4	36.4	31.9	32.8	28.0	42.6
Wrestling	50.4	52.1	44.1	52.7	48.3	44.3	50.7	54.4
Cooking	45.6	54.5	22.0	46.4	44.8	39.3	52.0	47.1
Typing	24.8	27.3	16.9	29.1	20.7	21.3	21.3	30.9
Bicycling	9.7	10.3	8.5	8.2	11.2	9.8	10.7	10.3
Vacuuming	40.3	46.7	20.3	43.6	37.1	36.1	45.3	30.9
Swimming	13.3	12.7	15.3	11.8	14.7	19.7	10.7	8.8
Horseback riding	27.9	29.7	23.7	28.2	27.6	26.2	26.7	29.4
Football	59.3	66.7	40.7	62.7	56.0	62.3	57.3	55.9
Sewing	31.4	32.1	28.8	38.2	25.0	29.5	26.7	32.4
Watching television	76.1	83.0	57.6	74.5	77.6	78.7	78.7	72.1
Playing cards	52.2	56.4	39.0	50.9	53.4	54.1	52.0	47.1
Bowling	18.1	17.6	18.6	19.1	17.2	24.6	14.7	17.6
Walking slowly, 2 mph	40.3	46.7	22.0	41.8	38.8	39.3	36.0	50.0
Lawn mowing (push mower)	19.5	20.6	16.9	20.0	19.0	14.8	21.3	17.6
Water skiing	26.5	23.6	32.2	31.8	21.6	24.6	34.7	20.6
Soccer	32.3	37.6	16.9	34.5	30.2	36.1	28.0	35.3
Badminton	36.3	37.6	32.2	36.4	36.2	29.5	32.0	44.1
Social dancing	31.9	32.1	30.5	30.0	33.6	23.0	33.3	30.9

Table 36 (continued)

Activity	Total Sample N=226	Race		Sex		Body Fatness Class		
		White n=165	Black n=59	Male n=110	Female n=116	"Lean" n=61	"Middle" n=75	"Fat" n=68
Volley ball	8.4	6.1	15.3	6.4	10.3	9.8	12.0	4.4
Walking rapidly, 4 mph	24.3	26.7	18.6	30.0	19.0	26.2	28.0	20.6
Garden work	38.9	38.8	39.0	40.0	37.9	44.3	38.7	36.8
Softball or baseball	17.3	19.4	10.2	15.5	19.0	21.3	13.3	16.2
Field hockey	33.6	33.9	33.9	35.5	31.9	42.6	30.7	29.4
Roller skating	30.1	33.9	20.3	30.0	30.2	36.1	29.3	26.5

VITA

Kitty Roberts Coffey was born in Jefferson City, Tennessee, on November 19, 1942, the daughter of W. Oliver and Verdie C. Roberts. She attended public schools in Hamblen County and was graduated from Morristown High School in 1961. In August, 1965, after having studied for the summer at Merrill-Palmer Institute of Child Development and Family Relationships, Detroit, she graduated magna cum laude from the University of Tennessee, Knoxville, with a Bachelor of Science degree in Home Economics. She received a Master of Science degree in Food Science from the University of Tennessee, Knoxville, in August, 1966.

Her professional career has included positions on the faculties of the School of Home Economics, University of Alabama, Tuscaloosa; Child Development Center, University of Tennessee Center for the Health Sciences, Memphis; and the College of Home Economics, University of Tennessee, Knoxville.

She is a member of the Society of Sigma Xi, Omicron Nu, Phi Kappa Phi, Pi Lambda Theta, Alpha Lambda Delta, Institute of Food Technologists, Society for Nutrition Education, American Association on Mental Deficiency, Tennessee Home Economics Association, American Home Economics Association, Knoxville District Dietetic Association, Tennessee Dietetic Association, and a registered member of the American Dietetic Association.

She is the wife of Benjamin B. Coffey of Morristown, Tennessee.