THE SELF-CONCEPT AS A FACTOR IN THE QUALITY OF DIETS OF ADOLESCENT GIRLS

by

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INTRODUCTION

Adolescence is a period in life characterized by rapid changes in physical size and personality development. The growth rates at this time are exceeded only by those in utero and in the first year of postnatal life (1). The growth spurt in the average female adolescent begins around the age of ten and is usually completed by the age of 15, although there is considerable variation among girls in the time of onset and the duration of growth (1). Because of this dramatic increase in growth and development, the adolescent has a greater need for nutrients. An increased need for protein, iron, and calcium occurs with the increase in lean body mass (1). Menstruation further increases the need for iron.

The quality of the diet consumed by most teenagers has often been questioned because of the change in eating habits that usually accompanies adolescence. Some of these changes include skipping meals, snacking on low nutrient dense foods, eating away from home, and exploring alternative dietary patterns such as vegetarianism and megavitamin therapy (2). Other factors such as alcohol and drug abuse, participation in sports, and pregnancy also have the potential to alter nutritional status of this age group. Although there is individual variation, research studies indicate that the diets of adolescents, especially adolescent girls, are low in certain nutrients (3-5).

The emphasis on slimness in our society has a great impact on the girl of pubertal age. The media's portrayal of the ideal woman as being ultra-thin only compounds the problem. Many young girls often try to achieve this image by following unconventional or self-styled dietary regimens which may not be nutritionally adequate. Attempts to change

appearance through weight reduction decreases food intake, and subsequently dietary quality.

A primary need of adolescents is acceptance by their peers and "approval" strongly influences their conception of themselves (6). Body image becomes an important factor in the development of the self-concept and may affect the quality of their diets.

Because of the extreme preoccupation with diet and weight control among adolescent girls and because their diets have been found to be low in some major nutrients, studies of the effect of their self-concept on the quality of their diets are justified. The objectives of this study of adolescent girls were:

1) to examine their self-concept.

2) to estimate their total body fat (fat weight) by calculating arm fat areas.

3) to investigate the relationship between their self-concept and their arm fat area.

4) to investigate the relationship between the quality of the diet and the self-concept of a subset of the sample of girls whose self-concept and fat weight were determined.

REVIEW OF LITERATURE

Nutritional Assessment

Methods of Assessment

The assessment of nutritional status is a comprehensive process aimed at identifying individuals or population groups at nutritional risk. In this process various kinds of information are collected and evaluated for use in developing nutrition education programs to help individuals and groups improve their diets. Assessment techniques include clinical evaluation, biochemical assessment, anthropometric measurements, and investigation of nutrient intake. Each of these methods has strengths and limitations and no method alone provides a complete assessment of nutritional status. The methods of assessment selected depends on the available laboratory facilities, funding, personnel, and time (7).

Anthropometric Measurements. Growth and physical development are the result of many complex biochemical functions that are dependent upon an adequate supply of nutrients. A child's pattern of growth and progress along a channel can indicate whether the diet is supplying sufficient nutrients for growth and other physiological needs without an excess that can lead to obesity.

The anthropometric measurements used most commonly include height, weight, triceps skinfold thickness, and mid-upper arm circumferences (8). At the 1968 White House Conference on Food, Nutrition, and Health (9) measurements of weight, standing height, and arm circumferences were recommended for the assessment of growth in school-age children through adolescence. Simko et al. (10) suggested weight and length as standard measurements for infants and children and triceps skinfold and arm

circumference measurements when a nutritional abnormality such as obesity or wasting is suspected. They also suggested measurements of triceps skinfold thickness and arm circumference for assessing the adequacy of lean and fat tissues in adolescents, adults, and elderly persons. Abraham et al. (11) stated that skinfold measurements can indicate the fat content of the subcutaneous tissues, which correlate well with total fat content of the body. Thus, skinfold measurements can be used to differentiate between an individual who is overweight because of muscle mass and one who is simply obese. Although there are 22 known body sites from which skinfold thicknesses may be obtained, the triceps skinfold is used most often since standards are available for the American population (12).

Dietary Intake. Investigations of dietary intake are conducted to identify those individuals who may be at risk of nutritional inadequacy. The findings are used to determine the sources and amounts of nutrients consumed and also to indicate general food patterns. Because absolute accuracy is difficult to achieve, the evaluation of dietary intake often is used in conjunction with another nutritional assessment method.

Methods of Data Collection. Dietary intake data from individuals can be obtained by several methods including the following (7, 13):

1. A 24-hour dietary recall interview in which the individual is asked to recall all foods and beverages consumed during the preceding 24 hours.
2. Records of food intake with the food expressed in weights, household measures or estimated quantities over a specified period of time.
3. A self-administered questionnaire or interview to obtain general information on the frequency of foods consumed.
4. A diet history obtained by a trained interviewer to determine the usual food intake pattern over a long period of time.
5. Laboratory studies in which duplicate samples of food are weighed and analyzed for nutrient composition.

Each method has its own strengths and weaknesses, but for most purposes researchers (12-15) agree that the 24-hour dietary recall is an effective method for dietary data collection. This method requires less time, money, subject cooperation, and professional personnel than most of the other methods (7).

As early as 1948, Bransby et al. (16) reported that 24-hour recall interviews were as accurate as weighed food records for assessing dietary intake of boys living at home or in residence halls. Data from the 24-hour recalls correlated well with food intake records kept at the halls. Young et al. (14) found that a seven-day food record was better than a 24-hour recall for analyzing the nutrient intake of one individual, but that the two methods could be used interchangeably in studies of groups of individuals. In a comparison of data from one-, seven-, 14-, and 28-day dietary records, Chalmers et al. (15) reported that the one-day record could estimate the mean intake of a group as accurately as the other three time periods. Because people tend to eat better when a one-day record is used, these researchers stated that the 24-hour recall might provide a more accurate dietary assessment.

Bosley (17) reported that 9 to 11 year-old children were able to recall their food intake during the previous 24-hours. She found this age group to be spontaneously curious, honest and more likely to answer truthfully than older children. Children in grades one through four were interviewed for recall of one day's diet in a study conducted by Emmons and Hayes (18). Measuring spoons and cups and different size servings of food were used to help the children determine the quantity of foods consumed. Mothers were then interviewed by phone for their recall of the child's diet during the same 24-hour period. Interviews were conducted

from Tuesday through Friday so that a school lunch was included in each day's meals. They found higher correlations between the nutritive levels calculated from the child's recall of lunch and lunch actually eaten than between those calculated from the recalls from the mother and from the child. The fourth graders were better able to recall correctly the foods eaten at home and school than the first graders. These researchers concluded that young children are able to recall one day's diet as accurately or more accurately than their mothers and that those above the second grade can give accurate dietary information.

Assessment of Dietary Quality. Traditionally, the nutrient content of recorded diets has been computed from tables of food composition and the resultant values have been compared to the appropriate Recommended Dietary Allowances (RDA) (19) or other accepted standards, such as those used with data from the Health and Nutrition Examination Survey (HANES) (20) or the Ten-State Nutrition Survey (TSNS) (21). Despite the ready availability of computers, data banks, and appropriate programs, calculations of the nutrient content of diets are tedious, time-consuming, and costly. For these reasons nutritionists have developed simpler methods, such as dietary scores, which are based on selected nutrients or food groups, for scoring dietary quality.

In 1954, Thomas et al. (22) developed and tested a method for assessing the quality of dietary intakes of 1,128 black and white women living in Detroit. The objective of their study was to determine qualitative differences in the intakes of groups of individuals and to identify extreme levels of intake rather than individual nutrient intakes. Their system was based on 14 food groups with points allotted to groups with maximum scores of 100 percent being equivalent to 125, 139, and 160 points for

non-pregnant, pregnant, and lactating women, respectively. The number of servings was set to meet the RDA for energy and eight nutrients for the three groups. This scoring system proved to be a simple and reliable method for assessing the dietary quality of women of low socioeconomic status. Later, Hinton et al. (4) used this system to investigate the relationships among psychological, sociological, and physiological factors and eating behavior of 140 adolescent girls in Iowa.

In a study of the factors affecting teenage food habits, Schorr et al. (5) used a Guttman scale or scalogram (23) to assess the quality of diets of 118 New York state seventh to twelfth grade students. The Guttman scale is cumulative, with any given scale step containing the food items therein and all those in preceding steps. This scale is often used to measure dietary complexity and is especially useful for large groups of people consuming many different food items. The study conducted by Schorr included a seven step version of the Guttman scale with the following seven food groups: whole milk, breads and rolls, beef, sweet foods and snack foods, fruits, orange juice, dark-green leafy and deep-yellow vegetables. With each succeeding scale step, the percentage of students included decreased while the level of dietary complexity increased.

Greger et al. (24) investigated the dietary intakes of 178 adolescent females from 24-hour dietary recalls collected during both the fall and spring of one school year. Two methods were used to assign dietary quality scores to each diet. One method involved summing all servings from the four food groups to give the Basic Four Total. The second method, the Modified Basic Four Total, was calculated by adding all servings from the four food groups, provided the number of servings from each group did not exceed the recommended number of servings for that group. Thus, if a girl

consumed more than the recommended number of servings from a food group, only the recommended number of servings for that food group were used for calculation rather than the actual number of servings she consumed. The maximum score possible for the Modified Basic Four Total was 14. Correlations were made between the Modified Total and Basic Four Total. The researchers concluded that because Basic Four Totals can be skewed to higher levels by consumption of large amounts of food from one food group, the Modified Total is probably a better indicator of dietary quality.

MacDonald et al. (25) also used a dietary score to assess the quality of diets of 256 Canadian girls. The Canadian Food Guide (26), which recommends four servings of milk or milk products, five servings of bread and/or cereals, five servings of fruits and/or vegetables and two servings of meat or meat alternatives per day to yield a maximum score of 16 points for adolescents, was used as a basis for the assessment. The authors stated that this guide is not intended as a standard against which dietary quality is rigorously assessed, but is useful in separating those individuals with poor food intakes from those with very good intakes. After 24-hour food records were collected from each girl, the number of servings from each food group was totaled to give a final score. On the basis of this scoring method, the 50 best (i.e., highest scores) and the 50 worst (i.e., lowest scores) diets were identified. These researchers concluded that although this scoring method is a gross estimate of dietary quality, it served to separate two very distinct groups with respect to dietary intake.

The Recommended Dietary Allowances are intended to serve as guides for achieving and maintaining adequate nutritional status. Many researchers use the RDAs as a basis for estimating the prevalence of low

dietary intakes in various population groups but caution must be used in drawing conclusions from these comparisons (27). Failure to achieve these levels of intake is not necessarily indicative of nutritional inadequacy. The United States Department of Agriculture (USDA) specified two-thirds of the RDA as the standard for identifying subjects at possible nutritional risk in the 1965-66 Household Food Consumption Survey (28).

Several different scoring systems based on the RDA have been developed for assessing nutrient adequacy. In a study of the differences in nutrient intake of high school students participating and not participating in the school lunch program, Howe and Vaden (29) used a method developed by Cosper (30) to determine dietary quality. Percentages of the RDA for protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, and ascorbic acid were calculated from 24-hour dietary recalls. Intakes equal to or greater than 100 percent of the RDA for all nutrients were classified as "excellent." If intakes were equal to or greater than 66.7 percent, they were rated as "good." The diets were rated as "fair" if intakes for all nutrients were equal to or greater than 50 percent, and "poor" if intakes were less than 50 percent of the RDA.

Schafer (31) used a similar method developed by Yetley (32) to study the effect of self-concept on the dietary quality of young married women. Intakes of protein, calcium, iron, vitamin A, thiamin, and ascorbic acid were calculated from 24-hour dietary recall interviews. Three points and an "excellent" rating were assigned to diets that met or exceeded the RDA for all six nutrients, two points and a rating of "good" to diets with 67 to 99 percent of the RDA and one point to the "poor" diets that provided less than 67 percent of the RDA.

Using percentages of the ROA as a measure of nutritional adequacy is a common practice among researchers. A percentage of the ROA for a single nutrient according to an individual's sex and age is referred to as the nutrient adequacy ratio (NAR). Madden and Yoder (33) used NAR values to evaluate the effectiveness of food distribution programs in rural Pennsylvania. NAR values can be used to compute mean adequacy ratios (MARs) which are used to judge overall dietary quality. MAR values are obtained by totaling NAR values and computing a mean value. All NAR values greater than 100 percent are truncated to 100 to prevent intakes exceeding the RDA for one nutrient compensating for inadequacies of others.

Newell et al. (34) evaluated the dietary quality of 1,242 Kansas fifth grade students by computing MAR values. Nutrient adequacy ratios were calculated for energy and nine nutrients, including and excluding supplements, from 24-hour recalls. Then, using two-thirds of the ROA as a starting point, they grouped the MAR values into four ranges as follows:

90 to 100
75 to <90
66 to <75
<66

In a study of 212 university students, Guthrie and Scheer (35) compared the validity of a quality score based on the Basic Four Food Guide (36) with that of a MAR based on 12 nutrients. Using 24-hour food records, four points were assigned to each of the four food groups for a possible total score of 16 points and MARs were calculated from the percentages of the 12 ROAs. The diets that scored 16 points also provided greater than 78 percent of the ROA for all 12 nutrients investigated. Guthrie and Scheer concluded that when the objective is to evaluate program effectiveness, the simple dietary score can be substituted for the more time-consuming dietary analysis.

Regardless of the type of quality score used, there is an apparent need for a simplified method of determining the nutritional quality of recorded diets. Each of the above methods has advantages and disadvantages and the type chosen should depend on the time and personnel available. The MAR has been shown to estimate dietary quality as accurately as a score based on food groups and is easier and less time-consuming than comparing actual nutrient intakes to RDAs.

Dietary Studies of Adolescent Girls

In recent years many nutritionists have voiced their concern over the nutritional quality of the diets of American teenagers. The 1977-78 USDA National Food Consumption Survey (37) indicated that the average female 11 to 15 years of age had intakes that were below the Recommended Dietary Allowance for more than one mineral or vitamin. Calcium and iron intakes for 38 and 42 percent of the girls, respectively, were less than 60 percent of the RDA for those minerals. Intakes of vitamins A and C also were less than 60 percent of the RDA for this age group (23 and 15 percent, respectively). The Ten-State Nutrition Survey (TSNS) conducted in 1968-69 (21), which focused on low income groups, showed that adolescents between ten and 16 years of age had the highest incidence of unsatisfactory nutritional status of any of the groups surveyed. More than one-half of the female adolescents surveyed in the TSNS consumed less than two-thirds of the 1974 RDA for iron, calcium, and vitamin A. The 1971-74 Health and Nutrition Examination Survey (HANES) (38), which included all income groups, indicated that adolescence is a period of increased risk of iron deficiency in both males and females and that deficiency was most prevalent in the 12 to 17 year age group.

Similar findings have been reported in regional and local studies. The Guilford County Nutrition Committee in North Carolina (3) conducted 24-hour dietary recall interviews with 6200 teenagers in the seventh, ninth, tenth, and twelfth grades in 12 schools. Using six food groups (meat, milk, bread and cereals, green and yellow vegetables, ascorbic acid-rich vegetables, and other fruits and vegetables) the number of servings in each food group consumed by students was compared with those recommended in the USDA Basic Four Food Guide (36). Although two or more cups of milk were consumed by 66 percent of students, 14 percent had none. Milk intake was lowest in grades 10 and 12, in which only 57 percent of the students consumed two or more servings. Consumption of vegetables was very low for all students in all grades with 83 percent consuming no deep-green leafy or yellow vegetables and 59 percent consuming no ascorbic acid-rich vegetables. Although 64 percent of the students consumed two or more servings of fruit and other vegetables, total consumption of all fruit and vegetables was well below the desirable level. Thus, the diets of these teenagers were probably low in vitamin A, calcium, and ascorbic acid. The number of meals missed by these students increased from ten percent in the seventh grade to 25 percent in the twelfth grade. In one school, more than a third of those in the tenth grade and over half of the twelfth graders missed a meal. The number and type of snack food consumed by these students also were determined. The seventh and ninth graders selected mostly wholesome foods for snacking such as fruit, bread, and milk, whereas those in grades 10 and 12 chose soft drinks, desserts, and candy.

Schorr et al. (5) studied the food habits of 118 adolescents in grades seven through twelve. Food preferences were obtained by asking

students to indicate on a list of foods and beverages those that they "liked most," "liked least of all," and "had never tasted." Thirty-four foods received favorable responses from at least 10 percent of the students with soda pop being selected most often as the food they "liked most." Milk and steak came in second and third, respectively, and cereal was listed last. The majority of the foods in the "most disliked" list were excellent sources of vitamin A, including liver, fish, spinach, and squash.

The students also were asked to record everything they ate for three days for analysis of nutrient intake. Analysis of the 3-day food records indicated that the mean intakes of calcium, iron, ascorbic acid, and vitamin A were considerably higher for males than for females. The percentages of all students consuming less than two-thirds of the RDA for these nutrients were 21, 44, 51, and 69, respectively. The results of this study also showed that as the complexity of the diet increased so did the intakes of calcium, iron, ascorbic acid, and vitamin A. Thus, the students who consumed a wider variety of foods had more nutritious diets.

A number of studies have found the nutritional status of adolescent girls, in particular, to be less than adequate. In comparison to their male counterparts, adolescent girls often exhibit poor eating habits. Spindler and Acker (39) reported that, in general, boys have better diets than girls. Only one-fourth of the girls in this study and half of the boys consumed the recommended four cups of milk or milk substitute on the day of the recall. Less than half of both boys and girls consumed the recommended four servings of fruits and vegetables. Protein intake was adequate for 63 percent of the girls who consumed two or more servings of meat, fish, or other alternate. Bread and cereal intake was adequate for the majority of the boys but only 35 percent of the girls consumed four

servings of bread or cereal and 40 percent had fewer than three servings. Only half of the girls consumed one good source of ascorbic acid. On the day of the recall 21 percent of the girls had skipped breakfast compared to only four percent of the boys. These researchers stated that the adolescents were eager to talk about nutrition and that this information should serve as a basis for improving the current nutrition programs for adolescents.

Greger et al. (24) investigated the dietary habits of 178 female adolescents in both the fall and spring of one school year. The nutrient intake and usual meal and snack pattern were determined from 24-hour recalls and diet histories. In the fall, 20 percent of the girls ate fewer than two servings of fruits and vegetables and 18 percent consumed less than two servings of milk or milk products compared to 15 and 30 percent, respectively, in the spring. Using the Modified Basic Four Total system, 14 percent of the girls' diets were classified as poor and only four percent of the girls had diets that conformed to the Basic Four Standard (containing the recommended 14 servings).

In a study of the eating behavior and dietary intake of adolescent girls, Hinton et al. (4) analyzed 7-day food records of 140 girls between the ages of 12 and 14. The girls completed one food record in the winter and one in the summer. These researchers found that the girls consumed less milk and fewer ascorbic acid- and carotenoid-rich fruits and vegetables than are recommended for girls of this age group. Although the nutrient intake of each girl was similar from winter to summer, the winter diets tended to be more nutritionally adequate than the summer diets. They also found that the girls who consumed greater quantities of food had better quality diets than those who ate less.

As part of a four year study to identify the factors related to the body composition of adolescents, Hampton et al. (40) compared the nutrient intake of a subsample of high school students with the total sample used in the larger study. The students were asked to complete four, 7-day food records throughout a period of one year. Fifteen percent of the girls in the subsample had intakes of ascorbic acid below two-thirds of the RDA during the four periods compared to 30 percent of the girls in the total sample. Calcium and iron levels also were low with 49 and 58 percent of the girls, respectively, consuming less than two-thirds of the RDA for these nutrients. The next lowest nutrient intake was vitamin A with 15 percent of the girls receiving less than two-thirds of the recommended level. Protein intake was adequate with all subjects meeting or exceeding the RDA for that nutrient. Hampton et al. concluded that iron, calcium, and vitamin A, in that order, were the most neglected nutrients in the diets of the adolescent girls.

The vitamin B_6 status of 583 black and white adolescent girls was investigated by Driskell et al. (41). The mean daily intake of the vitamin was 1.2 mg as determined by coenzyme stimulation of erythrocyte alanine aminotransferase activities and two 24-hour dietary recall records. The RDA for vitamin B_6 is 1.8 mg/day for girls 11 to 14 years of age. The results of this study indicated that 51 percent of the girls consumed less than 70 percent and 19 percent consumed less than 50 percent of the RDA for vitamin B_6.

Howe and Vaden (29) investigated the factors differentiating participants and nonparticipants in a school lunch program. Mean intakes of energy and eight nutrients were computed from 24-hour dietary recalls obtained from participants and nonparticipants. The results showed that

75.8 percent of the nonparticipating girls had diets rated as poor compared to 42 percent of the participating girls. At lunch only, more than 90 percent of the nonparticipating girls had a poor diet compared to 37 percent of the participants. The mean total day's intake of energy and all nutrients, except ascorbic acid, was significantly lower for girls than for boys. Neither participating nor nonparticipating girls met the RDA for calcium and thiamin.

Self-Concept of Adolescent Girls

Adolescence is a time of change in mental and emotional attributes. Probably at no other time in life is the need for acceptance by others so strong. It can be a time of confusion and uncertainty as the adolescent seeks to break the childhood ties with parents and establish a more independent lifestyle. Adolescents often become preoccupied with their own self-image and may measure their whole being solely by the reactions of their peers (42). This can lead to feelings of inferiority and a constant struggle to achieve a superficial image of perfection.

The self-concept has been defined as how a person feels about him/herself and how that person will behave in his/her environment (31). Schafer (31) postulated that people with low self-regard or self-esteem devote more energy to maintaining, defending, or building their self and are, therefore, less able to create or perform beyond the immediate emotional necessities. He further stated that a person with a good self-concept has the resources to direct attention to a higher level of involvement in secondary areas of behavior and is less likely to be influenced by others' opinions.

During early adolescence, considerable shifts in the self-concept often occur (43). Elliott (44) states that children at the age of 12 show a significant decrease in self-esteem and self-concept stability and, simultaneously, a sharp increase in depression and self-consciousness. For the female adolescent, developing a healthy self-concept is particularly difficult. Long before adolescence she has learned that physical attractiveness is a basic dimension of the female gender role (45). Acquiring an hour-glass figure consequently becomes a major task for many teenage girls. The never-ending search for beauty often leads to a negative body image, lowered self-esteem, and achievement conflicts (45).

Adolescent girls have been shown to possess lower self-esteem than adolescent boys. Stoner and Kaiser (46) used the Tennessee Self-Concept Scale (TSCS) to measure the difference in self-concept of 62 male and female high school juniors. The males scored significantly higher on three subscales: Personal Self, Social Self, and Self-Criticism. They concluded that males have a higher sense of adequacy and worth as a person and in social interactions and are more open with self-criticism than females.

Strong emphasis has been placed on the role of physical appearance in the evolution of self-concept and identity formulation (47-50). Body image appears to affect the female self-concept more than the male self-concept. Lerner and Karabenick (51) compared the body attitudes and self-concepts of 70 male and 119 female adolescents. The results indicated that mean physical attractiveness ratings were significantly related to self-concept of females but not for males. Also, the attractiveness ratings of a larger number of individual body parts were significantly related to self-concept for females than for males. Dwyer and Mayer (52)

found that physical appearance and inner self-image were more closely associated in adolescent girls than boys.

The close relationship between physical appearance and self-concept found in adolescent girls may affect food intake. Dissatisfaction with body size may lead to an alteration in diet, such as dieting (25). In a study of the factors affecting the dietary quality of adolescent girls, MacDonald et al. (25) found that the girls with the poorest diets perceived themselves to be larger than the girls with good diets and had dieted more often in the past in an attempt to reduce body weight than the girls whose diets were good. The girls with the poor diets also skipped meals more often than the girls with good diets, thus, reducing sheer quantity of food consumption. When less food is consumed, dietary quality often suffers (25). MacDonald et al. stated that the increased awareness of bodily appearance and size that occurs with adolescence coincides with a marked decrease in the quality of dietary intake.

Hinton et al. (4) studied the relationships among certain physiological, sociological, and psychological factors and eating behavior of adolescent girls. Using the Minnesota Counseling Inventory (53), they reported that girls who scored best in emotional stability, conformity, adjustment to reality, and family relationships, missed fewer meals and had better quality diets than the girls who scored less well. Analysis of 7-day food records showed a direct relationship between the quantity of food consumed and the quality of the diet. These researchers concluded that psychological adjustment is significantly related to the selection of a good diet and that eating, like other aspects of behavior, is affected by maturation and emotional adjustment.

METHODOLOGY

Approval and Consent

The study was conducted in a high school in a medium-sized mid-western city. Data were collected during class time on 15 year old girls enrolled in physical education classes. Approval for the study was obtained from subcommittees on research involving human subjects from the College of Education and from the Kansas State University Committee. The superintendent of the school district, principal, and physical education teachers also approved the study (Appendix A).

A letter to each parent or guardian and student that described the study and a consent form (Appendix A) were distributed in duplicate to the students by the class instructors, who also collected the completed forms. Rosters of the 160 students, who agreed to participate in the study, were developed and an identification (ID) number was assigned to each student. The first digit indicated the class and the last two digits indicated the student.

Anthropometric Measurements

Upper arm circumference and triceps skinfold measurements were taken on all participating students. The roster of names was given to the class instructors who sent students in groups of three or four at one time to the data collection area. The measurements were taken by the investigator and recorded by an assistant on a recording form (Appendix B). Only ID numbers were used to identify students when data were recorded.

The student was asked to stand with the left arm bare and flexed 90 degrees. The midpoint between the left shoulder (tip of the acromion process) and the elbow (tip of the olecranon process) was determined and marked. Arm circumference was measured at that point with a steel measuring tape. Readings were taken to the nearest tenth of a centimeter.

Triceps skinfold measurements were taken with a skinfold caliper[1] at the upper arm midpoint with the arm hanging freely and relaxed. A skinfold (long axis vertical) was picked up between the thumb and forefinger and about one centimeter above the midpoint mark and directly in line with the point of the elbow or olecranon process. The caliper jaws were applied at exactly the level marked. Readings were taken to the nearest half of a millimeter. Two readings were taken on each subject; if the two readings were not the same, a third reading was taken. If three readings were required, a mean was computed for data analysis. Upper arm circumference and triceps skinfold measurements were used to estimate the arm fat area using the formula derived by Frisancho (54).

Self-Concept Measurement

The Tennessee Self Concept Scale (TSCS) (55) (Appendix C) was used to assess the self-concept of the participants in the study. This instrument consists of 100 self-descriptive statements to which the subject responds on a 5-point response scale ranging from "completely true" to "completely false" (56). The statements are designed to portray the different aspects of the subject's concept of himself/herself. The TSCS yields 30 scores, 29 of which have a test-retest reliability in the 0.80-0.90 range, that

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[1]Lange Skinfold Caliper, Cambridge Scientific Industries, Cambridge, Maryland.

are calculated from the responses to characterize the subject's self-concept. For the present study, eleven scores of the TSCS provided measures in six general and five specific categories. The former comprised Identity (what he/she is); Self-Satisfaction (how he/she accepts him/herself); Behavior (how he/she acts); Self-Criticism (a measure of defensiveness); Total Self-Concept (overall level of self-esteem); and Total Conflict (amount of confusion concerning one's self). The five specific areas included Physical Self (view of body, state of health, physical appearance, skills, and sexuality); Moral-Ethical Self (moral worth, relationship to God, feelings of being a "good" or "bad" person, and satisfaction with religion or lack of it); Personal Self (sense of personal worth, feeling of adequacy as a person, and evaluation of personality apart from body or relationship to others); Family Self (feelings of adequacy, worth, and value as a family member); and Social Self (self as perceived in general relation to others).

The test was administered on a day when no class activities were planned. Each student was given a test booklet, answer sheet, and a pencil. Before beginning the test, the investigator announced to the students that all answers would be kept confidential and that they were not required to answer every question, however, the data would be invalid unless all questions were answered. A note with this explanation also was attached to each test booklet. After completing the test each student recorded her ID number on her answer sheet. Time to complete the test was approximately 30-40 minutes. Data from all completed answer sheets were compiled for computer scoring.

Dietary Evaluation

Twenty-four Hour Dietary Recall Interviews

Selection of Equipment and Materials. One dimension, life-size food models developed by the National Dairy Council were dry mounted and laminated on three 14"×22" poster boards according to food groups for use during the dietary interviews. Standard aluminum measuring cups and spoons, a 12" plastic ruler, and plastic glasses of varying sizes (5 oz., 8 oz., 10 oz., 12 oz., 16 oz., and 20 oz) were used to assist students in estimating amounts of foods eaten and beverages consumed. Each interviewer was provided with a portfolio for the food models and a plastic bag for the small equipment.

A 24-hour dietary recall form (Appendix D) was adapted from those used in related studies (57, 58). The form included space for recording the ID number of the subject, whether they took nutrient supplements or not and if so how often, and if they were presently on a special diet and why. Probing questions and procedures for interviews were modified from those used by Gilbert et al. (58) (Appendix D).

Interview Training. Training sessions with the interviewers were conducted prior to the study. The procedures to be used for the recall interviews, including a list of probing questions and visual aids were explained. Practice interviews were conducted by each interviewer prior to data collection.

Data Collection. A subsample of the 160 participating students were selected randomly for the dietary interviews. The names and ID numbers of all participating students were numbered consecutively from one to 160. Then, a random list of numbers between one and 160 were generated by computer from which the first 40 were selected. On the day of data

collection the 40 names were given to the class instructors, who dismissed the students from class for the dietary interviews.

Three interviewers conducted the dietary recall interviews at separate stations set up in teachers' offices. Each station included two folding chairs, a large desk, a set of food model posters, and a set of food measuring equipment.

Food Frequency

In addition to the 24-hour dietary recall, a food frequency questionnaire consisting of foods low in nutrient density was used to determine consumption of these foods on a daily, weekly, or monthly basis (Appendix D).

Preparation of Anthropometric, Self-Concept, and Dietary Recall Data for Statistical Analysis

The anthropometric and self-concept data were keypunched directly; prior coding was unnecessary. The data base used to develop a program to convert food intake data into nutrient values by meal was a combination of the USDA Handbook 456 (59) and the revised USDA Handbook 8-1 through 8-9 (60-68). The food composition values from these sources were merged into one data base. Food codes were assigned to the recall foods from the data base and an amount code was calculated as a multiple of the amount of food specified in the data base; i.e., if the student reported consuming one and one-half cups of milk and the nutrient analysis on the data base was for one cup quantity, the amount code entered into the computer was 1.50. Other nutrient values for food items were obtained from a previous study conducted at Kansas State University (58).

Supplements were coded as a separate meal to permit analysis of nutrient intake by meal and for the total day with or without supplements. A list of supplements was added to the data base. Since students interviewed frequently were not aware of the brand, the value of a standard supplement[1] was used for recording the nutrients consumed unless a specific type or brand was reported.

Data Analysis

Standard statistical procedures (69) were followed to analyze the anthropometric and self-concept data. Means, standard errors, and coefficients of variation were computed for arm circumference and triceps skinfold measurements and fat areas. Percentiles also were computed.

From the self-concept data, scores were calculated for each of the following: Identity, Self-Satisfaction, Behavior, Total Self-Concept, Total Conflict, Self-Criticism, Physical Self, Personal Self, Family Self, Social Self, Moral-Ethical Self, and Self-Criticism. Means standard errors, and coefficients of variation were computed for each score.

Similar procedures (69) were used to analyze energy and nutrient intakes of the adolescent girls who were interviewed, for the total day (with and without supplements) and for breakfast, lunch, dinner, and snacks. In between meal snacks were combined and reported as a meal. Means, standard errors, and coefficients of variation were computed for energy and 11 nutrients (protein, vitamin A, ascorbic acid, thiamin, riboflavin, niacin, vitamin B_6, calcium, phosphorus, magnesium, and iron). Percentages of the RDA were computed for energy and 11 nutrients, as well

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[1]Miles Laboratory, "One A Day" brand.

as the percentages of carbohydrate, protein, and fat in the total day's energy intake. Consumption of each of the low nutrient density foods on the food frequency questionnaire was converted to a per month basis. For statistical analysis, the list of foods was collapsed into the following groups: carbonated beverages, candy, baked desserts, and salty snacks.

To evaluate overall quality of the 24-hour dietary recalls, mean adequacy ratios (MARs) (33) were calculated. MAR values were generated by totaling nutrient adequacy ratios (NARs) and computing a mean value. Nutrient adequacy ratio refers to the percentage of the RDA for a single nutrient. All NAR values greater than 100 percent were truncated to 100 to prevent intakes in excess of the RDA for one nutrient compensating for inadequacies of others. The MAR values were obtained by using the following equation:

$$MAR = \frac{\sum_{i=1}^{k} X_i}{k} \text{ where } X_i = NAR \text{ if } NAR \leq 100$$
$$= 100 \text{ if } NAR > 100$$

Two MAR values, with and without supplements, were calculated. The MAR values were grouped into four ranges as follows:

90 to 100
75 to <90
66 to <75
<66

Because two-thirds of the RDA has been used routinely in group assessment for signifying nutrient adequacy that value was used as a starting point for establishing ranges of MAR values.

Pearson's product-moment correlation coefficients were calculated among the MAR values; the fat areas; the self-concept scores; and consumption of the four groups of low nutrient dense foods. A stepwise regression procedure was used to examine the effect of the self-concept

scores and consumption of groups of low nutrient dense foods on MAR values, with and without supplements. A significance level of 0.50 was the criterion for the inclusion of the score or food group in the statistical model. A score or food group entered the model according to its relative contribution to the MAR value. The score or food group was subsequently eliminated from the model if after the introduction of other scores or food groups it no longer made an important contribution to the MAR index.

RESULTS AND DISCUSSION

Anthropometric Measurements

Means, standard deviations, selected percentiles, and coefficients of variation for the anthropometric measurements are listed in Table 1. In Table 2, selected percentiles for upper limb fat of the subjects in our study and those in the NHANES I survey (54) are compared.

At the 5th, 50th, and 95th percentile, Kansas girls had larger arm circumferences, triceps skinfolds, and arm fat areas than girls in the national survey. The arm circumference values of Kansas girls were slightly higher at each percentile than those of their national counterparts, but at the 5th and 50th percentile triceps skinfold and fat area values were twice those of girls in the national survey. At the 95th percentile, arm fat areas of Kansas girls were closer to their national counterparts than at the 5th or 50th percentile. In a 1980 study of Kansas fifth graders (70), girls also tended to have larger triceps skinfold and arm fat measurements than those in the same age group in the NHANES I study. Recent studies have indicated that fat areas are systematically better estimators of fat weight than skinfold thickness (71). For this reason, Frisancho (55) has recommended that assessment of nutritional status during growth and adulthood be made with reference to fat and muscle areas.

Dwyer et al. (72) investigated the physical characteristics of 446 female adolescents designated as either dieters or nondieters. The mean triceps skinfold measurement for both groups (21 and 15 mm, respectively) was smaller than that found in our study (28 mm). The mean arm circumference value for the dieters was identical to that of our girls (262 mm)

Table 1. Means, standard deviations, selected percentiles and coefficients of variation for physical measurements of 15-year-old girls (N = 160)

physical measurement	mean and std. dev.	percentiles							coefficient of variation
		5th	10th	25th	50th	75th	90th	95th	
		← mm →							
arm circumference, mm	262 ± 33	220	231	240	260	280	320	339	13
triceps skinfold, mm	28 ± 9	16	18	22	29	35	48	53	32
arm fat area, mm	3,107 ± 1,331	1,566	1,912	2,202	3,046	4,056	6,117	6,375	43

Table 2. Comparison of selected percentiles for upper limb fat of 15-year-old girls in Kansas and in the NHANES survey*

measurements	Kansas girls				NHANES girls			
	N	percentiles			N	percentiles		
		5th	50th	95th		5th	50th	95th
		← mm →				← mm →		
arm circumference	160	220	260	339	117	208	254	322
triceps skinfold	160	16	29	53	117	8	17	32
arm fat area	160	1,566	3,046	6,375	117	839	1,886	4,195

*Source: Frisancho (54).

but the mean value for the nondieters was slightly lower (233 mm). Dwyer et al. did not measure arm fat area so a comparison with our girls cannot be made.

Self-Concept Measurement

Means and standard deviations for scores in each of the eleven categories of the Tennessee Self Concept Scale (TSCS) (55) for Kansas adolescent girls and 50th percentile norms established for TSCS are listed in Table 3. The standardization group from which the norms were developed was a broad sample of 626 people, with equal numbers of blacks and whites, males and females, between the ages of 12 and 68 (56).

Mean scores for all categories except Self-Criticism and Total Conflict fell more than one standard deviation below the 50th percentile, indicating that Kansas girls have low self-concepts. The mean Self-Criticism score was slightly above the 50th percentile, which suggests that Kansas girls were as open to self-criticism as half of those in the standardization population. The mean Total Conflict score (64.86) was higher than that for the standardization group (30.10). High scores in this category reflect confusion, contradiction, and general conflict in self-perception (56).

In terms of content areas of self-concept, mean scores for Physical Self, Moral-Ethical Self, Personal Self, Family Self, and Social Self were more than one standard deviation below the 50th percentile. A low score for Physical Self reflects a poor opinion of one's physical appearance, a finding not uncommon among teenage girls (45). The low mean Moral-Ethical score may indicate that these girls were not content with their morality or their relationship with God (56). The mean score for Personal

Table 3. Means and standard deviations for Tennessee Self Concept Scale scores for Kansas adolescent girls and 50th percentile norms from standardization group*

variable	Kansas girls	50th percentile norms
Physical Self	56.87 ± 4.39	71.78 ± 7.67
Moral-Ethical Self	54.30 ± 5.08	70.33 ± 8.70
Personal Self	51.12 ± 4.34	64.55 ± 7.41
Family Self	56.43 ± 5.66	70.83 ± 8.43
Social Self	52.23 ± 3.99	68.14 ± 7.86
Identity	82.81 ± 5.63	127.10 ± 9.96
Self-Satisfaction	92.51 ± 8.18	103.67 ± 13.79
Behavior	95.63 ± 6.73	115.01 ± 11.22
Total Self-Concept	270.96 ± 15.02	345.57 ± 30.70
Total Conflict	64.86 ± 15.00	30.10 ± 8.21
Self-Criticism	37.34 ± 4.48	35.54 ± 6.70

*Source: Fitts, W.H.: Tennessee Self Concept Scale (Manual). Nashville: Counselor Recordings and Tests, 1965.

Self was the lowest of the five content areas, suggesting that Kansas girls may lack, or have yet to develop, a sense of personal worth. Family Self and Social Self scores were slightly higher than Personal Self scores but were still below the 50th percentile, indicating that these girls may feel unworthy as a family member and in social interactions with other people in general.

The Total Self-Concept score was well below the 50th percentile. A low Total Self-Concept score reflects negative feelings and behaviors concerning the self and indicates lower self-esteem.

Our findings are similar to those of other researchers. Stoner and Kaiser (46) used the TSCS to measure the self-concept of 62 adolescent girls and boys. The girls' scores were nearly identical to those found in the present study. The boys scored significantly higher than the girls on three of the subscales: Personal Self, Social Self, and Self-Criticism. These researchers concluded that adolescent girls have a lower sense of adequacy and worth as a person and in social interactions and are less open to self-criticism than adolescent boys.

The self-concept of Kansas delinquent and nondelinquent adolescent boys was measured by the TSCS in a study by Jurich and Andrews (73). Scores for the delinquent boys were similar to those of the girls in the present study and were much lower than those of the nondelinquent boys. Perhaps the girls in the present study were more concerned with their feelings and behaviors than the nondelinquent boys or they were more truthful in their responses to questions on the TSCS instrument.

Adolescence is a critical time in the development of the self-concept and low self-concept scores can be expected for this age group (74). Elliott (44) states that adolescence is a time of great disturbance in

self-concept development. Their confusion as to who they are and how they feel about themselves is reflected in the high Total Conflict score and low Total Self-Concept score. Low scores for Physical Self on the TSCS are also not uncommon with this age group. Many adolescent girls want their physical appearance to resemble that of fashion models or actresses and become disillusioned if their expectations are unfulfilled. Lerner and Karabenick (51) reported that physical attractiveness was significantly related to the self-concept of female adolescents but not of male adolescents. Similarly, Moral-Ethical scores tend to be low for the adolescent girl. The development of sexuality during this time may lead her to question her own desires; she may wonder if she is a "good" or "bad" person (74). A once stable relationship with God may now be in a state of flux (74). At this age, the adolescent girl has not yet developed a true concept of herself and may feel inferior as a person and in social interactions (74). In a study of the various dimensions of the adolescent self-concept, Elliott (44) stated that a low self-esteem leads directly to increased social anxiety. Family relationships are often strained at this time also. Hence, scores on the TSCS for Personal Self, Family Self, and Social Self are often low for adolescent girls.

Twenty-four Hour Dietary Recall Interviews

Percentage of Students Consuming and Not Consuming Meals

The percentages of students consuming breakfast, lunch, dinner, snacks, and supplements on the day of the 24-hour dietary recall are listed in Table 4. At least 80 percent of the students consumed breakfast, lunch, and dinner. Slightly more than a fourth of the students took a vitamin or mineral supplement on the day of the recall. Similar to the

findings in other dietary studies of adolescent girls, breakfast was the meal most often omitted. Spindler and Acker (39) found 21 percent of the girls in their study had skipped breakfast. Hodges and Krehl (75) reported that many of their subjects were breakfast-skippers, a habit which was associated with low ascorbic acid intake. Hinton et al. (4) reported a high correlation between the percentages of meals missed by girls and poor diets.

Table 4. Percentage of students (N = 40) consuming breakfast, lunch, dinner, snacks, and supplements on day of 24-hour dietary recall interview

	those consuming	those not consuming
	%	%
breakfast	80	20
lunch	88	12
dinner	92	8
snacks	85	15
supplements	28	72

In the present study, most of the girls (85 percent) reported consuming at least one snack on the day of the recall. Eating between meals is common for many people, but especially so for teenagers. Data from the Ten-State Nutrition Survey (21) indicated that 78 percent of the teenagers interviewed ate between meals. Howe and Vaden (29) reported that between 22 and 45 percent of the total day's nutrient intake of teenagers came from between-meal snacks. Some studies have shown that snacking improved the nutritional quality of adolescent diets (76), especially those of adolescent girls (77).

Energy and Nutrient Intakes

The means, standard deviations, and coefficients of variation for energy and nutrient intakes for the total day (with and without supplements) and from breakfast, lunch, dinner, and snacks are listed in Tables 5 and 6, respectively. Intakes of vitamin A, niacin, vitamin B_6, and calcium were increased when supplements were taken by the students (Table 5). Energy, protein, vitamin A, calcium, phosphorus, and magnesium intakes were greater at lunch and dinner than at breakfast (Table 6). Snacks provided more energy, protein, phosphorus, and magnesium than breakfast and more energy, thiamin, phosphorus, and iron than lunch. Vitamin B_6 was supplied equally by all three meals and snacks.

Percentages of the RDAs

The Recommended Dietary Allowances for adolescent girls, 15 through 18 years, are listed in Table 7 and were used for converting students' intakes into percentages of the RDAs. The means, standard deviations, and coefficients of variation for percentages of RDAs for the total day's energy and nutrient intake (with and without supplements) are listed in Table 8.

The students' intakes of energy, protein, ascorbic acid, thiamin, riboflavin, niacin, and phosphorus met or exceeded the RDA, with or without supplements, on the day of the recall. Vitamin A intakes increased, from 94 percent to 122 percent, when a supplement was taken. Protein and ascorbic acid intakes, 172.8 and 217.1 percent, respectively, were more than three times the RDA for those nutrients. Percentages of the RDA for thiamin and riboflavin were similar (131.65 and 135.87 percent, respectively). Vitamin B_6 intake increased with the addition of a supplement, from 14.8 percent to 37.3 percent of the RDA. Without supplementation,

Table 5. Means, standard deviations, and coefficients of variation of total day's energy and nutrient intake (with and without supplements) of adolescent girls (N = 40) from 24-hour dietary recall interviews

	total day's meals (without supplements)			total day's meals (with supplements)		
	mean	standard deviation	coefficient of variation	mean	standard deviation	coefficient of variation
			%			%
energy, kcal	2,227	1,012	45	2,227	1,012	45
protein, gm	79.5	34.1	43	79.5	34.1	43
vitamin A, IU	3,759	3,361	89	4,884	3,897	80
ascorbic acid, mg	130.3	145.7	112	130.3	145.7	112
thiamin, mg	1.45	1.16	80	1.45	1.16	80
riboflavin, mg	1.76	1.08	61	1.76	1.08	61
niacin, mg	17.9	10.4	58	22.4	14.2	63
vitamin B_6, mg	0.3	0.5	157	0.7	1.0	140
calcium, mg	1,065.7	644.6	60	1,097.0	671.2	61
phosphorus, mg	1,365.3	640.9	47	1,365.3	640.9	47
magnesium, mg	54.6	44.7	82	54.6	44.7	82
iron, mg	14.10	8.43	60	14.54	8.95	62

Table 6. Means, standard deviations, and coefficients of variation of energy and nutrient intake from breakfast, lunch, dinner, and snacks of adolescent girls who consumed each meal from 24-hour dietary recall interviews

	breakfast (N = 32)			lunch (N = 36)			dinner (N = 37)			snacks (N = 34)		
	mean	standard deviation	coefficient of variation	mean	standard deviation	coefficient of variation	mean	standard deviation	coefficient of variation	mean	standard deviation	coefficient of variation
			%			%			%			%
energy, kcal	412	647	157	623	409	66	813	343	42	688	850	124
protein, gm	13.1	20.5	157	21.5	16.4	76	40.7	17.8	44	14.1	20.3	144
vitamin A, IU	752	1,069	142	888	822	93	2,006	2,902	145	591	1,404	238
ascorbic acid, mg	44.3	70.4	159	50.6	101.1	200	42.9	115.3	269	11.3	24.6	218
thiamin, mg	0.42	0.76	181	0.35	0.40	113	0.49	0.48	98	0.40	0.93	229
riboflavin, mg	0.48	0.64	132	0.44	0.43	97	0.73	0.59	81	0.36	0.64	180
niacin, mg	4.4	8.6	197	4.1	3.4	84	8.5	5.7	67	3.4	5.5	158
vitamin B_6, mg	0.1	0.4	277	0.1	0.1	204	0.1	0.1	186	0.1	0.4	383
calcium, mg	235	286	122	302	273	90	441	384	87	234	368	157
phosphorus, mg	261	285	109	327	306	94	610	326	53	350	504	144
magnesium, mg	10.7	17.0	158	14.9	24.1	162	23.0	33.2	145	13.4	22.6	169
iron, mg	3.55	7.01	197	3.35	2.84	84	5.88	3.97	67	3.36	5.55	168

Table 7. Recommended Dietary Allowances for females 15 to 18 years of age*

energy, kcal	2100
protein, gm	46
fat-soluble vitamins	
vitamin A, IU	4000
water-soluble vitamins	
ascorbic acid, mg	60
thiamin, mg	1.1
riboflavin, mg	1.3
niacin, NE	14
vitamin B_6, mg	2.0
minerals	
calcium, mg	1200
phosphorus, mg	1200
magnesium, mg	300
iron, mg	18

*Source: Food and Nutrition Board: Recommended Dietary Allowances. 9th rev. ed., 1980. Washington, DC: National Academy of Sciences, 1980.

Table 8. Means, standard deviations, and coefficients of variation for percentages of Recommended Dietary Allowances for total day's energy and nutrient intake (without and with supplements) of adolescent girls (N = 40) from 24-hour dietary recall interviews

	total day's meals (without supplements)			total day's meals (with supplements)		
	mean	standard deviation	coefficient of variation	mean	standard deviation	coefficient of variation
energy, kcal	106	48	45	106	48	45
protein, gm	172.8	74.2	43	172.8	74.2	43
vitamin A, IU	94	84	89	122	97	80
ascorbic acid, mg	217.1	242.8	112	217.1	242.8	112
thiamin, mg	131.65	105.35	80	131.65	105.35	80
riboflavin, mg	135.87	83.09	61	135.87	83.09	61
niacin, mg	128.1	74.5	58	160.3	101.5	63
vitamin B_6, mg	14.8	23.2	157	37.3	52.0	140
calcium, mg	89	54	60	91	56	61
phosphorus, mg	114	53	47	114	53	47
magnesium, mg	18.2	14.9	82	18.2	14.9	82
iron, mg	78.32	46.88	60	80.82	49.72	62

this nutrient was the least adequately consumed by the students. The students almost met their RDA for calcium both with and without supplements (89 and 91 percent, respectively). Magnesium and vitamin B_6 intakes were less than 25 percent of their respective RDAs. Lack of food nutrient composition data for vitamin B_6 and magnesium probably contributed to the low values. Iron intakes were slightly more than three-fourths of the RDA.

Calcium and iron intakes of Kansas girls were higher than those reported in the 1977-78 National Food Consumption Survey (37). Mean intakes of calcium and iron for Kansas girls were about 90 and 80 percent of the RDA, respectively, without or with supplements. Over one-third of their counterparts in the national survey consumed less than 60 percent of the RDA for calcium and iron. Similarly, vitamins A and C intakes of Kansas girls exceeded those of girls in the national survey.

Energy and protein intakes of Kansas girls were similar to those of adolescent girls in other studies. Daniel (78) reported that the energy intake of girls 12 to 17 years of age ranged from 1950 kcal to 2500 kcal, and protein intakes exceeded the RDA. Energy and protein intakes decreased with age.

Four seven-day food records collected by Hampton et al. (40) showed that the protein intake of teenage girls exceeded the RDA by at least 163 percent. Although 15 percent of their girls consumed less than two-thirds the RDA for vitamin A, 49 percent had intakes exceeding the RDA for this vitamin. Calcium intakes were low with 49 percent of the girls consuming less than two-thirds of the RDA. The mean intake of calcium was 897 mg. The girls in our study consumed an average of 1065.7 mg which is much closer to the RDA of 1200 mg. Hampton et al. also reported adequate amounts of ascorbic acid for 49 percent of their subjects, however, 35

percent consumed only two-thirds of the recommended level. Iron intakes were 53 percent of the RDA compared to 78 percent (without supplements) in our study.

Vitamin B_6 intake was extremely low for the girls in our study. Driskell et al. (41) reported that of 583 adolescent girls interviewed, about half consumed less than 66 percent of the RDA for vitamin B_6. Coenzyme stimulation values indicated that thirteen percent of the girls were of deficient status and 20 percent were considered marginal status. The girls in our study consumed an average of 0.3 mg of vitamin B_6 (without a supplement) and 0.7 mg (with a supplement) which is only 14.8 and 37.3 percent of the RDA, respectively.

Evaluation of Dietary Quality

Means, standard deviations and coefficients of variation for percentage carbohydrate, protein, and fat in total day's energy intake are listed in Table 9. The percentages for the protein and fat intakes were slightly higher and the carbohydrate slightly lower than those suggested in the second edition of the Dietary Goals (79).

Table 9. Means, standard deviations, and coefficients of variation for percent carbohydrate, protein, and fat in total day's energy intake of adolescent girls (N = 40)

	mean	standard deviation	coefficient of variation
			%
carbohydrate	50.1	12.0	24
protein	14.5	4.2	29
fat	35.4	10.1	29

Means, standard deviations, and coefficients of variation of Mean Adequacy Ratios (MARs), with and without supplements, and the percentages of subjects in selected MAR ranges are listed in Tables 10 and 11, respectively. The mean MAR value for girls who included a nutrient supplement on the recall day was only slightly higher (3 percent) than the value for those who did not take a supplement (Table 10). Although the MAR values for girls not taking a supplement were greater than 75 percent, 37 percent had MARs that were less than 66 percent. None of the students who did not take a supplement had MARs greater than 90. Supplementation increased the percentage of subjects in the 75 to less than 90 range by only one percent and decreased the percentage of those in the lower two ranges. Five percent of those who took a supplement achieved a MAR greater than 90.

Table 10. Means, standard deviations, and coefficients of variation of Mean Adequacy Ratios (MARs), without and with supplements, for adolescent girls (N = 40) from 24-hour dietary recall interviews

	mean	standard deviation	coefficient of variation
			%
MAR, without supplement	69	15	22
MAR, with supplement	72	16	23

Table 11. Percentages of adolescent girls (N = 40) in selected ranges of Mean Adequacy Ratios (MARs)

	<66	66 to <75	75 to <90	90 to 100
MAR, without supplement	37	22	44	0
MAR, with supplement	32	18	45	5

In a study of the factors differentiating participants and non-participants of the National School Lunch Program, Howe and Vaden (29) reported that 75.8 percent of the female nonparticipants had diets classified as "poor" compared to 42.1 percent of participants. Only five percent of the participants and none of the nonparticipants had diets rated as "excellent." The addition of a vitamin supplement did not improve the diet ratings of the female subjects.

Greger et al. (24) studied the dietary habits of 178 adolescent females and found their diets to be low in fruits, vegetables, and milk. The majority of girls in their study consumed less than the recommended number of servings for three of the four food groups.

MacDonald (25) investigated the nutritional quality of 24-hour dietary intakes of adolescent girls. They found that students with "good" diets consumed more food and more kilocalories from each food group than girls with "poor" diets.

In a study of food consumption and quality of diets of Kansas elementary students, between 10.5 and 12.0 years, Newell et al. (34) found that 15 percent of the girls who did not take a supplement had MARs in the $\geq$90-100 range and only seven percent in the <66 range. The percentages were similar for girls who had a supplement on the recall day. The lower MAR values in our study of adolescent girls suggests a deterioration of dietary quality during adolescence or the scores may have been lowered by the incomplete values for vitamin B_6 and magnesium contents of food in the nutrient data base.

Interrelationships Among the Variables

Effect of Self-Concept Scores and Consumption of Low Nutrient Oensity Foods on MAR Values

Partial regression coefficients and standard errors from analysis of the effects of self-concept and consumption of low nutrient density foods on quality of diets of adolescent girls are listed in Table 12. Significant variables affecting MAR calculated without supplements were Self-Satisfaction and baked desserts. The significant variables affecting MAR with supplements were Self-Satisfaction and baked desserts. No other variables for either MAR value were significant at the P = 0.50 level.

Correlations Among the MAR Values, Fat Areas, Self-Concept Scores and Consumption of Low Nutrient Density Foods

Correlation coefficients of mean adequacy ratios (MARs) (with supplements) with anthropometric measurements, self-concept scores, and snacks of adolescent girls are listed in Table 13. MAR values were correlated negatively with carbonated beverages, candy, and baked desserts. That is, as the consumption of those foods increased the quality of the diet decreased. Fat area values were associated negatively with Physical Self and candy. The decreased consumption of candy by girls with larger fat area values may have been attributable to their reluctance to report candy consumption or they may have consumed less candy in efforts to reduce body weight. There was a positive correlation between MAR values and Self-Satisfaction. The explanation for the positive association between Family Self and carbonated beverage consumption is unclear.

The negative correlation between fat area and Physical Self in our study is similar to the finding of Hendry and Gillies (80). These researchers investigated various characteristics of 1000 15 to 16 year old

Table 12. Partial regression coefficients and standard errors from analysis of the effects of self-concept and consumption of low nutrient density foods on the quality of diets of adolescent girls from 24-hour dietary recall interviews

variable	MAR (without supplement)			MAR (with supplement)		
	$\hat{\beta}i$	std error	F	$\hat{\beta}i$	std error	F
self satisfaction	0.37	0.25	2.21	0.63	0.31	4.04*
social self				-0.76	0.63	1.47
self criticism				-0.80	0.53	2.27
baked desserts	-0.002358	0.000766	9.45**	-0.002532	0.000825	8.10**
df error	34			32		
mean square	177.32			204.49		
R^2	0.31			0.35		

* $P \leq 0.05$
** $P \leq 0.01$

Table 13. Correlation coefficients* of Mean Adequacy Ratios (MARs) (with supplements) with physical measurements, self-concept scores, and snacks of adolescent girls

	MAR	fat area	carbonated beverages	candy	baked desserts
MAR			-0.356	-0.350	-0.464
fat area				-0.319	
self-satisfaction	0.328				
physical self		-0.330			
family self			0.390		

*All coefficients are significant at $P \leq 0.05$.

students categorized as "overweight," "underweight," or "average." The overweight girls possessed lower body esteem than the underweight or average girls. MacDonald et al. (25) reported that overweight adolescent girls perceived themselves to be larger than the normal weight girls which apparently led to dissatisfaction with their appearance. Research by Stunkard and Mendelson (81) indicated that two behavioral disturbances are associated with adolescent obesity: overeating and distortions of body image characterized by a feeling that the body is grotesque or should be regarded with contempt.

The positive correlation between Self-Satisfaction and MAR value in our study also is supported by other studies. MacDonald et al. (25) investigated the factors that differentiated adolescent girls with poor diets from those with good dietary intakes. They found that the girls who were less satisfied with their appearance favored skipping meals as a method of weight reduction and had diets classified as "poor." In a study of the

eating behavior of adolescent girls, Hinton et al. (4) reported that the girls who scored best in emotional stability, conformity, adjustment to reality, and family relationships, missed fewer meals and had better diets than girls with lower scores.

Schafer (31) found the self-concept to be an important factor in the quality of diets of young married women. Women who had a good self-concept tended to have better quality diets. Schafer stated that persons with a positive self-concept are likely to be confident in their abilities to select foods and prepare meals and are less dependent on others for information concerning their diet.

SUMMARY

Adolescence is characterized by intense mental and physical growth. Many believe it is the time when the self-concept is developed and solidified. Physical appearance reportedly has a great effect on the self-concept of the adolescent female. The desire to be thin may lead to poor eating habits, such as skipping meals and following fad diets. Thus, the quality of their diets may be affected by their self-perception. Because of the paucity of information on the relationship between self-concept and dietary quality, this study was designed to investigate the effect of self-concept on the quality of diets of adolescent girls.

Scores for self-concept, measured by the Tennessee Self-Concept Scale (TSCS), and fat area values, calculated from anthropometric measurements, were obtained on 160 15 year old girls enrolled in physical education classes. A questionnaire was used to determine the frequency of consumption of low nutrient density foods, and 24-hour dietary recall interviews were conducted with a random subsample of 40 girls. Dietary data were analyzed for energy and 11 nutrients and expressed as percentages of the Recommended Dietary Allowances (RDA). Mean adequacy ratios (MARs) were calculated to assess dietary quality. Relationships among all variables were determined.

At the 5th, 50th, and 95th percentile, Kansas girls had larger arm circumferences, triceps skinfolds, and arm fat areas than their national counterparts. Their self-concept scores on most of the 11 categories of the TSCS were below the 50th percentile norms. Intakes of energy, protein, ascorbic acid, thiamin, riboflavin, niacin, and phosphorus met or exceeded the RDAs for these nutrients. Calcium, iron, magnesium, and vitamin B_6 intakes were less than their respective RDAs. Less than half of the girls

received MAR values greater than 75 percent and more than a third had MARs that were less than 66 percent.

MAR values were correlated negatively with carbonated beverages, candy, and baked desserts. Negative correlations also were found between fat area values and Physical Self scores. Self-Satisfaction scores were correlated positively with MAR values as were Family Self scores and carbonated beverages. Partial regression analysis showed that Self-Satisfaction and baked desserts affected MAR values significantly.

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APPENDICES

APPENDIX A

Approval and Consent

KANSAS STATE UNIVERSITY

Graduate School

Research and Sponsored Programs
Fairchild Hall
Manhattan, Kansas 66506
913-532-6195

TO: Dr. Kathleen Newell
Foods and Nutrition
Justin Hall

Proposal Number: 441

FROM: Robert P. Lowman, Chair
Committee on Research Involving Human Subjects

DATE: October 23, 1984

RE: Committee Review of Your Proposal Titled The Self-Concept as a Factor in the Quality of Diets of Adolescent Girls (approved at the meeting of October 4, 1984)

The Committee on Research Involving Human Subjects has reviewed your proposal and has approved it with the stipulations indicated below and has determined that:

[X] There is no more than minimal risk to subjects.

[ ] There is greater than minimal risk to subjects.

This approval applies to this project only and only under the conditions and procedures described in the application. Any change in the protocol or conditions described in the proposal will require separate approval. This approval may be followed by a periodic review of the project and examination of records related to the project. Individual identification of human subjects in any publication is an "invasion of privacy" and requires a separately executed "informed consent."

Prior to involving human subjects, properly executed informed consent must be obtained from each subject or an autrorized representative, and such forms must be retained on file for a minimum of three years after termination of the project. Each research subject must be furnished with a copy of the informed consent document for his or her personal records.

Any unanticipated problems involving risk to human subjects or others must be reported immediately to the Director of the Student Health Center and the Chairperson of the Committee on Research Involving Human Subjects.

Stipulations: Require spoken and written reiteration of subjects' right to withdraw or skip questions but to emphasize to subjects that if they particpate the results will be invalid unless all questions are answered. This written notification should be in the form of a note attached to the front of the personality inventory and the person administering the questionnaire should remind participants verbally when they begin completing the questionnaire.

KSU
KANSAS STATE UNIVERSITY

College of Education

Office of the Dean
Bluemont Hall
Manhattan, Kansas 66506
913-532-5525

December 5, 1984

Dr. Hal Rowe, Superintendent
Unified School District 383
2031 Poyntz
Manhattan, KS 66502

Dear Dr. Rowe:

In keeping with the agreement between the Manhattan Public Schools and the College of Education, we have screened the enclosed proposals by Dr. Kathleen Newell and Ms. Cindy Byfield to conduct research in the schools, and are forwarding it to you for your action. The proposals have been approved by our Committee on Research Involving Human Subjects and we see no harm arising as a result of the studies.

Sincerely,

David R. Byrne, Dean
College of Education

DR8:11b

Enclosures

bcc: Dr. Newell
Ms. Byfield

(Pilot)

KANSAS STATE UNIVERSITY

Department of Foods and Nutrition

Justin Hall
Manhattan, Kansas 66506
913-532-5508

Dear Parent or Guardian and Student:

Your school has been selected to take part in a study of adolescent food habits. The Department of Foods and Nutrition at Kansas State University will conduct the study. The superintendent of your school district and the school principal have approved the study.

The procedures to be used in the study will be pilot tested on a random sample of 14 year old girls who are currently enrolled in physical education classes. They will be asked to complete a questionnaire concerning their self-concept, which will require about 50 minutes. In addition, arm measurements will be taken on each pilot study participant and each one will be interviewed for recall of one day's diet. The arm measurements will require about five minutes and the diet interview between 20 and 30 minutes.

Risks to the student will be minimal and all information will be kept confidential with responses and data identified by number only. We hope that all students will take part in the study, however participation is voluntary. The student may refuse to participate or discontinue participation at any time with no penalty or loss of benefits to which the student is otherwise entitled.

Data from this study will provide greater understanding of factors affecting food habits of adolescent girls that can lead to improvement in their nutritional status.

Please indicate your willingness to take part in the study on the form on the backside of this letter and return one copy to the classroom teacher tomorrow or as soon as possible. You may retain the second copy for your file. If you have any questions regarding the research, please contact Dr. Kathleen Newell (913-532-5508). Thank you for your cooperation.

Sincerely,

Cindy Byfield
Graduate Student, KSU

Kathleen Newell
Professor
Dept. of Foods and Nutrition, KSU

Parental Consent

I have read the description of the research study on the front sida of this form and:
(please check one)

_____ I give permission for _____ to participate in
(student's name)
the study described on the front side of this form.

_____ I do not give permission for _____ to participata in
(student's name)
the study described on the front side of this form.

_____
(signature of parent or guardian)

_____
(date)

Student Consent

I have read the description of the research study on the front side of this form and:
(please sign your name after one sentence)

I will take part in this study.

_____ _____
(signature of student) (date)

I will not take part in this study.

_____ _____
(signature of student) (date)

Please return one copy of these forms to your teacher tomorrow or as soon as possible. Thank you.

KANSAS STATE UNIVERSITY

Department of Foods and Nutrition

Justin Hall
Manhattan, Kansas 66506
913-532-5508

Dear Parent or Guardian and Student:

Your school has been selected to take part in a study of adolescent food habits. The Department of Foods and Nutrition at Kansas State University will conduct the study. The superintendent of your school district and the school principal have approved the study.

All 15 and 16 year old girls enrolled in physical education classes will be asked to participate. Each girl will be asked to complete a questionnaire concerning her self-concept, which will require about 50 minutes. In addition, arm measurements will be taken on each study participant and each one will be interviewed for recall of one day's diet. The arm measurements will require about five minutes and the diet interview between 20 and 30 minutes.

Risks to the student will be minimal and all information will be kept confidential with responses and data identified by number only. We hope that all students will take part in the study; however participation is voluntary. The student may refuse to participate or discontinue participation at any time with no penalty or loss of benefits to which the student is otherwise entitled.

Data from this study will provide greater understanding of factors affecting food habits of adolescent girls that can lead to improvement in their nutritional status.

Please indicate your willingness to take part in the study on the form on the backside of this letter and return one copy to the classroom teacher tomorrow or as soon as possible. You may retain the second copy for your file. If you have any questions regarding the research, please contact Dr. Kathleen Newell (913-532-5508). Thank you for your cooperation.

Sincerely,

Cindy Byfield
Graduate Student, KSU

Kathleen Newell
Professor
Dept. of Foods and Nutrition. KSU

Parental Consent

I have read the description of the research study on the front side of this form and:
(please check one)

_____ I give permission for _____ to participate in
(student's name)
the study described on the front side of this form.

_____ I do not give permission for _____ to participate in
(student's name)
the study described on the front side of this form.

_____
(signature of parent or guardian)

_____
(date)

Student Consent

I have read the description of the research study on the front side of this form and:
(please sign your name after one sentence)

I will take part in this study.

_____ _____
(signature of student) (date)

I will not take part in this study.

_____ _____
(signature of student) (date)

Please return one copy of these forms to your teacher tomorrow or as soon as possible. Thank you.

APPENDIX B

Form for Anthropometric Measurements

NAME _____ NUMBER

BIRTHDATE _____

TRICEPS SKINFOLD:

READING #1 _____ mm

READING #2 _____ mm

READING #3 _____ mm

UPPER ARM CIRCUMFERENCE _____

APPENDIX C

Self-Concept Instrument

Completely False	Mostly False	Partly False and Partly True	Mostly True	Completely True
1	2	3	4	5

		Item No.
1.	I have a healthy body	1
3.	I am an attractive person	3
5.	I consider myself a sloppy person	5
19.	I am a decent sort of person	19
21.	I am an honest person	21
23.	I am a bad person	23
37.	I am a cheerful person	37
39.	I am a calm and easygoing person	39
41.	I am a nobody	41
55.	I have a family that would always help me in any kind of trouble	55
57.	I am a member of a happy family	57
59.	My friends have no confidence in me	59
73.	I am a friendly person	73
75.	I am popular with men	75
77.	I am not interested in what other people do	77
91.	I do not always tell the truth	91
93.	I get angry sometimes	93

Completely False	Mostly False	Partly False and Partly True	Mostly True	Completely True
1	2	3	4	5

		Item No.
2.	I like to look nice and neat all the time	2
4.	I am full of aches and pains	4
6.	I am a sick person	6
20.	I am a religious person	20
22.	I am a moral failure	22
24.	I am a morally weak person	24
38.	I have a lot of self-control	38
40.	I am a hateful person	40
42.	I am losing my mind	42
56.	I am an important person to my friends and family	56
58.	I am not loved by my family	58
60.	I feel that my family doesn't trust me	60
74.	I am popular with women	74
76.	I am mad at the whole world	76
78.	I am hard to be friendly with	78
92.	Once in a while I think of things too bad to talk about	92
94.	Sometimes, when I am not feeling well, I am cross	94

Completely False	Mostly False	Partly False and Partly True	Mostly True	Completely True
1	2	3	4	5

		Item No.
7.	I am neither too fat nor too thin	7
9.	I like my looks just the way they are	9
11.	I would like to change some parts of my body	11
25.	I am satisfied with my moral behavior	25
27.	I am satisfied with my relationship to God	27
29.	I ought to go to church more	29
43.	I am satisfied to be just what I am	43
45.	I am just as nice as I should be	45
47.	I despise myself	47
61.	I am satisfied with my family relationships	61
63.	I understand my family as well as I should	63
65.	I should trust my family more	65
79.	I am as sociable as I want to be	79
81.	I try to please others, but don't overdo it	81
83.	I am no good at all from a social standpoint	83
95.	I do not like everyone I know	95
97.	Once in a while, I laugh at a dirty joke	97

Completely False	Mostly False	Partly False and Partly True	Mostly True	Completely True
1	2	3	4	5

		Item No.
8.	I am neither too tall nor too short	8
10.	I don't feel as well as I should	10
12.	I should have more sex appeal	12
26.	I am as religious as I want to be	26
28.	I wish I could be more trustworthy	28
30.	I shouldn't tell so many lies	30
44.	I am as smart as I want to be	44
46.	I am not the person I would like to be	46
48.	I wish I didn't give up as easily as I do	48
62.	I treat my parents as well as I should (Use past tense if parents are not living)	62
64.	I am too sensitive to things my family says	64
66.	I should love my family more	66
80.	I am satisfied with the way I treat other people	80
82.	I should be more polite to others	82
84.	I ought to get along better with other people	84
96.	I gossip a little at times	96
98.	At times I feel like swearing	98

Completely False	Mostly False	Partly False and Partly True	Mostly True	Completely True
1	2	3	4	5

		Item No.
13.	I take good care of myself physically	13
15.	I try to be careful about my appearance	15
17.	I often act like I am "all thumbs"	17
31.	I am true to my religion in my everyday life	31
33.	I try to change when I know I'm doing things that are wrong	33
35.	I sometimes do very bad things	35
49.	I can always take care of myself in any situation	49
51.	I take the blame for things without getting mad	51
53.	I do things without thinking about them first	53
67.	I try to play fair with my friends and family	67
69.	I take a real interest in my family	69
71.	I give in to my parents (Use past tense if parents are not living)	71
85.	I try to understand the other fellow's point of view	85
87.	I get along well with other people	87
89.	I do not forgive others easily	89
99.	I would rather win than lose in a game	99

Completely False	Mostly False	Partly False and Partly True	Mostly True	Completely True
1	2	3	4	5

		Item No.
14.	I feel good most of the time	14
16.	I do poorly in sports and games	16
18.	I am a poor sleeper	18
32.	I do what is right most of the time	32
34.	I sometimes use unfair means to get ahead	34
36.	I have trouble doing the things that are right	36
50.	I solve my problems quite easily	50
52.	I change my mind a lot	52
54.	I try to run away from my problems	54
68.	I do my share of work at home	68
70.	I quarrel with my family	70
72.	I do not act like my family thinks I should	72
86.	I see good points in all the people I meet	86
88.	I do not feel at ease with other people	88
90.	I find it hard to talk with strangers	90
100.	Once in a while I put off until tomorrow what I ought to do today	100

APPENDIX D

Procedures and Forms for Dietary Recall Interviews

GUIDELINES FOR DIETARY RECALL INTERVIEWS

The objective of this study is to determine the effect the self-concept may have on the quality of diet in adolescent girls. The 24-hour dietary recall is a fact-finding mission from which we will base this comparison.

An important part of a successful interviewing technique is identifying potential sources of bias and overcoming as many of these sources as possible prior to the interview. Bias in the interview situation can lead to the securing of incorrect information. One everpresent source of bias is due to the individual differences from interviewer to interviewer. This source can never be completely overcome but can be minimized by standardizing the interview so the interviewer has a limited free choice in the procedure (1). Generally, there are two types of interviews: standardized and unstandardized or, often called, structured or unstructured. The structured interview has fixed wording and sequencing of questions. Unstructured interviews are more flexible and are primarily used for exploratory devices. As measurement devices, the unstructured interview is inadequate (1).

Babbie (2) and Wakefield (3) identified other sources of bias and are summarized below:

From the interviewer:

1) Inappropriate appearance or behavior. Untidy appearance and over dressing will interfere in establishing a good rapport between interviewer and respondent. Generally the interviewer should dress in fashion similar to that of the people being interviewed.

2) Taking liberties with questions. This may elicit different types of responses and affect the data.

3) Variation in the interviewers' probing technique. Impromptu explanation of questions should be avoided, however, open-ended

probing questions may need to be used when the respondents misinterpret questions, contradict themselves or simply when more information is needed on an item. Avoid the "Do you really mean that?" tone of voice and be careful not to use suggestive probes.

4) Attitudes of the interviewer may affect the respondent. (Facial expressions or mannerisms may convey the interviewer's dislike of the situation or the individual.)

5) Record responses exactly. (Interviewer expectations may cause a response to be interpreted and recorded improperly.)

From the respondent:

1) Bias in memory of the respondent. (Food models and standard measuring devices can assist the respondent in recalling foods eaten and portion sizes.)

2) Intentional concealment of information. (Particularly a problem when very personal information is sought but also may be a problem when the respondent suspects the information may be used against him.)

3) Respondent who perceives the interview as unimportant and participates half-heartedly.

GUIDELINES FOR DIETARY RECALL INTERVIEWS

General Instruction for Interviews (4)

1) Record the foods and drinks on the 24-Hour Dietary Recall Form II as the child mentions them. Obtain specific descriptions concerning the food or drink. Do not worry about amounts until all foods are recorded. Record where meal was eaten, using appropriate code.

2) Use the Probing Questions to get complete and specific information about types of foods eaten; e.g., if the student says he/she had a sandwich find out what kind of sandwich, if it had butter or mayonnaise or salad spread in addition to the filling, or what kind of bread, and approximately how many slices of tomatoes.

3) Call attention to the posters with food models to assist students in identifying types of foods eaten.

4) Then proceed to get information on quantities consumed. Use measuring cups, spoons, and graded sizes of glasses from interview equipment kit to assist students in identifying quantities. Enter in the amount column on form.

5) Also, use posters with food models to assist in determining portions; e.g., if child has eaten the same size serving as the model then record as 1 × mdl; if child says he has eaten less or more than the model, record as a fraction or multiple of the model (½ × mdl).

Some Do's and Don'ts for Interviewers (4)

1) Do be friendly, but gently firm, when you ask your questions.

2) Do try to obtain the desired information as quickly as possible, but do not hurry the child at any time.

3) Do express confidence at all times in the information being supplied by the child. Do not show surprise verbally or by facial expressions concerning anything said or done by the child.

4) Do avoid expressing approval or disapproval of any food/beverage reported by the child.

5) Do ask general questions to help the child remember what he/she has eaten but do not ask questions that suggest specific foods eaten.

Establishing Rapport with Respondents

Since the respondents are asked to volunteer a portion of their time and to divulge personal information about themselves, they deserve the most enjoyable experience that the researcher and the interviewer can provide (2). Establishing good rapport in an interview situation puts the respondent at ease, yet maintains the authority of the interviewer. This can often be accomplished by initially talking about non-food items until the child becomes comfortable with the interviewer. A few minutes is usually long enough to establish this relationship.

Sequence of Interview

1) Follow narrative and instructions on form called Introductory Narrative for 24-Hour Dietary Recall.

2) If the interview takes place in the morning, first ask the child about foods eaten that morning, then the foods eaten on the previous day. Progress backward timewise to approximately the same time of day the interview is being conducted. This should usually include a morning, noon and evening meal plus snacks. Enter meal code in appropriate column if student identifies meal (4).

3) If the interview takes place in the afternoon, ask first about foods eaten within the past few hours, then during the morning and at home before coming to school. Proceed to the previous

day, progressing backward. Include those foods and drinks consumed within the last 24 hours (4).

Completion of Recall Data (4)

As soon as possible after the on-site visit, review forms and complete or clarify as needed. If "model," or a portion thereof, were entered as quantity, refer to List of Food Models and enter exact quantity. Using code sheet, enter Meal Code and Where Code for each food in appropriate columns on recall form. Also, determine food code and quantity code from listing of foods in data base and enter appropriate codes.

REFERENCES

1. Kidder, L.H.: Selltiz, Wrightsman, and Cook's Research Methods in Social Relations. 4th ed. Chicago: Holt, Rinehart and Winston, 1981.

2. Babbie, E.R.: Survey Research Methods. Belmont, CA: Wadsworth Publishing Co., Inc., 1973.

3. Wakefield, L.M.: The interview technique in research--source of bias. J of Home Economics 58(8):640, 1966.

4. Gilbert, L.: Anthropometric measurements and nutrient intake of Kansas fifth grade students. Unpublished M.S. thesis, Kansas State University, 1981.

PROBING QUESTIONS

1. Was the milk: whole, two percent, skim or chocolate?

2. Did you have sugar on your cereal? Was your cereal cooked, dry or presweetened?

3. Was your toast white, whole wheat, rye, raisin, or other? What did you put on it?

4. Were your mashed potatoes real or instant? Did you put anything on them?

5. Did you have lettuce, tomato, mayonnaise, ketchup, mustard, butter, pickles, cheese, or onions on your sandwich?

6. Did you have two slices of bread for your sandwich?

7. Did you have dressing on your salad?

8. How were the vegetables cooked? Did you have butter or sauce on your vegetables?

9. Did you put sugar or anything else in your tea or coffee?

10. What kind of juice did you have at breakfast? Did it come from a can or bottle, or powder? Was it pure juice, i.e., Minute Maid, Scotch Treat, Dewey Fresh, etc.? Was it artificial, i.e., Awake, Tang, Bright Day, etc.?

11. What kind of cookies did you eat? Were they homemade or store-bought? Do you know the brand name? Did they have chocolate chips, peanut butter, oatmeal, or anything else in them?

12. What kind of pie or cake did you have? Did it have any topping, frosting or fruit on it?

13. Did you have any fruit in your cake or jello? Was it canned, frozen or fresh?

14. Did the pop you drank come in a can or a regular or a giant size bottle? Was it diet?

15. Were your crackers saltines, whole wheat, graham or other?

16. Were your eggs fried, scrambled or poached?

24-Hour Dietary Recall

I.D. Number: _____ Date of recall: _____

Day of week of recall: _____ Recall taken by: ___ _____

Time of interview: ___ _____

1. Do you take vitamin and/or mineral supplements?

_____ yes

_____ no

(If answer is yes)
How many per day? _____

per week? _____

2. What kind? (Insert brand name if known)

Multivitamins _____
Ascorbic acid _____
Vitamins A and D _____
Iron _____
Other _____

3. Are you on a special diet now?

_____ yes

_____ no

If yes, why are you on a diet?

_____ For weight reduction
_____ For weight reduction (doctor's prescription)
_____ For weight gain
_____ For allergy, specify _____
_____ For other reasons, specify _____

If no, have you been on a special diet within the past year?

_____ yes

_____ no

If yes, for what reason? _____

Meal Code

B = breakfast
am = am snack
L = lunch
pm = afternoon snack
O = dinner
eve = evening snack

Source and Where Eaten Codes

SL = School Lunch
CL = Carried Lunch from Home
H = Home
O = Other Home (Friend or Relative)
V = Vending Machine
G = Grocery
FF = Fast Food (State Name)
R = Restaurant (not fast food)
Other (specify)

Abbreviations

hmd = homemade
com = commercial
cnd = canned
jc = juice
FF = french fries
pot = potatoes
wh brd = white bread
ww brd = whole wheat bread
crm = cream
sug = sugar
frt = fruit
c = with
s = without
fr = fried
veg = vegetable
crax = crackers
tst = toast
marg = margarine
bu = butter
chix = chicken
rst = roast
br = broiled
cof = coffee

Amount Codes

tsp = teaspoon
Tbsp = tablespoon
c = cup
oz = ounce
lb = pound
mdl = model
in. = inch

FOOD CODE	AMT. CODE	MEAL CODE	WHERE CODE	MEAL	WHERE?	FOOD/TYPE/PREPARATION	AMOUNT

FOOD FREQUENCY

Directions: For the following list of foods, please indicate the number of times on the average you eat them per day, week, or month whichever is appropriate. Record the number of times eaten in the first column and circle the appropriate frequency in the last column. For example, if you eat bread 3 times per day, record this as:

No. of times	Frequency	D = per day
3	(D) W M	W = per week
		M = per month
		Y = yearly

If you never eat a food, put a 0 in no. of times.

	No. of times	Frequency
1. Doughnuts		
2. Sweet rolls		D W M Y
3. Pie		D W M Y
4. Cake		D W M Y
5. Cookies		D W M Y
6. Baked desserts (other than pie, cake)		D W M Y
7. Potato or corn chips		D W M Y
8. Snack crackers		D W M Y
9. Kool-Aid		D W M Y
10. Regular pop (Coke, 7-Up, etc.)		D W M Y
11. Beer, wine, or other alcoholic beverages		D W M Y
12. Candy or candy bars		D W M Y
13. Sugar used in drinks or on cereal		D W M Y

APPENDIX E

Individual Physical Measurements of Adolescent Girls

Table 14. Individual physical measurements of adolescent girls

ID number	arm circumference	triceps skinfold	arm fat area
	← mm →		
101	240	20	2115.28
102	250	20	2185.84
103	280	22	2734.93
104	280	33	3735.23
105	230	17	1698.50
106	260	29	3081.25
107	220	23	2114.53
108	270	29	3254.48
109	290	39	4460.41
110	370	49	7143.17
111	220	22	2039.87
112	250	26	2719.07
113	240	28	2718.82
201	290	22	2846.60
202	240	27	2641.50
203	300	37	4444.08
204	300	24	3147.61
205	250	28	2884.25
206	290	30	3675.68
207	320	45	5639.26
208	230	19	1929.77
209	260	28	2995.49
210	250	30	3043.14
211	260	20	2318.62
212	290	23	2919.53
213	250	29	2990.88
214	280	30	3462.10
215	270	32	3543.91
216	240	24	2400.09
217	240	19	1966.33
218	240	23	2316.48
219	230	15	1517.72
220	240	18	1905.53
301	250	29	2964.48
302	250	22	2369.87
303	240	21	2202.56
304	240	25	2535.95
305	240	29	2794.58
306	280	37	4104.79
307	230	21	2095.89
308	210	13	1260.37
309	280	26	3075.93
310	240	13	1460.37
311	280	41	4444.86
312	280	40	4343.37

Table 14. Individual physical measurements of adolescent girls (cont.)

ID number	arm circumference	triceps skinfold	arm fat area
	← mm →		
313	270	29	3284.21
314	260	26	2849.07
315	250	30	3069.02
316	320	32	4279.09
317	240	26	2562.60
318	280	29	3430.88
319	240	22	2288.26
320	380	56	8210.93
321	230	24	2307.61
322	220	18	1698.20
323	260	29	3137.54
324	270	31	3401.38
325	260	20	2318.62
326	340	48	6381.90
327	270	34	3654.80
328	280	29	3399.48
401	220	24	2163.43
402	250	34	3342.08
403	240	24	2427.61
404	260	24	2698.29
405	280	35	3909.46
406	260	28	2995.49
407	300	42	4914.56
408	260	30	3165.43
409	250	22	2339.63
410	320	52	6170.10
411	250	25	2662.62
412	260	32	3382.25
413	280	39	4265.41
414	250	25	2605.46
415	280	27	3174.83
416	250	31	3120.24
417	250	29	2990.88
418	250	17	1930.70
419	250	30	3017.10
420	250	26	2719.07
422	250	25	2605.46
423	270	26	2947.60
501	270	19	2281.47
502	240	21	2202.56
503	260	26	2819.27
504	230	11	1137.31
505	250	18	2027.69
506	280	28	3272.16
507	260	26	2819.27

Table 14. Individual physical measurements of adolescent girls (cont.)

ID number	arm circumference	triceps skinfold	arm fat area
	← mm →		
508	240	21	2144.55
509	310	47	5577.03
510	280	34	3852.08
511	380	59	8476.04
512	220	15	1473.29
513	240	20	2085.84
514	280	39	4239.08
515	270	29	3254.48
516	260	35	3562.80
517	270	40	4119.22
518	230	20	2013.62
519	280	30	3462.10
520	270	31	3430.24
521	240	33	3104.71
522	240	26	2589.07
523	240	28	2718.82
524	260	35	3587.89
525	270	28	3164.25
526	220	18	1698.20
527	230	23	2203.15
529	230	12	1266.90
530	240	32	3058.91
531	260	27	2937.45
532	360	49	6899.84
533	240	23	2344.53
534	230	22	2122.97
535	240	21	2173.64
536	250	23	2459.53
537	240	25	2509.13
538	220	15	1473.29
539	300	30	3758.77
540	240	20	2085.84
601	230	17	1728.02
602	250	28	2911.17
603	310	44	5328.02
604	260	18	2119.35
605	250	27	2802.45
606	280	40	4369.00
607	280	28	3336.17
608	230	27	2508.16
609	240	20	2115.28
610	290	32	3835.76
611	300	45	5133.05
612	260	26	2819.27
613	240	19	1996.47

Table 14. Individual physical measurements of adolescent girls (cont.)

IO number	arm circumference	triceps skinfold	arm fat area
	← mm →		
614	240	19	1996.47
615	250	25	2634.13
616	240	28	2718.82
617	260	21	2351.22
618	230	20	2013.62
619	260	30	3165.43
620	260	30	3193.14
621	250	25	2662.62
622	310	31	4085.58
623	250	32	3195.76
624	230	22	2149.87
625	250	24	2576.63
626	300	34	4224.19
627	240	21	2202.56
628	240	21	2144.55
629	370	53	7598.83
630	200	18	1521.54
631	320	53	6248.16
632	250	25	2605.46
633	300	38	4565.89
634	270	32	3515.76
635	260	30	3165.43
636	390	55	8312.89
637	260	27	2908.16
638	270	25	2852.13
639	270	25	2884.13
640	240	22	2288.26
641	250	26	2719.07
642	220	16	1558.94

APPENDIX F

Individual Self-Concept Scores of Adolescent Girls

Table 15. Individual self-concept scores for adolescent girls

ID number	identity	self satis-faction	behavior	total self-concept	total conflict	physical self	moral-ethical self	personal self	family self	social self	self criticism
101	79	90	90	259	53	57	57	52	47	46	32
102	79	81	88	248	66	55	47	46	55	45	43
103	79	97	91	267	67	61	55	54	48	49	39
104	84	84	94	262	70	55	60	48	49	50	39
105	77	82	108	267	91	57	50	49	63	48	44
106	93	88	91	272	64	54	56	53	59	50	46
107	76	94	92	262	60	54	50	49	52	54	33
108	79	88	87	254	62	56	44	53	49	52	35
109	87	112	98	297	67	60	60	57	68	52	40
110	83	98	99	280	72	45	67	47	64	57	35
111	84	85	100	269	65	59	49	48	61	52	39
112	88	85	90	263	61	60	52	51	51	49	35
113	93	91	95	279	65	57	55	56	58	53	41
201	76	85	104	265	51	50	52	45	55	63	45
202	80	87	91	258	50	53	53	45	52	55	40
203	82	105	113	300	78	67	56	57	65	55	36
204	95	106	95	296	64	46	64	62	72	52	33
205	80	92	92	264	48	64	54	53	51	42	39
206	83	99	96	278	44	58	58	46	59	57	35
207	82	97	94	273	75	59	52	54	59	49	34
208	77	97	96	270	58	62	59	48	49	52	39
209	79	103	112	294	48	64	60	53	59	58	36
210	81	105	96	282	88	63	56	52	61	50	40
213	83	117	114	314	70	63	64	58	70	59	44
214	79	88	95	262	80	61	51	47	52	51	29
215	78	94	97	269	71	54	52	49	63	51	37
216	80	101	90	271	67	55	50	50	61	55	31
217	86	80	92	258	72	51	50	44	59	54	30
218	82	87	89	258	58	58	48	48	54	50	36
219	79	106	89	274	82	50	60	59	55	50	35
220	88	97	100	285	57	60	59	50	61	55	36
301	83	88	90	261	103	53	51	47	58	52	29
302	96	118	109	323	67	68	67	58	69	61	40
303	91	92	100	283	49	66	55	44	65	53	45
304	77	91	90	258	46	56	52	52	48	50	40
305	84	76	93	253	55	52	53	53	41	54	40
306	89	110	97	296	62	57	72	50	62	55	35
307	79	97	103	279	65	57	64	51	56	51	38
308	79	85	92	256	60	54	49	47	57	49	31
309	86	90	93	269	65	59	56	52	53	49	29
310	90	96	97	283	85	69	53	51	55	55	39
311	76	85	94	255	51	52	53	46	54	50	41
312	83	94	88	265	79	59	53	50	51	52	43
313	80	92	97	269	79	53	51	50	55	60	37
314	74	88	93	255	57	57	50	45	53	50	35
315	81	91	99	271	87	59	55	51	56	50	38
316	78	94	92	264	56	52	51	51	62	48	43
317	85	95	95	275	71	56	60	48	56	55	37
318	78	91	93	262	32	57	54	50	53	48	37
319	83	100	100	283	53	59	55	58	56	55	38
321	89	86	99	274	56	61	52	48	57	56	40
322	91	96	92	279	87	56	55	51	63	54	26
323	83	81	100	264	78	58	45	48	62	51	38
324	84	86	83	253	35	58	47	48	48	52	32
325	78	94	99	271	89	52	58	57	51	53	44
326	77	94	90	261	69	51	46	54	62	48	41
327	82	78	100	260	90	58	52	44	55	51	36
328	78	98	100	276	54	59	53	58	55	51	34
401	72	86	96	254	48	58	52	45	51	48	35
402	80	95	92	267	77	56	52	48	59	52	40
403	82	76	96	254	74	63	44	44	52	51	42
404	81	92	95	268	72	55	54	52	54	53	34
405	86	93	98	277	37	58	54	55	53	57	45
406	90	78	94	262	58	53	57	58	48	46	33
407	83	92	104	279	55	51	63	54	62	49	35
408	79	85	86	250	74	56	49	49	46	50	35
409	82	85	92	259	91	55	51	46	61	46	41

Table 15. Individual self-concept scores for adolescent girls (cont.)

ID number	identity	self satis-faction	behavior	total self-concept	total conflict	physical self	moral-ethical self	personal self	family self	social self	self criticism
410	66	88	85	239	63	49	49	50	48	43	39
411	82	99	93	274	76	60	61	48	54	51	45
412	81	93	95	269	75	62	53	48	55	51	39
413	74	84	85	243	65	51	45	45	54	48	41
414	85	104	96	285	65	68	54	47	61	55	44
415	79	95	100	274	60	53	57	54	60	50	40
416	79	91	93	263	61	58	52	49	53	51	33
417	80	78	92	250	50	52	48	47	52	51	39
418	84	92	98	274	92	60	57	50	54	53	29
419	71	82	98	251	55	58	49	52	44	48	37
420	84	99	99	282	56	61	53	54	67	47	35
421	88	102	126	316	68	63	62	61	68	62	48
422	89	97	87	273	63	57	55	48	61	52	42
423	76	81	93	250	86	54	50	45	51	50	35
501	95	103	102	300	70	68	57	55	60	60	45
502	84	98	95	277	87	51	62	48	59	57	31
503	82	97	91	270	100	56	54	48	57	55	37
504	80	93	96	269	45	59	53	50	52	55	38
505	89	97	89	275	53	53	57	49	61	55	39
506	75	84	81	240	62	48	47	46	49	50	33
507	80	92	89	261	75	54	52	50	52	53	33
508	81	90	88	259	103	53	55	49	53	49	40
509	90	87	96	273	65	57	56	50	57	53	41
510	74	99	93	266	56	53	56	48	55	54	32
511	93	106	98	297	49	57	61	58	64	57	39
512	79	89	97	265	47	53	57	48	58	49	35
513	95	98	115	308	54	64	62	64	61	57	44
514	86	78	108	272	94	60	53	51	56	52	28
515	89	96	104	289	41	61	59	53	60	56	37
516	88	90	98	276	38	57	58	57	51	53	36
517	83	104	103	290	38	61	57	55	58	59	33
518	78	84	93	255	67	53	47	52	46	57	35
519	72	91	89	252	58	51	52	44	56	49	31
520	88	92	95	275	77	56	58	53	58	50	45
521	88	90	89	267	63	55	54	53	53	52	43
521	86	92	93	271	143	53	53	52	57	56	42
523	91	86	98	275	53	50	53	59	56	57	38
524	80	94	93	267	87	50	52	49	60	56	27
525	80	92	93	265	67	55	54	50	58	48	39
526	81	97	97	275	71	54	62	52	56	51	40
527	86	92	98	276	70	61	53	55	57	50	35
529	85	95	101	281	121	54	58	57	59	53	26
530	86	89	102	277	43	60	58	53	55	51	39
531	84	104	89	277	67	58	55	53	62	49	34
532	83	104	100	287	65	56	58	56	65	52	38
533	90	85	99	274	64	61	55	55	52	51	37
534	77	78	90	245	71	61	37	47	51	49	36
535	102	82	96	280	70	52	59	59	61	49	40
536	81	99	98	278	68	55	50	53	64	56	42
537	82	85	98	265	45	59	52	48	56	50	38
538	84	87	94	265	43	58	51	49	54	53	35
539	79	110	113	302	60	60	62	55	67	58	42
540	82	94	99	275	49	55	58	52	53	57	35
601	87	106	101	294	54	63	61	58	60	52	41
602	80	87	81	248	54	53	50	45	51	49	32
603	74	98	82	254	48	53	56	47	58	50	36
604	89	94	95	278	44	59	51	57	61	50	37
606	81	87	90	258	108	56	51	45	57	49	28
607	81	102	94	277	59	58	55	46	59	59	38
609	75	93	99	268	76	57	49	59	56	47	33
610	84	98	104	286	66	60	56	52	60	58	42
611	72	81	92	245	69	52	46	49	49	49	36
612	85	96	94	276	116	57	55	52	57	55	29
613	85	81	88	254	52	56	52	52	45	49	40
614	81	95	93	269	55	57	55	51	55	51	47
615	81	89	98	268	58	53	54	49	58	54	36
616	84	85	95	264	32	55	49	52	60	48	39

Table 15. Individual self-concept scores for adolescent girls (cont.)

ID number	identity	self satis-faction	behavior	total self-concept	total conflict	physical self	moral-ethical self	personal self	family self	social self	self criticism
617	91	87	106	284	52	57	50	51	66	60	45
618	84	95	100	279	71	58	55	52	64	50	32
619	84	95	93	272	54	63	57	48	53	51	38
620	79	86	90	255	113	50	52	47	56	50	32
621	91	97	102	290	42	56	56	55	67	56	40
622	78	108	91	277	57	53	58	51	62	53	36
623	84	100	96	280	60	62	62	51	57	48	41
625	92	92	89	273	31	57	57	53	54	52	36
626	74	99	96	269	33	53	60	50	49	57	40
627	84	80	89	253	77	60	53	44	51	45	42
628	89	94	99	282	72	59	57	54	59	53	41
629	93	100	100	293	41	62	61	60	51	59	38
630	87	95	100	282	54	60	56	62	57	47	36
631	84	98	101	283	69	57	53	52	62	59	33
632	86	106	109	301	57	56	63	58	59	65	34
633	91	93	100	284	62	61	59	53	59	52	35
634	75	92	92	259	35	55	54	51	52	47	41
635	85	91	102	278	72	57	56	52	60	53	34
636	81	96	95	272	26	56	53	53	58	52	33
637	86	91	90	267	91	60	53	48	47	59	36
638	79	91	92	262	54	46	52	49	63	52	37
639	76	95	83	254	52	55	44	53	52	50	37
640	87	84	95	266	70	59	49	50	56	52	36
641	78	80	86	244	64	57	45	47	46	49	41
642	83	76	94	253	89	62	50	41	56	44	43

APPENDIX G

Individual Dietary Intakes, Percentage of 1980 RDA and MAR Values (With and Without Supplements) of Adolescent Girls

Table 16. Individual dietary intakes, percentages of the 1980 RDA* and MAR† (with supplements) of adolescent girls

ID number	energy	protein	vit. A	ascorbic acid	thiamin	ribo-flavin	niacin	vit. B_6	calcium	phos-phorus	magnesium	iron	MAR
	kcal	gm	I.U.	mg	mg	mg	mg	mg	mg	mg	mg	mg	
101													
intake	2,238	45.9	7,465	134.1	0.80	1.45	25.4	2.1	1,271	1,328	32.6	8.98	86
% RDA	107	99.7	187	223.5	72.56	111.71	181.8	105.0	106	111	10.9	49.89	
104													
intake	1,340	40.0	1,697	36.9	0.36	0.31	12.5	0.3	296	829	41.9	9.05	48
% RDA	64	87.0	42	61.5	32.45	24.27	89.3	16.9	25	69	13.9	50.30	
105													
intake	2,316	100.5	14,844	446.6	2.59	2.81	20.0	0.3	1,306	1,805	65.0	15.78	85
% RDA	110	218.5	371	744.4	236.10	216.51	143.0	13.4	109	150	21.7	87.71	
107													
intake	2,118	71.1	9,035	124.5	2.38	3.01	37.9	2.3	678	807	25.0	32.13	87
% RDA	101	154.7	226	207.4	216.86	232.06	270.7	115.0	56	76	8.3	178.51	
109													
intake	2,400	97.7	4,831	155.5	1.07	3.02	12.8	0.1	1,888	1,726	33.4	10.97	80
% RDA	114	212.4	121	259.1	97.35	232.13	91.8	5.2	157	144	11.1	60.98	
205													
intake	3,305	76.5	4,190	47.6	1.70	2.06	16.5	0.2	1,587	2,081	5.0	15.16	81
% RDA	157	166.2	105	79.3	154.68	158.32	117.7	12.5	132	173	1.6	84.24	
207													
intake	1,013	58.5	7,633	198.9	0.82	1.48	28.6	2.1	923	1,086	33.3	6.84	78
% RDA	48	127.2	191	331.6	75.04	114.32	204.4	105.2	77	90	11.1	38.04	
209													
intake	3,431	114.7	2,693	24.3	0.60	1.51	30.0	0.0	983	1,956	0.0	7.93	66
% RDA	163	249.3	67	40.5	54.19	116.26	214.6	0.0	82	163	0.0	44.06	
212													
intake	1,330	68.4	2,346	34.4	1.23	0.89	16.1	0.0	127	837	0.0	9.95	57
% ROA	63	148.6	59	57.3	112.22	68.48	115.0	0.0	10	70	0.0	55.28	
213													
intake	3,063	119.3	4,358	77.8	2.66	3.47	26.5	0.3	2,226	1,485	98.4	17.76	87
% RDA	146	259.3	109	129.8	241.96	267.35	189.1	15.3	185	124	32.8	98.67	
214													
intake	1,026	26.7	3,931	93.3	0.43	0.60	5.7	0.2	406	645	59.6	5.80	48
% RDA	49	58.0	98	155.5	39.83	46.79	41.1	8.9	34	54	19.8	32.24	
217													
intake	2,159	89.1	3,248	80.2	1.21	2.11	21.5	0.2	1,009	1,556	80.1	13.35	81
% ROA	103	193.6	81	133.7	110.08	162.79	153.8	8.6	84	130	26.7	74.20	

Table 16. Individual dietary intakes, percentages of the 1980 RDA* and MAR† (with supplements) of adolescent girls (cont.)

ID number	energy	protein	vit. A	ascorbic acid	thiamin	ribo-flavin	niacin	vit. B_6	calcium	phos-phorus	magnesium	iron	MAR
	kcal	gm	I.U.	mg	mg	mg	mg	mg	mg	mg	mg	mg	
220													
Intake	2,014	37.3	1,397	642.9	1.41	0.47	8.3	0.0	590	1,043	129.0	7.06	61
% RDA	96	81.0	35	1,071.5	128.18	36.39	59.2	0.0	49	87	43.0	39.22	
306													
Intake	2,208	109.8	2,795	113.7	1.47	2.12	32.1	0.3	1,287	1,767	82.7	10.83	81
% RDA	105	238.7	70	189.6	133.67	163.41	221.3	14.6	107	147	27.6	60.17	
309													
Intake	1,775	59.9	2,954	130.5	1.01	1.54	8.7	0.4	998	1,115	80.9	8.05	73
% RDA	84	130.1	74	217.5	91.58	118.56	62.4	18.8	83	93	26.9	44.73	
311													
Intake	2,302	96.2	964	16.1	0.78	0.47	28.5	0.0	367	1,350	129.0	16.75	60
% RDA	110	209.1	24	28.2	70.45	36.42	203.6	0.0	31	112	43.0	93.06	
313													
Intake	1,742	81.8	2,980	15.1	1.03	2.61	6.1	0.1	699	1,135	6.2	23.38	65
% RDA	83	177.9	74	25.2	94.08	201.15	43.6	3.0	58	94	2.0	129.91	
316													
Intake	1,311	62.1	8,803	175.8	1.08	1.86	40.3	2.6	981	1,201	45.0	32.95	88
% RDA	62	135.0	220	293.0	98.38	142.87	288.2	128.3	82	101	15.0	183.04	
320													
Intake	1,987	92.1	2,324	113.0	0.85	1.37	14.4	0.2	847	1,341	53.8	11.72	74
% RDA	95	200.3	58	188.4	77.15	105.11	103.0	11.1	71	112	17.9	65.16	
324													
Intake	2,486	85.2	2,555	30.2	1.38	2.06	15.0	0.1	2,210	779	45.6	12.75	72
% RDA	118	185.3	64	50.3	125.95	158.54	107.4	5.0	184	65	15.2	70.83	
326													
Intake	2,079	52.6	2,177	39.0	0.34	0.47	11.2	0.0	511	826	58.0	9.65	54
% RDA	99	114.3	54	65.0	30.90	36.01	80.4	3.3	43	69	19.3	53.61	
328													
Intake	5,091	134.7	15,104	129.1	5.09	3.27	45.6	2.3	2,193	3,055	103.6	30.98	94
% RDA	242	292.8	377	215.2	462.77	251.67	325.8	115.8	183	254	34.5	172.13	
404													
Intake	2,186	83.2	3,848	608.4	2.27	2.24	13.8	0.2	1,635	1,857	83.4	12.36	84
% RDA	104	180.9	96	1,014.1	206.67	172.65	98.7	13.1	136	155	27.8	68.67	
405													
Intake	556	11.6	367	176.6	0.76	0.38	7.3	0.0	63	156	4.0	10.61	32
% RDA	26	25.1	9	294.4	68.98	29.37	52.3	0.0	5	13	1.3	58.94	

Table 16. Individual dietary intakes, percentages of the 1980 RDA* and MAR† (with supplements) of adolescent girls (cont.)

ID number	energy	protein	vit. A	ascorbic acid	thiamin	ribo-flavin	niacin	vit. B_6	calcium	phos-phorus	magnesium	iron	MAR
	kcal	gm	I.U.	mg	mg	mg	mg	mg	mg	mg	mg	mg	
406													
Intake	4,830	157.6	1,214	3.3	5.00	3.96	52.5	0.0	2,105	1,582	0.5	45.67	70
% RDA	230	342.7	30	5.5	454.54	304.77	375.0	0.0	175	132	0.2	253.76	
410													
Intake	1,535	82.0	6,314	76.3	0.79	0.96	50.4	2.4	392	943	73.0	7.00	74
% RDA	73	178.4	158	127.2	72.49	74.18	359.7	121.5	33	79	24.3	38.91	
412													
Intake	1,161	38.9	10,978	206.7	0.69	0.40	51.7	4.0	266	506	0.0	4.19	60
% RDA	55	84.7	274	344.4	62.87	31.13	369.4	200.0	22	42	0.0	23.25	
417													
Intake	4,657	124.0	2,314	76.6	0.74	1.20	19.6	0.4	983	1,022	24.5	15.67	75
% RDA	222	269.5	58	127.7	67.64	99.83	140.0	19.4	82	85	8.1	87.05	
419													
Intake	2,171	74.2	3,882	34.8	1.35	2.70	10.6	0.5	1,784	1,727	76.0	11.67	79
% RDA	103	161.3	97	58.1	122.79	207.59	75.9	25.0	148	144	25.3	64.82	
504													
Intake	2,223	95.4	10,465	333.7	1.79	1.48	23.9	0.0	802	1,364	0.7	16.75	80
% RDA	106	207.4	261	556.1	163.25	113.76	171.1	0.0	67	114	0.23	93.08	
509													
Intake	2,874	130.1	7,380	127.2	2.19	3.71	16.9	0.4	2,359	2,243	144.7	15 83	88
% RDA	137	282.9	184	212.0	199.42	286.08	120.9	23.0	196	187	48.2	87.97	
513													
Intake	2,027	73.9	2,722	126.3	0.91	1.60	11.0	0.0	1,103	1,132	2.5	10.23	72
% RDA	96	160.8	68	210.5	82.98	123.79	78.8	0.0	92	94	0.8	56.83	
516													
Intake	1,997	99.7	6,131	14.2	1.96	1.71	31.4	2.3	1,776	2,125	146.5	17.57	89
% RDA	95	216.8	153	23.6	178.73	131.80	224.1	117.0	148	177	48.8	97.66	
520													
Intake	1,121	55.1	12,499	117.6	0.76	1.45	8.9	0.0	1,058	1,119	0.0	8.67	68
% RDA	53	119.9	312	196.0	69.50	111.30	63.4	0.0	88	93	0.0	48.19	
522													
Intake	2,373	100.2	6,864	9.8	4.14	2.83	42.2	2.2	1,535	2,623	44.3	24.20	86
% RDA	113	217 8	172	16.5	376.18	217.74	301.6	108.0	128	219	14.7	134.47	
535													
Intake	1,530	32.7	357	64.4	0.31	0.55	10.5	0.0	391	558	13.0	6 41	43
% RDA	73	71.0	9	107.3	28.18	42.35	74.9	0.0	33	46	4.3	35.61	

Table 16. Individual dietary intakes, percentages of the 1980 RDA* and MAR† (with supplements) of adolescent girls (cont.)

ID number	energy	protein	vit. A	ascorbic acid	thiamin	ribo-flavin	niacin	vit. B_6	calcium	phos-phorus	magnesium	iron	MAR
	kcal	gm	I.U.	mg	mg	mg	mg	mg	mg	mg	mg	mg	
604													
intake	2,262	88.2	7,277	76.0	2.04	3.20	46.7	2.1	1,665	1,886	41.5	20.71	93
% RDA	108	191.6	182	126.7	185.82	246.53	334.0	107.2	138	157	13.8	115.06	
631													
intake	3,675	138.3	3,928	218.9	1.37	2.74	23.4	0.6	1,968	2,587	120.6	24.84	89
% RDA	175	300.7	98	364.8	124.90	211.42	167.0	30.0	164	216	40.1	138.00	
640													
intake	1,372	41.5	21	58.5	0.04	0.02	4.9	0.0	298	385	87.0	5.26	34
% RDA	65	90.1	1	97.5	3.27	1.69	35.2	0.0	25	32	29.0	29.22	
642													
intake	1,793	32.8	475	20.7	0.45	0.36	7.4	0.3	313	946	112.0	6.40	43
% RDA	85	71.3	12	34.5	41.27	27.77	53.1	17.0	26	79	37.3	35.56	

*Percentages of 1980 Recommended Dietary Allowances for girls 15 to 18 years old (19).

†The mean adequacy ratio (MAR) was calculated by averaging the percentage RDA values for energy and 11 nutrients, including supplement, with values over 100% being truncated.

Table 17. Individual dietary intakes, percentages of the 1980 RDA* and MAR† (without supplements) of adolescent girls

ID number	energy	protein	vit. A	ascorbic acid	thiamin	ribo-flavin	niacin	vit. B_6	calcium	phos-phorus	magnesium	iron	MAR
	kcal	gm	I.U.	mg	mg	mg	mg	mg	mg	mg	mg	mg	
101													
intake	2,238	45.9	2,465	134.0	0.79	1.45	5.4	0.1	1,271	1,328	32.6	8.98	67
% RDA	106	99.7	62	223.5	72.56	111.71	38.9	5.0	106	111	10.8	49.89	
104													
intake	1,340	40.0	1,697	36.9	0.36	0.31	12.5	0.3	296	829	41.9	9.05	48
% RDA	63	87.0	42	61.5	32.44	24.28	89.3	16.9	25	69	14.0	50.30	
105													
intake	2,316	100.5	14,844	446.7	2.59	2.81	20.0	0.2	1,306	1,805	65.0	15.79	85
% RDA	110	218.5	371	744.4	236.10	216.51	143.0	13.4	109	150	21.7	87.22	
107													
intake	2,118	71.1	9,035	124.4	2.38	3.01	37.9	2.3	678	907	25.0	32.13	87
% RDA	101	154.7	226	207.4	216.87	232.06	270.7	115.0	56	75	8.3	178.52	
109													
intake	2,400	97.7	4,831	155.4	1.07	3.02	12.8	0.1	1,888	1,726	33.3	10.97	80
% RDA	114	212.4	121	259.1	97.35	232.13	91.7	5.2	157	144	11.1	60.98	
205													
intake	3,305	76.5	4,190	47.6	1.70	2.06	16.5	0.2	1,587	2,081	5.0	15.16	81
% RDA	157	166.2	105	79.3	154.68	158.32	117.7	12.5	132	173	1.7	84.24	
207													
intake	1,013	58.5	2,633	198.9	0.82	1.49	8.6	0.1	923	1,086	33.3	6.85	64
% RDA	48	127.2	66	331.6	75.04	114.32	61.6	5.2	77	90	11.1	38.04	
209													
intake	3,431	114.7	2,693	24.3	0.59	1.51	30.0	0	983	1,956	0	7.93	66
% RDA	163	249.3	67	40.5	54.19	116.26	214.6	0	82	163	0	44.06	
212													
intake	1,330	68.4	2,346	34.4	1.23	0.89	16.1	0	127	837	0	9.95	57
% RDA	63	148.6	59	57.3	112.23	68.48	115.0	-	10	70	-	55.28	
213													
intake	3,063	119.3	4,358	77.9	2.66	3.47	26.5	0.3	2,226	1,485	98.3	17.76	87
% RDA	146	259.4	109	129.8	241.96	267.35	189.1	15.3	185	124	32.8	98.67	
214													
intake	1,026	26.7	3,931	93.3	0.44	0.60	5.7	0.2	406	645	59.6	5.80	48
% RDA	49	58.0	98	155.5	39.83	46.80	41.1	9.0	34	54	19.9	32.24	
217													
intake	2,159	89.0	3,248	80.2	1.21	2.12	21.5	0.2	1,009	1,556	80.0	13.36	81
% RDA	103	193.7	81	133.7	110.08	162.79	153.8	8.6	84	130	26.7	74.20	

Table 17. Individual dietary intakes, percentages of the 1980 RDA* and MAR† (without supplements) of adolescent girls (cont.)

ID number	energy	protein	vit. A	ascorbic acid	thiamin	ribo-flavin	niacin	vit. B_6	calcium	phos-phorus	magnesium	iron	MAR
	kcal	gm	I.U.	mg	mg	mg	mg	mg	mg	mg	mg	mg	
220													
intake	2,014	37.3	1,397	642.9	1.41	0.47	8.3	0	590	1,043	129.0	7.06	60
% RDA	96	81.0	35	1,071.5	128.18	36.38	59.2	1.2	49	87	43.0	39.22	
306													
intake	2,207	109.8	2,794	113.7	1.47	2.12	32.1	0.3	1,287	1,767	82.7	10.83	81
% RDA	105	238.7	70	189.6	133.67	163.42	229.3	14.6	107	147	27.6	60 18	
309													
intake	1,775	59.9	2,954	130.5	1.00	1.54	8.7	0.3	998	1,115	80.9	8.05	73
% RDA	84	130.1	74	217.5	91.59	118.56	62.4	18.8	83	93	26.9	44.73	
311													
intake	2,302	96.2	964	16 9	0.77	0.47	28.5	0	367	1,350	129.0	16.75	60
% RDA	110	209.1	24	28.2	70.45	36 42	203.6	-	30	112	43.0	93.06	
313													
intake	1,742	81.9	2,980	15.1	1.03	2.61	6 1	0	699	1,135	6.1	23.38	65
% RDA	83	177.9	74	25.2	94 08	201.15	43 6	3.0	58	95	2.0	129.92	
316													
intake	1,311	62.1	3,803	175.8	1.08	1.85	20.3	0.6	981	1,201	45.1	14.95	RO
% RDA	62	135.0	95	293.0	98.38	142.87	145 4	28.3	82	100	15.0	83.04	
320													
intake	1,987	92.1	2,324	113.0	0.85	1.37	14.4	0.2	847	1,341	53.8	11.73	74
% RDA	95	200.3	58	188.4	77.16	105.11	103.0	11.1	71	112	17.9	65.16	
324													
intake	2,486	85.2	2,555	30.2	1.38	2.06	15.0	0.1	2,210	779	45.6	12.75	72
% RDA	118	185.3	64	50.3	125.95	158.54	107.4	5.0	184	65	15.2	70.83	
326													
intake	2,079	52.6	2,177	39.0	0 34	0 46	11.2	0	511	826	58.0	9.65	54
% RDA	99	114.3	54	65.0	30.90	36.01	80.4	3.3	43	69	19.3	53 61	
328													
intake	5,091	134.7	10,104	129.1	5.09	3.27	25.6	0 3	2,193	3,055	103.6	30.98	87
% RDA	242	292.9	253	215.2	462.77	251.68	183.0	15.8	183	254	34.5	172.13	
404													
intake	2,186	83.2	3,848	608.4	2 27	2.24	13 8	0.2	1,635	1,857	83.4	12.36	84
% RDA	104	180.9	96	1,014.0	206.68	172.65	98.7	13.1	136	155	27.8	68.67	
405													
intake	556	11.6	367	176.6	0.76	0.38	7.3	0	63	156	4.0	10.61	32
% RDA	26	25.9	92	294.4	68.9R	29.38	52.3	0.9	5.2	13	1.3	58.94	

Table 17. Individual dietary intakes, percentages of the 1980 RDA* and MARI (without supplements) of adolescent girls (cont.)

ID number	energy	protein	vit. A	ascorbic acid	thiamin	ribo-flavin	niacin	vit. B_6	calcium	phos-phorus	magnesium	iron	MAR
	kcal	gm	I.U.	mg	mg	mg	mg	mg	mg	mg	mg	mg	
406													
Intake	4,830	157.7	1,214	3.3	5.00	3.96	52.5	0	1,480	1,582	0.5	45.68	70
% RDA	230	342.7	30	5.5	454.54	304.77	375.0	0.0	123	132	0.2	253.76	
410													
Intake	1,535	82.0	1,314	76.3	0.79	0.96	30.4	0.4	392	943	73.0	7.00	62
% RDA	73	178.4	33	127.2	72.49	74.18	216.8	21.0	33	79	24.3	38.91	
412													
Intake	1,161	38.9	5,978	206.7	0.69	0.40	31.7	2.0	265	506	0	4.19	60
% RDA	55	84.7	149	344.4	62.87	31.14	226.6	100.0	22	42	0.0	23.26	
417													
Intake	4,657	124.0	2,314	76.6	0.74	1.29	19.6	0.4	983	1,022	24.5	15.67	75
% RDA	221	269.5	58	127.7	67.64	99.83	140.0	19.4	82	85	8.2	87.06	
419													
Intake	2,171	74.2	3,882	34.9	1.35	2.69	10.6	0.5	1,784	1,726	76.0	11.67	79
% RDA	103	161.3	97	58.1	122.79	207.59	75.9	25.0	149	144	25.3	64.82	
504													
Intake	2,223	95.4	10,465	333.7	1.79	1.48	23.9	0	802	1,363	0.7	16.75	80
% RDA	106	207.5	262	556.2	163.25	113.76	171.1	0.7	67	114	0.2	93.08	
509													
Intake	2,874	130.1	7,380	127.2	2.19	3.71	16.9	0.5	2,359	2,243	144.7	15.83	88
% RDA	137	282.9	184	212.0	199.42	286.08	120.9	23.0	197	187	48.2	87.97	
513													
Intake	2,027	73.9	2,722	126.3	0.91	1.60	11.0	0	1,103	1,132	2.5	10.23	72
% RDA	96	160.8	68	210.5	82.98	123.79	78.8	0.1	92	94	0.8	56.83	
516													
Intake	1,997	99.7	1,131	14.2	1.96	1.71	11.4	0.3	1,151	2,125	146.5	17.58	74
% RDA	95	216.8	28	23.6	178.74	131.80	81.3	17.0	96	177	48.8	97.66	
520													
Intake	1,121	55.2	12,499	117.6	0.76	1.45	8.9	0	1,058	1,119	0	8.67	68
% RDA	53	119.9	312	196.0	69.50	111.30	63.5	0.0	88	93	0.0	48.19	
522													
Intake	2,373	100.2	1,864	9.9	4.13	2.83	22.2	0.1	1,535	2,623	44.3	24.20	74
% RDA	113	217.8	47	16.5	376.18	217.74	158.8	8.0	128	219	14.8	134.47	
535													
Intake	1,530	32.7	357	64.4	0.31	0.55	10.5	0	391	558	13.0	6.41	43
% RDA	73	71.0	9	107.3	20.18	42.35	74.9	1.2	33	46	4.3	35.61	

Table 17. Individual dietary intakes, percentages of the 1980 RDA* and MAR† (without supplements) of adolescent girls (cont.)

ID number	energy	protein	vit. A	ascorbic acid	thiamin	ribo-flavin	niacin	vit. B_6	calcium	phos-phorus	magnesium	iron	MAR
	kcal	gm	I.U.	mg	mg	mg	mg	mg	mg	mg	mg	mg	
604													
Intake	2,262	88.2	2,277	76.0	2.04	3.20	26.8	0.1	1,665	1,886	41.5	20.71	81
% RDA	108	191.7	57	126.7	185.82	246.53	191.2	7.2	139	157	13.8	115.06	
631													
Intake	3,675	138.3	3,928	218.9	1.37	2.74	23.4	0.6	1,968	2,587	120.6	24.84	89
% RDA	175	300.7	98	364.8	124.90	211.42	167.0	30.0	164	216	40.2	138.00	
640													
Intake	1,372	41.5	21	58.5	0.04	0.02	4.9	0	298	385	87.0	5.26	34
% RDA	65	90.1	0.5	97.5	3.27	1.69	35.2	1.2	25	32	29.0	29.22	
642													
Intake	1,793	32.8	475	20.7	0.45	0.36	7.4	0.3	313	946	112.0	6.40	43
% RDA	85	71.3	12	34.5	41.27	277.69	53.1	17.0	26	79	37.3	35.56	

*Percentages of 1980 Recommended Dietary Allowances for girls 15 to 18 years old (19).

†The mean adequacy ratio (MAR) was calculated by averaging the percentage RDA values for energy and 11 nutrients, excluding supplements, with values over 100% being truncated.

THE SELF-CONCEPT AS A FACTOR IN THE QUALITY OF DIETS OF ADOLESCENT GIRLS

by

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ABSTRACT

Adolescence is characterized by intense mental and physical growth. Many believe it is the time when the self-concept is developed and solidified. Physical appearance reportedly has a great effect on the self-concept of the adolescent female. The desire to be thin may lead to poor eating habits, such as skipping meals and following fad diets. Thus, the quality of their diets may be affected by their self-perception. Because of the paucity of information on the relationship between self-concept and dietary quality, this study was designed to investigate the effect of self-concept on the quality of diets of adolescent girls.

Scores for self-concept, measured by the Tennessee Self-Concept Scale (TSCS), and fat area values, calculated from anthropometric measurements, were obtained on 160 15 year old girls enrolled in physical education classes. A questionnaire was used to determine the frequency of consumption of low nutrient density foods, and 24-hour dietary recall interviews were conducted with a random subsample of 40 girls. Dietary data were analyzed for energy and 11 nutrients and expressed as percentages of the Recommended Dietary Allowances (RDA). Mean adequacy ratios (MARs) were calculated to assess dietary quality. Relationships among all variables were determined.

At the 5th, 50th, and 95th percentile, Kansas girls had larger arm circumferences, triceps skinfolds, and arm fat areas than their national counterparts. Their self-concept scores on most of the 11 categories of the TSCS were below the 50th percentile norms. Intakes of energy, protein, ascorbic acid, thiamin, riboflavin, niacin, and phosphorus met or exceeded the RDAs for these nutrients. Calcium, iron, magnesium, and vitamin B_6 intakes were less than their respective RDAs. Less than half of the girls

received MAR values greater than 75 percent and more than a third had MARs that were less than 66 percent.

MAR values were correlated negatively with carbonated beverages, candy, and baked desserts. Negative correlations also were found between fat area values and Physical Self scores. Self-Satisfaction scores were correlated positively with MAR values as were Family Self scores and carbonated beverages. Partial regression analysis showed that Self-Satisfaction and baked desserts affected MAR values significantly.