INFLUENCES OF PARENTAL CHARACTERISTICS ON ADOLESCENT'S NUTRIENT INTAKE

By

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Bachelor of Science

Oklahoma State University

Stillwater, Oklahoma

1997

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
July, 1999

INFLUENCES OF PARENTAL CHARACTERISTICS

ON ADOLESCENT'S NUTRIENT

INTAKE

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ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to my advisor, Dr. Gail Gates for all her guidance, support, knowledge, patience, friendship and for the confidence she had in me. I am grateful for the long hours and weekends you spent helping me to complete my thesis, I could not have completed this without such a wonderful supportive advisor. I wish to thank my committee members Dr Christine Johnson and Dr. Kathryn Keim for taking the time to work with me and for providing me with their guidance and knowledge.

I would like to give my special appreciation to my mother Sandra Kidd and to my husband Rob Caillet for being so supportive and encouraging. Thank you for being so understanding, patient, and helpful throughout this last year and a half. I could not have completed this task with out the unconditional love my family has given during this period of time.

Finally, I would like to thank the Department of Nutritional Sciences for providing me the opportunity to be a part of the program at Oklahoma State University, and for supporting me during this last year and a half of this study.

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CHAPTER I

INTRODUCTION

Nutrition related diseases such as heart disease, obesity, diabetes and some cancers are becoming increasingly evident in the western countries. These diseases are becoming a major cause of death for many Americans. Many risk factors associated with these diseases are developed in childhood and carried through into adulthood. The most prominent risk behavior commonly seen in children is an unhealthy diet pattern consisting of high total energy, fat, and cholesterol (Feunekes et al.1997, Kennedy and Powell 1997, Laskarzewski et al.1980, Oliveria et al. 1992, Perusse et al. 1988, Stafleu et al. 1994, Vauthier et al. 1996, Nguyen et al. 1996, Wardle 1995).

The Healthy People 2000 objectives for children include (United States Department of Health and Human Services 1991).

1) A reduction in dietary fat intake to an average of 30 percent of calories or less, and an average saturated fat less than 10 percent of calories for those 2 years and older. These recommendations were developed because eating habits that lead to obesity, heart disease, some cancers, high blood cholesterol, and gallbladder disease develop during childhood.
2) An increase in calcium intake so at least 50 percent of youth aged 12 to 24 consume 3 or more servings daily of foods rich in calcium. Calcium is necessary for bone formation and maintenance as well as teeth formation, all of which are rapidly occurring during childhood.

3) A reduction in iron deficiency to less than 3 percent among children age 1 to 4 and among women of childbearing age, to prevent adverse effects on growth and development caused by iron deficiency. Anemia is also a concern for those who are not receiving enough iron in their diet.

Maintaining folate levels plays an important role in an individuals health. According to the HHANES 1982-84 and NHANES III 1988-91, folate intake from foods was lower than the 1989 RDA's for non-Hispanic black females (LSRO 1995). The new folate RDA's for adolescents aged 9 to13 is 300 μg and 400 μg for adolescents over 13 and adults (Food and Nutrition Board 1997, Yates 1998). Low folate levels are associated with an increased risk of atherosclerosis and neural tube defects.

The family impacts a child's dietary habits in many ways. Most families share the same sociocultural, demographic, educational, environmental, physiological, and behavioral influences, which can affect the diet (LSRO 1995). Children are usually limited to the foods their parents buy, prepare, and serve, as well as economic and accessibility limitations of the family (Fisher and Birch 1995). It has also been observed that family members influence each other through attitudes, norms, and behavior modeling (Feunekes 1997). Similarities in nutrient intake were more often noted between individuals or families living in the same household, whether or not they are biologically related, than those families who did not live together. However, researchers have found more similarities between spouses than between parent and child (Perusse 1988, Oliveria 1992). Those similarities found in the parent/child relationship were stronger between the mother and child than father and child (Oliveria 1992). Monozygote twins were found to have more similar diets than dizygote twins (Perusse 1988).

Researchers report that knowledge and attitude about nutritional needs has a great impact in fat and cholesterol intake (LSRO 1995). However, the strongest impact found so far in nutrient consumption is the cohabitational effect, those who live in the same household have the most similar diets (Garn et al. 1979).

The studies conducted above show an association between fat, saturated fat, and cholesterol intake in parents/guardians and their children. However, these studies have not looked at the parental/guardian influence on calcium, iron, and folate intake in their adolescents. These nutrients have been identified as current and potential public health concerns (LSRO 1995).

Adolescents between the ages of 12 and 19 have been chosen as the target audience for this study for a variety of reasons. There has been limited information found comparing parent/guardian and adolescent nutrient intake. Most research covers the impact of the family on children up to age 12. Adolescents, unlike children, are becoming more and more exposed to foods outside the home, which brings about influences from others. Some adolescents have the freedom to eat school lunch at fast food restaurants, allowing them to make their own choices. Some schools prepare many foods allowing students to make their own lunch choices. By the age of 16 many adolescents own cars, and along with their busy schedules this keeps them from eating meals with their families. For these reasons it is important to look at the influence parents have on their child's nutrient and food intake even when they are not eating foods prepared at home.

Two studies were used to obtain the information on calcium, iron, folate, and energy intakes of adolescents and the food and nutrition knowledge and attitudes, and beliefs of their parents. These studies were conducted as a two-part study. The

Continuing Survey of Food Intakes by Individuals (CSFII) was used to collect information on the parent/guardian and child's dietary intake. The study was conducted through two in-person interviews consisting of a 24-hour dietary recall for each interview. The second part of the study, the Diet and Health Knowledge Survey (DHKS) was conducted on the parent/guardian's knowledge, attitude, and beliefs toward nutrition and dietary intake. This part of the study was conducted over the phone two to three weeks after the second CSFII interview. For those subjects without telephones, in person interviews were conducted for DHKS.

The objective of this study was to determine the relationship between dietary intake, food group score (knowledge of the food guide pyramid serving recommendations) food and nutrition beliefs, nutrition knowledge, attitudes toward nutrition and demographic characteristics of the parent and the dietary intake of their children. This study used information gathered from the 1994-96 Continuing Survey of Food Intake by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS). The following research questions were addressed:

What is the relationship between dietary intake (calcium, folate, iron, and energy) of the parent and dietary intake of their adolescent?

What is the relationship between nutrition knowledge of the parent and the dietary intake of their adolescent?

What is the relationship between the parent's attitude toward nutrition and the dietary intake of their adolescent?

What is the relationship between the parent's beliefs about nutrition and the dietary intake of their adolescent?

What is the relationship between the demographic characteristics of the parent and the dietary intake of their adolescent?

What is the relationship between the parent's food group intake and the food group intake of their adolescent?

What are the relationships among demographic characteristics of the parent, their nutrition knowledge, and their attitudes and beliefs about nutrition, and their food group score and nutrient intake? What are the relationships among these parental factors and the nutrient intake and food group intakes of their adolescent?

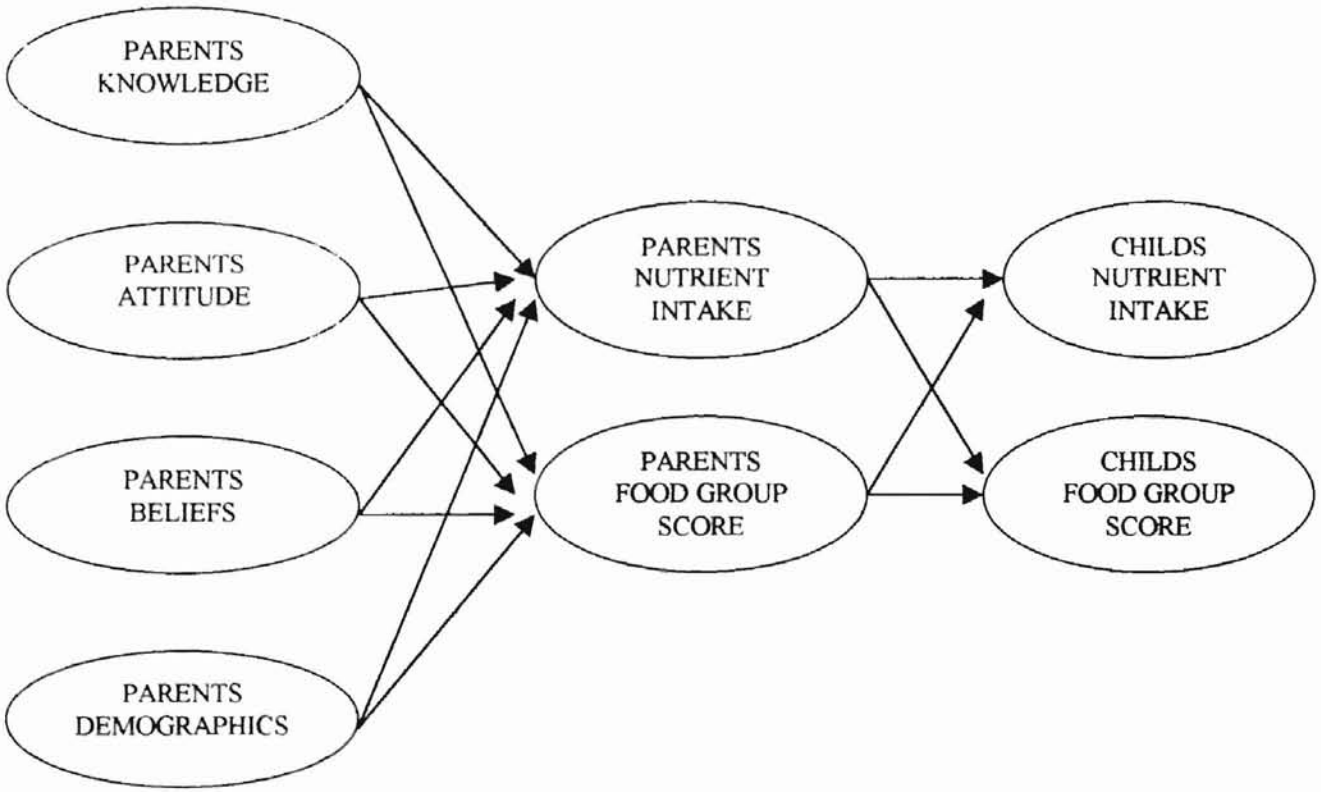

Figure1. Theoretical model of the relationship among parent's knowledge, attitude, beliefs, and demographic characteristics on their food group score and nutrient intake. Influence of the parent's food group score and nutrient intake on their child's food group score and nutrient intake.

CHAPTER II

REVIEW OF LITERATURE

Identification of Current Nutrient Concerns Of Adolescents

The Third Report on Nutrition Monitoring (TRONM) contains information on the dietary, nutritional, and health related status of the people in the United States. In order to complete this report, data from the 1989-91 CSFII (conducted by the USDA) and the 1988-91 NHANES (conducted by HHS) were analyzed. The Life Sciences Research Office (LSRO) of the Federation of American Societies for Experimental Biology coordinated with the HHS and USDA to interpret and analyze the data. The LSRO recruited expert consultants with specialties in dietary intakes; food consumption patterns and analysis; public, community, and clinical nutrition; along with other health and nutrition areas. Together the LSRO and expert consultants categorized food components based on the public's health needs. Nutrients and food components were categorized as current public health issues, potential public health issues, and not a current public health issue (LSRO 1995).

A food component was considered a current public health issue if:

1. Dietary intakes were low or high for a substantial proportion of the population and if evidence from National Nutrition Monitoring System (NMMS) surveys of health and nutrition status indicated related health problems in the population or in subgroups of the population, or

2. Dietary intakes were low or high for a substantial proportion of the population, and if evidence from epidemiological or clinical studies in the literature indicated related health problems in the population or in subgroups of the population.

A food component was considered a potential public health concern if:

1. Dietary intakes were low or high for a substantial proportion of the population, and if limited evidence from either (NMMS) nutrition and health surveys or studies in the literature suggested related health problems in at least some subgroups in the population, or
2. Dietary intakes were adequate for the majority of the population, but limited evidence from either NNMS nutrition and health surveys in the literature suggested related health problems in at least some subgroups in the population, or
3. Dietary intakes were low or high for a substantial proportion of the population, and if evidence was not available from either NNMS nutrition and health surveys or studies in the literature that permitted evaluation of the public health significance of observed dietary intakes

Food components were considered not to be a current public health issue if:

1. Dietary intakes were adequate for the majority of the population, and evidence from either NNMS nutrition and health surveys or studies in the literature did not suggest related health problems in the population, or

2. Dietary intakes were low or high for a substantial proportion of the population, but evidence from either NNMS nutrition and health surveys in the literature did not suggest related problems in the population.

The following sections look at four nutrients (calcium, folate, iron, and energy) that are considered current or potential public health concerns and are examined in the current study.

Calcium

Calcium intake is necessary during adolescence to aid in bone growth. Skeletal development along with peak bone mass is increased during puberty causing an increased need for calcium to help prevent osteoporosis and fractures later in life (Mitchell 1997). Peak bone mass, which is reached around age 25, is related to calcium intake during bone mineralization (National Research Council 1989). The 1989 Recommended Daily Intakes (RDA) for calcium for adolescents aged 12-19 years old was 1200 mg. This RDA was set to meet the needs of nearly all (97% to 98%) healthy persons aged 12-19 years old. In 1997 the RDA for calcium was changed to Adequate Intake (AI). The Adequate Intake for a nutrient is based on observed or experimentally determined approximations of nutrient intake by a group of healthy people. It is used when a RDA cannot be determined (Food and Nutrition Board 1998). The current AI for calcium intake in adolescents is 1300 mg, an increase of 100 mg from the 1989 RDA.

Calcium intake is considered to be a current public health concern in the TRONM based on evidence of low intakes from the 1988-91 NHANES and 1989-91 CSFII data. These surveys show calcium to be below the 1989 RDA for adolescent females and males

with the exception of non-Hispanic white males (LSRO 1995). According to Mitchell (1997) diet surveys indicate calcium intakes for adolescent females are 400-700 mg below the 1989 RDA. Munoz et al. (1997) used 1989-91 CSFII data to determine the proportion of adolescents meeting pyramid food group recommendations. A higher percentage of adolescent males aged 12-19 years old (48.9%) met the pyramid servings for dairy products than did adolescent females (21.7%). To help combat the current poor calcium intake a National Health Objective in *Healthy People 2000* was to increase calcium so that at least 50% of youth aged 12-24 consume 3 or more servings of foods rich in calcium each day.

Iron

Iron is necessary to transport oxygen to tissues, to facilitate oxygen use and storage in muscles, as a transport medium for electrons, and as part of enzyme reactions (United States Department of Health and Human Services 1998). The iron requirement for adolescents increases to accommodate the increase in lean body mass, blood volume, and red cell mass that occurs at this age (Mitchell 1997). The current RDA for adolescents is 12 mg for males and 15 mg for females (National Research Council 1989).

Iron is a food component that is considered a current public health concern. Data from the 1988-91 NHANES and 1989-91 CSFII showed that median intakes were 32% - 37% below the 1989 RDA for adolescent females (LSRO 1995). Iron deficiency usually results in anemia which leads to physical inactivity, decreased immune response, short attention span, irritability, and reduced ability to learn (National Research Council 1989). A national health objective of *Healthy People 2000* is to reduce iron deficiency to less

than 3% among women of childbearing age (United States Department of Health and Human Services 1991). Further research and continued monitoring is needed to increase iron intake among adolescent females.

Folate

Folate is necessary for amino acid metabolism and nucleic acid synthesis (National Research Council 1989), and low folate levels in pregnant women are associated with certain kinds of neural tube defects (LSRO 1995). Folate deficiency is associated with impaired cell division and altered protein synthesis (National Research Council 1989). Folate also plays a role in homocysteine metabolism. Studies have shown that high serum levels of homocysteine are associated with atherosclerosis (LSRO 1995). The current RDA for folate is 300 μg for adolescents 9 through 13 years old and 400 μg for adolescents 14 through 19 years old (Food and Nutrition Board 1998).

The Third Report on Nutrition Monitoring classifies folate as a potential public health concern. Data from the 1988-91 NHANES and 1989-91 CSFII surveys showed that the intake for non-Hispanic black females age 16-19 years old was 83% of the 1989 RDA of 180 μg. All other adolescents had intakes just above 100% of the 1989 RDA (National Research Council 1989). However, compared to the new RDA for folate, intakes for all adolescents were below the recommended level of 400 μg.

Energy

Energy is necessary for growth, muscle activity, and synthesis of body compounds. Energy requirements for adolescents vary due to growth rate, body size, and

physical activity (Whitney and Rolfes 1993, Mitchell 1997). An adolescent's energy needs are determined by the adolescent's height, weight, and physical activity (Mitchell 1997). The TRONM has categorized food energy as a current public health issue. Data collected from the 1988-91 NHANES and 1989-91 CSFII showed median food intakes of adolescents below the 1989 RDA. However, one-fifth of these adolescents were overweight (LSRO 1995). These seemingly contradictory findings could be due to underreported food intake, food energy intake recommendations being higher than actual energy expenditure, and/or low energy expenditure of adolescents (LSRO 1995).

Health problems can result from both excessively high and low energy intakes, however further studies are needed to determine the energy consumption and needs of adolescents. Studies have shown that a high energy intake along with a low energy expenditure can lead to weight gain and eventually obesity (LSRO 1995). Obesity is associated with an increased risk for hypertension, coronary artery disease, lipid disorders, and non insulin dependent diabetes mellitus (Type 2), joint disease, gallstones, and respiratory problems (Mahan and Escott-Stump 1996). Although adolescents are probably not yet at risk for these diseases, studies show that dietary patterns established in childhood are usually carried through to adulthood (Stafleu 1994, Oliveria et al. 1992, Wardle 1995). Approximately 21% of adolescents in the United States are overweight, which is a 6% increase over the last 10 years (Mahan and Escott-Stump 1996). A high energy intake in adolescence can lead to obesity in adulthood (LSRO 1995). Low energy intakes can also be a concern for adolescents. According to results from the 1977-1978 Nationwide Food Consumption Survey and the 1976-1980 NHANES study adolescents reported average intakes that were below the RDA (National Research Council 1989).

Healthy Eating Index- Measuring Diet Quality

Kennedy et al. (1995) developed an index to measure diet quality that incorporates dietary guidelines and nutrient needs into a 10 point "Healthy Eating Index" (HEI). The HEI is a 10 component index that is scored on the consumption of suggested servings for each of the 5 food groups and adherence to 5 of the dietary guidelines (total fat, saturated fat, cholesterol, sodium, and variety of food). Each of the 10 components is worth a maximum of 10 points totaling a possible 100. This index was used for a sample population based on data collected during the 1989 and 1990 CSFII/DHKS study. The overall score of the sample respondents was 63.9. Results showed that as the overall HEI score decreased there was an increased likelihood of falling below 75% of the RDA for most nutrients.

Based on the work done in 1989 by Kennedy et al., the United States Department of Agriculture (USDA) and Center for Nutrition Policy and Promotion (CNPP) developed a Healthy Eating Index that was used with the 1994-96 CSFII nationally representative data. The same scoring method and total possible points that applied to Kennedy's HEI applies to the HEI developed by the USDA and CNPP. The mean score for the 1994 data was 63.6, 63.5 for 1995, and 63.8 for 1996. Females (64.4) scored higher than males (62.9), and Asian Pacific Islanders had the highest overall mean score (66.8). Participants who were 300% or more of poverty had the highest score in their category (65.0) and those with more than 4 years of college had the highest scores in their category (68.0). A score of 81 or higher indicated a good diet; a score of 51-80 indicated a diet that needs improvement; and a score of 50 or less indicated a poor diet.

Approximately 12% of the population had a good diet and 18% had a poor diet. Scores were similar between females age 11 to 14 (63.5) and males age 11 to 14 (62.3) as well as between females age 15 to 18 (60.8) and males age 15 to 18 (60.7). The overall HEI scores showed an improvement form 1989 (61.5) to 1996 (63.8).

Influence of Demographic Characteristics on Food Intake

Many factors can affect a person's food consumption. An individual's income level can greatly affect what they are able to buy, store, and prepare. Individuals with a lower socioeconomic status tend to consume more calories from fat (Kennedy and Powell 1997), and are less likely to be aware of the association between diet and disease (Morton 1997) than those in a higher socioeconomic status. Age can be a contributing factor to food consumption. Adolescent females tend to limit the intake of certain foods when dieting (Neumark-Sztainer et al. 1997). Gender also plays a role in food consumption. Boys were found to have higher food intakes than girls (Kennedy and Powell 1997, Farris et al. 1986, Krebs-Smith et al. 1997, Neumark-Sztainer at al. 1997). Nutrient intake varies by race depending on the population, age, and nutrient studied.

Neumark-Sztainer et al. (1997) examined the correlation between sociodemographic characteristics and consumption of milk products by adolescent males and females between 12 and 20 years old. Dairy product intake was reported to be low by 7.1% of males and 13.1% of the females involved in the study. Fewer adolescent males (9.8%) than females (16.9%) from lower socioeconomic status (SES) (the parent did not have a high school diploma or the parent was not working full time) reported consuming

low dairy intakes. Fewer adolescent males (5.9%) in the upper SES (the parent was a college graduate or had done some graduate work and worked at least part time) reported a low dairy consumption than adolescent females in the upper SES (9.6%). Asian Americans reported the lowest dairy consumption with 21.4% of males and 29.4% of females reporting inadequate dairy product consumption compared to only 5.3% of white males and 11.0% of white females. Only 11.3% of adolescents 12 to14 years old reported inadequate dairy product consumption while 14.9% of older adolescents (17 to 20 years old) reported low dairy product consumption.

A study conducted by Krebs-Smith et al. (1997) used data from the 1989-91 Continuing Survey of Food Intakes by Individuals to determine the influence of gender and race on consumption of an adequate number of servings in each of the five food groups of the food guide pyramid. Study respondents completed a 24-hour dietary recall and a 2-day dietary record. Males were more likely to meet recommendations for vegetables and meat (14% meeting the recommendations) than females (8%). More women met the recommendation for vegetables only (10%) than males (5%). Fourteen percent of women met none of the food group recommendations while 4% of the males did not meet any recommendations. Only 5% of whites met only the recommendations for meat while 8% met none of the recommendations. Blacks and Hispanics had a higher percent of individuals who met only recommendations for meat (11% and 10%, respectively) and none of the food recommendations (16% and 9%, respectively) as compared to whites.

The effect of race and sex on macronutrient intakes of 10-year-old children was examined by Farris et al. (1986). Children were interviewed to obtain a 24-hour dietary

recall. Results showed that whites had a greater intake of protein than blacks. Boys consumed more calories from protein (13.6%) than girls (12.8%). Girls consumed slightly more of their calories (50.7%) from carbohydrates than boys (49.1%).

Kennedy and Powell (1997) reviewed data from the 1989-1991 and 1994 Continuing Survey of Food Intakes by Individuals to determine the changing eating patterns of American children between the ages of birth and 18 years of age. They examined the effect of age on calorie intake and found that children in all ages consumed more energy in 1994 than in 1989-1991. Mean percent of RDA for protein, vitamins A, C, and B6, niacin, food energy, iron, and calcium were higher for boys than for girls. Data from the 1994 study showed that as household income increased from less than 130% of poverty to greater than 300% of poverty, the percent of calories from fat and saturated fat decreased.

Morton (1997) conducted a study using the 1994 CSFII/DHKS data to compare nutrition knowledge of low and high-income respondents. Low-income was described as a gross income at or below 130% of poverty for the last month. The other income bracket consisted of all incomes above 130% of poverty. Low-income respondents were less aware of the relationship between diet and disease than higher income respondents. Few low (4%) or high-income (7%) respondents knew the correct number of recommended servings for the bread, cereal, rice, and pasta group. Significantly fewer respondents from the low-income group (44%, $p < 0.05$) knew the correct number of servings in the vegetable group than did the high-income respondents (51%).

Family Aggregation

Studies have shown that individuals who live together are more likely to consume similar foods than those who do not live together. Many families share the same cultural values, environment, and behavioral influences, all of which are likely to influence diet. Adolescents are usually not responsible for buying and preparing food for the family/household, which makes then subject to eating what their parents buy and prepare (Fisher and Birch 1995). Studies show that intakes are more alike within generations (Vauthier et al. 1996). Other similarities between mother-child and father-child nutrient intake vary depending on age, race, and nutrient.

Laskarzewski et al. (1980) examined the relationship between cholesterol, total carbohydrate, saturated and polyunsaturated fats, and energy intake of parents and their children (ages 6 to 19). Data were collected using a 24-hour dietary recall each week over the course of a 12-month period. Data were collected for only one parent and one child in each family. For families with more than one child the oldest child was selected. Children's intake was significantly related to parental carbohydrate intake for white parents over the age of 44 ($r = 0.38$, $p = 0.02$), for children with black fathers over the age of 40 ($r = 0.97$, $p = 0.0004$) and for black mothers over the age of 40 ($r = 0.92$, $p = 0.006$). Energy intake of white mothers younger than 34 years old was significantly related to their children's energy intake ($r = 0.67$, $p = 0.002$). Saturated fat intake was significantly correlated with children's intake among white mothers younger than 34 ($r = 0.47$, $p = 0.03$), all white fathers ($r = 0.40$, $p = 0.01$), and black mothers older than 40 ($r = 0.65$, $p = 0.04$). Oldest parent-oldest child relationships were significantly correlated

for total carbohydrate, saturated fat, and caloric intake. All nutrients, except cholesterol were significantly correlated for all parent-child relationships.

Lin et al. (1996) looked at the influence of dining out, household characteristics and the nutrition knowledge of the child's meal planner on the diets of children 2 to 17 years old. Data used for the study came from the 1989-91 CSFII/DHKS study. They found that 71% of male adolescents met their iron recommendations but only 21% of female adolescents met their iron recommendations. White respondents consumed 117% of their RDA for iron, black respondents consumed 106% of the RDA, Hispanics consumed 103% of the RDA, and those classified as others consumed 127% of their RDA for iron. Only 16% of female adolescents met the 1989 RDA for calcium, and 38% of male adolescents met the RDA for calcium. Calcium intake was higher in whites than any other race. Whites consumed 101% of calcium recommendations, blacks consumed 83%, Hispanics consumed 91%, and those classified as other consumed 94% of their calcium recommendations.

Garn et al. (1979) looked at the Ten State Nutrition Survey to determine the resemblance in energy and protein intake of family members. Energy and protein intake between spouses had a higher correlation for blacks ($r = 0.32$ and $r = 0.46$, respectively) than whites ($r = 0.30$ and $r = 0.39$, respectively). Energy and protein intake was more strongly correlated between white siblings (0.25 and 0.28, respectively) than black siblings (0.19 and 0.21, respectively). Mother-child correlation for energy intake was higher for blacks ($r = 0.27$) than whites ($r = 0.22$). Mother-child correlation for protein was higher among whites ($r = 0.30$) than blacks ($r = 0.22$).

Stafleu et al. (1994) conducted a study among three generations of women to determine their family resemblance in energy, fat, and cholesterol intake. The women in the study were maternally related and were not living together. Data were collected using a food frequency questionnaire. Results indicate that there was a stronger correlation in nutrient intake among the younger and middle generation than other generations. Significant correlations were seen between the younger and middle generation for energy ($r = 0.22$, $p \leq 0.05$), grams of saturated fat ($r = 0.23$, $p \leq 0.05$) and for milligrams of cholesterol ($r = 0.21$, $p \leq 0.05$). The cholesterol intake of middle and older generations ($r = 0.29$) were significantly correlated, while the younger and older generation had a significant correlation between saturated fatty acid intake expressed in grams ($r = 0.23$) and polyunsaturated fatty acids ($r = 0.33$) as a percent of energy intake.

Vauthier et al. (1996) looked at the energy, fat, protein, and carbohydrate intake of 387 French families to determine if eating meals together effects their macronutrient intake. Data were collected using a 3-day food diary. Nutrient intakes were compared between parents, parent and child, and between siblings. Significant correlations were found among all pairs. Father's energy intake was more closely related to the son's energy intake ($r = 0.35$, $p \leq 0.05$) and daughter's energy intake ($r = 0.33$, $p \leq 0.05$) than was the mother's energy intake. Correlations for nutrient intake were higher within generations than between generations. Results showed that the more meals a family eats together, the more similar their macronutrient intakes. Shared meals had a greater influence between generations on fat and carbohydrate intake than did protein. These results may be due in part to cultural inheritance.

Oliveria et al. (1992) conducted a study that looked at the relationship between parent and parent-child nutrient intakes. Families completed four sets of 3-day food diaries for both parents and children during the first year of the study. Calcium intakes were significantly correlated for mother-son pairs ($r = 0.22$, $p \leq 0.05$) and mother-child pairs ($r = 0.29$, $p \leq 0.01$). Father-child intake was significantly correlated for protein ($r = 0.34$, $p \leq 0.01$), saturated fatty acids ($r = 0.34$, $p \leq 0.01$) and cholesterol intake ($r = 0.34$, $p \leq 0.01$). Mother-child intakes were significantly correlated for protein ($r = 0.29$, $p \leq 0.01$), carbohydrate ($r = 0.37$, $p \leq 0.001$), total fat ($r = 0.46$, $p \leq 0.001$), saturated fatty acids ($r = 0.48$, $p \leq 0.001$), monounsaturated fatty acids ($r = 0.43$, $p \leq 0.01$), cholesterol ($r = 0.37$, $p \leq 0.001$), and sodium ($r = 0.30$, $p \leq 0.001$). Overall, nutrient intakes were more highly correlated between mothers and children than between fathers and children.

Patterson et al. (1988) examined dietary fat, sodium, and energy in Mexican-American and Anglo families. Data were collected through a 24-hour recall, a food frequency questionnaire, and a 3-day food record. Anglo fathers and their younger child's total and saturated fat intake, dietary sodium/potassium (Na/K) ratio, and sodium intake were significantly correlated. Anglo fathers and their older children had no significant correlation for fat, saturated fat, and sodium. Mexican-American fathers and their children had no significant correlation for fat intake. Anglo mothers and their younger child had a significant correlation for energy, fat, sodium, and Na/K intake. Mothers and oldest child did not show any significant correlations for dietary fat, sodium, or calories. Mexican-American fathers and their younger child showed significant correlations for Na/K intake and significant correlations with their oldest child in sodium intake and

Na/K intake. Mexican–American mothers and younger children showed a significant correlation energy, total fat, and sodium. Mothers and their oldest child showed significant correlations for total fat and sodium intake. Overall parents had a higher correlation with their younger child than with their older child.

Feunekes et al. (1997) conducted a study to determine family resemblance in fat and cholesterol intake among families in the Netherlands. Data were collected through a two-day dietary record. Energy, total fat, and cholesterol intake were significantly correlated for all parent-child relationships. Correlations between energy intake were highest between mothers and daughters ($r = 0.24$, $p \leq 0.05$) and fathers and daughters ($r = 0.24$, $p \leq 0.05$). Total fat had the highest correlation among father-daughter relationships ($r = 0.35$,$p \leq 0.05$). Cholesterol intake had the highest correlation among mother-daughter pairs ($r = 0.45$, $p \leq 0.05$).

Perusse et al. (1988) examined family resemblance in energy intake among biological and adoptive-foster relatives. There were 375 families from Quebec who participated in the study. Both parents and children completed a 3-day dietary record. Parent child correlations were significant for all nutrients; energy, carbohydrate, fat, and protein intake. Foster parent and adopted child intakes were significantly correlated for all variables except carbohydrate as a percent of energy. These authors concluded that family aggregation is present in nutrient intake.

Couturier and Imbach (1997) compared mother's and daughter's calcium intakes and the distribution of food groups from which calcium was obtained. Participants in the study completed a five-day food record and completed a food frequency questionnaire. Total calcium intake was not significantly correlated for mothers and daughters ($r = 0.17$,

$p = 0.08$). When supplements were excluded, the calcium intake showed a stronger correlation ($r = 0.26$, $p = 0.02$). The only significant correlation in food distribution was found in calcium from beans and nuts ($r = 0.44$, $p \leq 0.001$).

Relation Between Parent and Child Food Preferences

There are many factors that affect an adolescent's food choices and food preferences. One of these factors may be parental food choices and food preferences. Some studies support the idea that parent's food choices and preferences influence those of their children while others are contradictory. It has been noted that people within a culture have a tendency to eat similar foods and that the child's primary source of consumption information comes from the observation of human eating patterns. Studies show that the amount of exposure to certain foods can influence an individual's food likes and dislikes. Repeated exposure tends to increase the liking of a certain food product (Wardle 1995). However, studies on this subject tend to show contradictory results.

Birch (1980) examined the food preferences of 128 preschool children and their parents. Preferences for fruits, vegetables, sandwiches, and snacks were compared. Only one mother-child pair had a correlation between their food preferences of 0.75 to 1.00 ($p = 0.01$) while there were no father-child correlations at this value. There were 12 mother-child pairs and 8 father-child pairs that had correlations of 0.54 to 0.74 ($p = 0.05$). Most commonly, mother-child and father-child pairs showed no significant correlations

(0.11 to 0.32 and –0.10 to 0.10, respectively). Overall neither mothers' nor fathers' preferences were strongly related to their children's preferences.

Bryan and Lowenberg (1958) conducted a study to examine the influence of the father's food preference on those of his preschool child. Sixty-one preschool children and their fathers were evaluated on their preference for 36 foods. The 36 foods consisted of vegetables, fruits, fats, breads and cereals, and protein foods. The father's preference was self-reported. Preferences of the preschool children were taken from the children themselves and from the mother. Results showed that the only significant similarity in food preferences was for vegetables ($r = .28$, $p \leq 0.05$). Children liked fatty foods the best and vegetables the least. On the other hand, fathers liked fruits the best and vegetables the least. Father-child pairs had the following food preferences: 6 pairs shared 25-36 food preferences, 20 pairs shared 19-24 food preferences, and 34 pairs shared 0-18 food preferences.

Rozin (1991) examined the correlation of food preferences between college students and their biological parents. A questionnaire about food preferences was administered to both the parents and their child. Answers were based on a 9-point hedonic scale with 0= can not answer, never tried, 1= extremely dislike, to 9=like extremely. Mid-parent-child (mother-father average values) correlations were highest for the category aesthetic preferences ($r = 0.21$) while food preferences were less correlated ($r = 0.16$). Correlations were higher for mother and child ($r = 0.12$) than for father and child($r = 0.12$). Father-daughter correlations were slightly higher for food preferences ($r = 0.13$) than for mother-daughter ($r = 0.11$). Food preferences were more strongly correlated between mother-son ($r = 0.12$) than father-son ($r = 0.07$).

Pliner (1983) looked at the similarities in the food preferences of 105 college aged students and their parents. Students and their parents were given a questionnaire to complete according to their likes and dislikes. The questionnaire consisted of 47 foods to be rated as like extremely, like moderately, like slightly, neither like nor dislike, dislike moderately, dislike extremely. Foods listed were from the following groups: meat, fish, poultry, and eggs; dairy products; vegetables; and cereal and grain products. Results indicate that the students preferences were similar to the preferences of their mothers ($z = .254$, $p < 0.0001$) and fathers ($z = .246$, $p < 0.0001$). Female students had preferences more similar to their mothers ($z = .287$, $p < 0.01$), while male students had more similar preferences with their father ($z = .192$, $p < 0.01$). This study demonstrated family resemblance in food preferences, and indicated that same sex pairs (mother-daughter, father-son) were more similar than opposite sex pairs (mother-son, father-daughter).

Borah-Giddens and Falciglia (1993) used meta-analysis to determine the relationship between parent-child food preferences. Children in this analysis were defined as individuals 25 years old or younger. A total of 13 articles were reviewed and used for the study. The number of foods measured in each of the thirteen studies varied from 5 to 139. Of the13 articles studied, three found a significant resemblance in parent-child food preferences (Logue et al. 1988, Pliner 1983, Pliner and Pelchat 1986) and three others indicated no significant resemblance (Birch 1980, Rozin et al. 1984, Weldner et al. 1985). One article did not indicate whether there was a significant relationship between parent-child food preferences (Burt and Hertzler 1978). Meta-analysis showed that overall there was a significant positive correlation between parent-child pairs. However, this correlation was of a low magnitude.

Other Influences on Food Intake and Food Preference

Many factors influence the diet of children and adolescents. Some of these influences help to ensure a quality diet, while others are harmful resulting in an inadequate intake of nutrients or overeating. Some of these influences include the demographic characteristics of the parents and/or meal planners, as well as the degree of family aggregation (families who live together in the same household) (Patterson 1988). Encouragement, praise, and interaction at the dinner table can strongly influence the food choices children make (Klesges et al. 1983). Parental behavior and body mass index (BMI) have also been associated with the dietary habits and intake of their children (Fisher and Birch 1995). Dieting, binge eating, dining out, parental employment, and knowledge add to the list of factors that can effect diet quality (Hertzler 1983).

Koivisto et al. (1994) examined the influence of parent and child mealtime behaviors on the child's food intake. The children examined in the study ranged from 3 to 7.5 years old. Family meals were videotaped for the evening meal, 7-day weighted food records were taken for the children, and a 7-day food record using household measurements was used to measure food intake for other family members. Only 28 of the 50 families studied had both parents present at evening meals. The child's energy intake was inversely correlated with parental behaviors of offering assistance to the child and to negative statements about the child. The child's intake was positively correlated with the child's behavior of taking food when recommended by the parent. Overall child eating and drinking was inversely related to negative comments from parents.

Klesges et al. (1983) studied the negative and positive effects of parent-child interactions on the food intake and mealtime behaviors of children age 12 to 30 months. The BATMAN (Bob and Tom's Method of Assessing Nutrition) was used to assess the child's eating behavior and the parent's behavior during the evening meal. Signs of encouragement, discouragement, and prompting were observed. There were more maternal prompts to eating than paternal, and verbal encouragement occurred more often than physical encouragement. There was a strong relationship between parental prompts to eat, such as "eat more meat" and "do you want more food", and the child's relative weight. Overweight children received more encouragement to eat, and more offers of food than did children of normal weight.

Fisher and Birch (1995) examined the correlation between high-fat food preferences and fat intake of children 3 to 5 years old. The child's fat intake and fat preferences were then correlated with their parent's obesity. The child's fat intake was measured using weighed food intake data collected during six 30-hour periods. Children's fat preferences were measured by rank order preference for foods served at lunch and dinner on day one. Data collected on the parents consisted of the Three Factor Eating Questionnaire, perception of his or her eating behavior, and self assessed height and weight. Results showed that children's fat preferences were significantly correlated with their percent of fat intake ($r = 0.54$, $p < 0.05$) and parental BMI ($r = 0.75$, $p < 0.01$). Children of heavier parents had a stronger preference for high fat foods than did children of parents with a low BMI.

Nguyen et al. (1996) conducted a study to determine the association between parental obesity and dietary fat intake of their children, and the relationship between

dietary fat intake and body fat in children. Data were collected on macronutrient intake, body composition, and energy expenditure for both parents and children. Results showed that obesity in mothers had an influence on the fat intake of their children. Children with obese mothers had a tendency to consume more energy from fat than children without obese mothers. However, obesity in fathers had a smaller influence on the child's fat intake. Fat intake of children was positively associated with fat mass in boys, but not in girls.

Hertzler (1983) reviewed findings that can contribute to children's food preferences. Familiarity with foods was related to food preferences. Children were familiar with fewer foods than their parents and had fewer likes than their parents. Children who attended day care where they are exposed to different foods tended to be more likely to accept new foods. A child's food acceptance tended to model that of parents or peers. Children were more likely to try foods if they saw their parents or friends eating them. Praise and positive reinforcement by an adult were associated with an increased preference for that food. A child was also more likely to eat a variety of foods if he or she was eating in a happy, relaxed atmosphere. Using food as a discipline or reward was negatively correlated with food preferences. Parents who were more educated about the importance of good nutrition tended to involve the child in the buying, planning, and preparing of meals.

Studies showing the effect of maternal employment on children's diet and family food consumption were reviewed by Johnson et al. (1993). They found that 57% of mothers with children under the age of six were employed.. Some children ate out more often when their mother worked, while others ate more meals at school, daycare, and at

babysitters. Studies comparing the diets of children with and without a working mother showed no difference in diet quality between the two groups.

Neumark-Sztainer et al. (1997) identified various factors that affect dairy product consumption among adolescents. Dairy product consumption, psychosocial, sociodemographic, and personal variables were collected on adolescents between the ages of 12 and 20 years old. Adolescents from a low socioeconomic background had the lowest dairy consumption. Asian Americans had lower consumption of dairy products than African Americans and whites. More overweight females had an inadequate dairy consumption than those who were not overweight. Adolescents with grades of a C or below and whose family was lacking in structure had a lower diary consumption than other adolescents. Dieting and binge eating were also associated with inadequate dairy intake.

The effect of a mother's knowledge and food choice on her child's food intake was examined by Contento et al. (1993). The mother's criteria for choosing foods was rated and then correlated with the child's consumption of that food. Criteria examined included questions such as "How good are these foods for the health of your child" and "How do these foods taste to our child". Questions regarding disease risk and food intake were also asked. Results indicated that a mother's food beliefs influenced what foods she bought for the child. Mothers who felt that health was important to the child bought healthy foods and fed their child a diet that reduced the risk for chronic disease. Mothers who bought foods that they knew their child liked and would eat, may or may not have been buying healthy foods. The diets of children from the health oriented families were of better quality then those of taste oriented families.

Murphy et al. (1995) correlated kindergarten student's food preference and dietary guideline knowledge to their actual food intake. Students were asked questions that pertain to the dietary guidelines such as "Define nutrition", "What are ways people become too fat", and "name some foods with lots of sugar". Students were also asked about their favorite foods, and foods they disliked. Students were asked to name foods they thought were "not good for you" and foods that were "good for you". Most of the students were aware of the meaning of nutrition and variety and how people can become too fat. Students were able to identify foods that are high in fat, sugar, and salt. However the student's food preferences were not correlated with what they knew about the dietary guidelines. Favorite foods included pizza, ice cream, and meats, foods they indicated as "not good for you", while their least favorite foods were vegetables. These results indicate that although kindergarten students know what foods are good and bad for them their preferences do not reflect their knowledge.

Hertzler and Fray (1996) conducted a study among college students to determine how personal and family attributes affect their fat intake. Responses to food and weight concerns, such as frequently trying to lose weight; eating when feeling blue; really like steaks; and eating to build muscle, were significantly related to fat intake. Responses to questions regarding high fat foods, such as really like chocolate; really like ice cream; really like fast food sandwiches/french fries, were significantly related to fat intake. Family attributes such as, family encourages food activities, family involvement on food activities, family criticism of food decisions, and family health and social networks, were scored similarly on factor analysis, but did not have a significant effect on fat intake.

Lin et al. (1996) conducted a study using data from the 1989-91 CSFII/DHKS study to assess the influence of eating away from home on the diets of American children ages 2 to 17 years old. They found that meals consumed away from home had a big impact on a child's diet. Foods eaten away from home had less iron, calcium, and fiber content than those eaten at home. School meals provided a greater percentage of calories, total fat, and saturated fat compared to all other meals eaten away from home. Of the foods consumed at home, morning meals provided the lowest fat while evening meals provided the most. Home foods had a lower fat density than those consumed away from home. The nutrient content of foods consumed away from the home was lower for families whose meal planner did not finish high school, and was highest in families whose meal planner had completed college.

The amount of calcium and milk consumed at breakfast by children 9 to 13 years old was studied by Ortega et al. (1998). The amount of calcium consumed throughout the day was also recorded to see if there was any correlation with breakfast consumption. Ninety-five percent of the children consumed milk products at breakfast. Breakfasts that supplied less than 20% of total energy intake were low in milk products. When breakfast consisted of more than the average milk product consumption more milk was consumed throughout the day as well.

Coates et al. (1985) conducted a study to determine the influence of class and parent involvement, along with a school wide media program on changing the salty snack food consumption of inner city high school students. Classroom instruction consisted of six one-hour sessions as part of the health education curriculum. Parental involvement consisted of phone calls and brochures to make them aware of the program and earn their

support for it. Parents were encouraged to make healthy snacks and to decrease the amount of salty foods available for snacks. Posters, flyers, and announcements were part of the school wide media approach. A posttest at the end of the intervention showed that those students who received the intervention had a lower salty snack consumption than those who did not receive the intervention. A three-month follow up showed that those students who had parent involvement were consuming significantly more target snacks than those without parental involvement. However, classroom participation and parental involvement produced significant changes only in the immediate reduction of salty snack foods and did not affect consumption at post-test conducted six months later.

The diet and nutrient intake of adolescents can be influenced by individuals other than their parents. Magazines that target adolescents can be a source of information for various topics, including diet and health. Korinis et al. (1998) conducted a study to determine if teen and young adult magazines allocated the same amount of coverage to weight loss as they did to calcium needs and intake. In the 128 issues used for this study, 611 articles dealt with calcium or weight loss. Seventy nine percent of these articles were about weight loss. Only 5% of the articles concerning calcium were in teen focused magazines, leaving 95% of these articles in women's magazines. Between the two topics (calcium and weight loss), calcium accounted for 38% of the articles in women's magazines, but only 2% in teen focused magazines.

The *Kellogg* Children's Nutrition Survey was conducted by Harris/Scholastic Research (1989) to assess what America's school children, grades 3 through 12, reported eating. A majority of junior high (61%) and senior high (60%) students felt that they sometimes eat the right kinds of food, while only 27% of junior high students and 39% of

senior high students felt they ate the right kinds of foods very often. Both junior and senior high students felt they have the most influence over what they eat although they report that a parent or guardian prepares the meals at home. Children grades 6 through 12 reported drinking milk only 5.2 days per week. Unsweetened cold cereals were consumed an average of 2.2 days while sweetened cold cereals were only consumed an average of 2.0 days per week. Foods that children reported as being "very nutritious" were not liked as well as foods they reported as "not nutritionally very good". More elementary school children (73%) rated nutrition as very important to them than did junior (45%) and senior high (36%) students. A majority of senior high (86%) and junior high students (74%) felt that most Americans don't eat the right foods.

Knowledge, Attitudes, and Beliefs, and Behaviors Regarding Nutrition

Nutrition knowledge, attitudes, beliefs, and behaviors affect the diets of many Americans. A person's knowledge, attitudes, beliefs, and behavior can have a positive or negative effect on a person's diet, and one factor can heavily influence another. If someone has incorrect knowledge about a certain food or group of foods it could lead them to unhealthy attitudes, beliefs, and especially behaviors. For example if a person does not know about the effects of saturated fat on cardiovascular disease and sources of saturated fatty acids then they may be unaware that they are consuming saturated fat. Their lack of knowledge may influence their beliefs and attitudes; a person who is unaware of the effects of saturated fat on cardiovascular disease may believe they are eating a healthy diet, and therefore have a positive attitude toward their dietary intake. On

the other hand, someone who is knowledgeable about saturated fat may not care about its effects on health and continue to eat saturated fat, or they may try to avoid eating an excessive amount of saturated fat. Each variable is linked to another in some way, but they may not influence one another. By studying individual's knowledge, attitudes, beliefs and their relationship to behavior, we can begin to figure out what has the most influence on a person's diet. This can help with the development of intervention strategies targeted toward unhealthy behaviors.

The Knowledge-attitude-behavior (KAB) model consists of two basic constructs: knowledge effects attitudes and attitude effects behavior. This model assumes that everything is under volitionary control and that an increase in knowledge leads to a more positive attitude which is likely to change dietary behaviors. Some feel there is more to behavior change than what the KAB model explains. Studies have shown that knowledge itself may not play as large of role on behavior change as once thought, while other studies have found no link between knowledge and attitudes. Although there is some association between knowledge, attitudes, and behaviors other factors may be involved such as age and environment (Baranowski 1997).

Knowledge

Morton (1997) conducted a study to compare diet related knowledge among low- and high-income Americans with children living in the household. Data from the 1994 Continuing Survey of Food Intakes by Individuals (CSFII) were used for this study. Low-income respondents were less aware of diet disease relationships than high-income respondents. The percent of low-income respondents aware of any health problems

caused by fiber, calcium, sugar, and being overweight was significantly lower ($p < 0.05$) than the percent of high-income respondents. Only 2% of low-income respondents with children reported the correct number of servings from the bread, cereal, rice, and pasta group as compared to 9% of high-income respondents. Respondents from the lower income group had less overall diet related knowledge than high-income respondents.

Variyam and Smallwood (1996) examined the 1994 CSFII/DHKS study to determine the effect of socio-demographic and economic characteristics on an individual's knowledge about dietary fiber. Structural equation modeling indicated that participation in a nutrition program, black and Hispanic ethnicity, and smoking were associated with a lower level of knowledge about fiber. However, being female, having a high school, college, or postgraduate education, being vegetarian, and having a higher household income were associated with more knowledge about fiber. Overall, these variables were responsible for 37% of variation in knowledge.

Buttriss (1997) conducted a study to determine the starch, fiber, fat, and calcium knowledge of people living in the United Kingdom. Subjects were asked to identify foods that contained starch, fiber, saturated fats, and polyunsaturated fat. Scores to these questions were based on the number of respondents who incorrectly identified at least one half of the foods in each group. Thirty-five percent of respondents age 18-24 were incorrect about fiber containing products, 84% were wrong about starch containing products. The percent of people who identified whole milk as a source of calcium decreased from 1992 to 1995 However, the percent of people who identified skim milk, cheese, eggs, fish, butter, vegetables, bread, meat, and beans as a source of calcium

increased over the years. The number of people who correctly identify foods containing iron increased for all foods from 1992 to 1995.

A study conducted by Contento et al. (1993) looked at the relationship between a mother's food knowledge and the food consumption of her children. The mother's knowledge was based on her beliefs about 17 foods. Healthful knowledge was significantly higher for mothers who selected food for their child based on health (84 $\pm$ 8%) than mothers who selected foods based on the child's taste preference (80 $\pm$ 11%). Heart disease knowledge was significantly higher among mothers who selected food based on health ($p < 0.05$, 58 $\pm$ 20%) than mothers who selected food based on taste (51 $\pm$ 20%).

Kapil et al. (1991) conducted a study to determine the nutrition-related knowledge of pregnant and lactating adolescents. Ninety one percent of the girls were aware that low iron intake was a cause of anemia in mothers and children, but only 64% were aware that cooking in an iron vessel increases the iron content of the food. Forty nine percent of the girls thought that fruits were rich sources of calories and protein, and 38% thought green leafy vegetables were good sources of calories. Ninety percent were aware that vitamin A deficiency causes night blindness. A majority of the girls were knowledgeable about their own nutritional needs, but there were some gaps in their knowledge about the nutrition needs of their baby. Twenty percent thought that a lactating mother did not need any more food than a pregnant mother and 14% thought that a mother should eat less in the third trimester so that her baby would be small for delivery.

Reid et al. (1996) conducted a study to determine Canadian's awareness of dietary terms. Data were gathered by the National Institute of Nutrition (NIN) and its partners to

identify changes from 1989 to 1994. Knowledge of dietary terms did not increase with the exception of blood cholesterol. The percent of people who knew what dietary cholesterol, fish oil, polyunsaturated fat and monounsaturated fat meant decreased from 1989 to 1994. Knowledge about what saturated fat means stayed the same over the years.

Shephard and Stockley (1987) conducted a study to determine if nutrition knowledge had an effect on attitudes and behaviors of those living in the United Kingdom. The study was conducted using the Fishbein and Ajzen model to show the correlation between knowledge, attitudes, and behavior. Knowledge questions asked about the fiber and fat content of certain foods, and about the average calorie intake of a man. The average nutrition knowledge score was 8.6 out of a possible 10. Nutritional knowledge had a low correlation with subjective norm ($r = 0.04$) and did not correlate attitude with behavior ($r = 0.01$). Overall, there was not a significant correlation between knowledge and attitude or behavior.

Brook and Tepper (1996) conducted a survey to determine high school student's knowledge regarding food and nutrition. Students were asked knowledge questions regarding protein, sugar, fat, cholesterol, vitamins, iron, and calories. Students answered half of the knowledge questions correctly. The average knowledge score was 47.6 ± 14.6 out of a possible 100.

Beliefs About Nutrition

Lloyd et al. (1992) examined the nutrition beliefs of individuals in the United Kingdom. Participants completed a questionnaire to determine their beliefs regarding changing to a low fat diet. Subjects believed that they were more likely to make a change

if it is a healthy change and economical. They believed they were less likely to make the change if it decreased the taste of a meal and reduced the protein intake. Based on a food frequency questionnaire, subjects were classified as having a low, medium, or high fat diet. When asked how they felt about the content of their diet all three categories of subjects believed their diet was low in fat. Regardless of the fat content of their diet, all individuals believed that their diet was healthy, and that what they ate affected their health.

Stafleu et al. (1995) looked at the familial resemblance in beliefs toward food consumption. This study was conducted among three generations of women: young children, their mothers, and their grandmothers, living in low-income areas of southern Netherlands. Respondents indicated whether they believed the food was "thinning", "tasty", "expensive", "convenient", "causes heart disease", or "prevents bone demineralization". Results showed that there were significant differences among generations and families concerning beliefs about a majority of the foods. There was a significant difference ($p < 0.05$) between generations for beliefs about margarine, chicken, fish, smoked beef, raw ham, cheese, whole milk, yogurt, cake, and biscuits. There was a significant difference ($p < 0.05$) between generations for oil, pork, beef, raw ham, liver sausage, cheese, custard, cake, and biscuits. There was a greater resemblance in beliefs between mothers-grandmothers than mothers-children. There was no resemblance between children and grandmothers.

Buttriss (1997) conducted a study in the United Kingdom to determine the nutrition beliefs about diet. Twenty one percent of people believed they were well

informed about healthy eating, and 59% believed they were fairly well informed. Women were more likely to feel informed than men.

Morton et al. (1997) looked at the nutrition beliefs of low and high-income individuals with children in the household. There was no significant difference in beliefs between the high and low-income respondents. Only 35% of low-income and 33% of hig-income respondents believed it was important to choose a diet with plenty of breads, cereals, rice, and pasta. Forty four percent of low-income and 40% of high-income respondents believed it was important to eat at least two servings of dairy products daily. A higher percentage of high-income respondents had a stronger belief in the importance of following most dietary guidelines except for guidelines concerning grain intake, dairy intake, and a low cholesterol intake.

Attitudes Toward Nutrition

Lloyd et al. (1993) conducted a study in the United Kingdom to examine the attitudes of individuals toward changing to a low fat diet. Attitude scores ranged from a −3 to +3, with a more positive score indicating a more favorable attitude toward making the change. Attitude was significantly correlated with the intention to change to reduced fat milk ($F = 2.0$, $p < 0.05$) as well as increasing fruit and vegetable intake ($F = 2.8$, $p < 0.05$). Other attitudes such as reducing cakes and cookies, fried foods, butter and margarine, red meat, and meat products along with increasing bread and potatoes and using reduced fat products were not significant factors for dietary change.

Morton et al. (1997) looked at nutrition related attitudes of low and high-income respondents with children in the household. This study examined the respondent's

attitude toward the importance of nutrition, safety, taste, food preservations, price, and ease of preparation. Ease of preparation was the only variable rated at a lower importance than nutrition by both income levels. High-income respondents felt that the importance of price and food preservation were of less importance than nutrition. Safety and taste were attributes that were considered more important than nutrition for both income groups. There was a significant difference in the attitudes of low and high-income respondents toward food preservation and price ($p < 0.05$). Only 53% of high-income respondents felt food preservation was important while 75% of low-income respondents rated it as important. Thirty six percent of high-income respondents were concerned about price, while 71% of low-income respondents rated it as important.

Stafleu et al. (1995) looked at the family resemblance in attitudes toward certain foods. The study was conducted among three generations of women living in Southern Netherlands. Two attitude questions were asked for 20 different foods. Respondents were asked if they "liked eating the food", and rated whether "eating the food was very good to very bad". Liking attitudes between generations were significantly different ($p < 0.05$) for butter, margarine, smoked beef, raw ham, cheese, whole milk, and skimmed yogurt. The liking attitudes between families were also significant ($p < 0.05$) for butter, margarine, oil, pork, beef, chicken, smoked beef, egg, whole yogurt, and custard. Attitudes toward certain foods being good or bad to eat showed significant differences both between generations and between families. Attitudes in the child-mother generation had a greater number of differences than the mother-grandmother and the child-grandmother. There were very few attitude differences between the older-younger generations.

Buttriss (1997) examined the nutrition attitudes of individuals in the United Kingdom. Questions regarding fat, fiber, sugar, salt, starchy foods, and cooking methods were asked. Using less salt and sugar, eating less fat, grilling instead of frying, and eating more fiber were very important to a majority of respondents. Overall, eating more fiber was rated as most important, and very little importance was attached to eating more starchy foods.

Brook and Tepper (1996) looked at high school student's attitudes toward obesity. Out of 20 possible points the students' attitude score toward obesity was 3.2 ± 1.7. Ninety one percent believed obesity was a risk factor for poor health. Students who participated in sports had a more negative attitude toward obesity than other students. A negative attitude toward obesity was more prevalent among boys than girls.

The 1994-96 CSFII/DHKS data were used by Variyam et al. (1996) to determine if there was any relationship between socio-economic and demographic characteristics and nutrition attitudes. Overall, socio-economic and demographic characteristics were responsible for only 5% of the variation in their attitudes. Living in the south, being involved in food assistance programs, being black or Hispanic, being a smoker, and household income all had a negative effect on attitudes.

Reid et al. (1996) conducted a study among Canadians to determine changes in attitude toward nutrition between the years 1989 to 1994. There was a significant difference in the number of respondents who felt nutrition was important. Only 59% felt it was important in 1989 versus 66% ($p < 0.05$) in 1994. There was a significant increase in the number of respondents who were very concerned about fat, chemical residues in food, cholesterol, calcium, and calories. Those who are very concerned about calcium

increased from 28% to 36%, while those concerned about calorie intake increased from 26% to 32%.

Nutrition Behavior

Morton et al. (1997) examined the 1994 CSFII/DHKS data to determine dietary practices of low-income versus high-income respondents with children. The use of food labels and frequency of selected eating habits were characteristics examined among low and high-income respondents. High-income respondents with children were significantly more likely to use food labels (71%) than low-income respondents with children (59%). Low-income respondents were significantly more likely to check for vitamins and minerals (73%) than high-income respondents (62%). Significantly fewer low-income respondents reported eating low fat lunch meats instead regular lunch meat and skim milk instead of 2% or whole milk ($p < 0.05$). Low-income respondents reported eating more fried chicken, chips, and eggs than high-income respondents.

Reid et al. (1996) used data collected from the National Institute of Nutrition to determine the reported dietary actions of Canadians. Canadian respondents were asked which actions they had taken to eat well, and main actions taken due to concern about fat, cholesterol, and fiber. When data were compared to the same study conducted in 1989 there were significantly more respondents in 1994 who bought/ate lower fat products, trimmed fat off meat, used less butter/margarine, exercised/watched weight, ate more bran/high fiber cereals and muffins, and ate more whole grain breads, and fruits and vegetables.

Shephard and Stockley (1987) used the Fishbein and Ajzen model to determine if nutrition knowledge about high fat foods predicted behavior. This study was conducted with 210 individuals residing in the United Kingdom. The Fishbein and Ajzen model looked at the effect nutrition knowledge had on attitude to behavior and subjective norm. The variables were then correlated with behavioral intention. Respondents were asked behavior questions regarding their frequency of consumption of meats, meat products, butter, margarine, and milk. Results showed that attitudes to behavior and subjective norm combined were strongly related to behavioral intention ($R = 0.69$). T-tests showed that men had a higher behavioral intention than women ($p < 0.001$).

Contento et al. (1993) looked at the relationship between a mother's food choice criteria and the food consumption of her preschool children. Mother's food choice criteria was grouped into 10 categories based on why the mother chose that food for her child. Child dietary intakes were measured using the Willet FFQ and 24-hour recall. Results showed that parents who bought foods because they were healthy had children who ate less calories, total fat, saturated fat, and more vitamin A than those whose parents bought foods based on taste.

Stafleu et al. (1995) conducted a study among three generations of women not living together to determine their intention toward eating certain foods. There was a significant difference between the younger and middle generation in the intention to consume butter, margarine, pork, chicken, egg, whole yogurt, custard, and cake and biscuits (cookies). There were significant differences between the middle and old generations in intentions to consume butter, pork, chicken, fish, smoked beef, raw ham,

whole yogurt, and custard. There were no significant intention differences between the young and older generations.

These studies found that parent's nutrient intake is similar to their child's nutrient intake through family aggregation. However, most of these studies have been limited to similarities in macronutrient intake rather than intake of vitamins and minerals such as calcium, iron, and folate. These studies also looked at the effect of one's knowledge, attitude, beliefs, and behaviors on his or her nutrient intake. However, little is known about the effect of parent's knowledge, attitude, belief, and behaviors on their child's nutrient intake. Therefore, the purposes of our study were to determine 1) the correlation between nutrient intake of parent's and their children; 2) the relationship between parent's knowledge and their child's nutrient intake; 3) the relationship between parent's attitude toward nutrition and their child's nutrient intake; 4) the relationship between parent's nutrition beliefs and their child's nutrient intake; 5) the relationship between a parent's demographic characteristics and their child's nutrient intake; and 6) whether the parent's nutrient intake and food group score will mediate the relationship between parent's demographic characteristics and the child's food group score and nutrient intake.

CHAPTER III

METHODOLOGY

The sampling procedure for the data collected on the 1994-96 CSFII/DHKS was designed by Westat Inc., a firm from Rockville, MD. The sampling design was a stratified multi-stage area probability sample (Westat 1995) which takes into account the geographic location, degree of urbanization, and socioeconomic characteristics. This allowed for nationally representative samples of non-institutionalized persons in the U.S. defined by sex, age, and income level. The U.S. was divided into 1,404 primary sampling units (PSU'S) of at least 15,000 people. Sixty-two PSU's were randomly chosen for data collection.

Each of the 62 PSU's were further divided into 36 segments consisting of blocks or groups of blocks. Thirty-six segments were randomly selected for sampling during each of the 3 years of the study. Addresses of the dwelling units within the areas were collected. Address sites were screened to determine the appropriate number of sample persons in each sex-age group. In order to obtain the appropriate number of people for each group the screening questionnaire specified the characteristics of the person who could be included in the study. DHKS respondents were selected from subjects 20 years of age or older who participated in the first CSFII interview. Only one DHKS respondent was allowed per household.

This was the first CSFII/DHKS study done using Spanish language questionnaires and bilingual English/Spanish interviewers.

CSFII Data Collection

Prior to data collection each address selected was visited to make sure the address was a dwelling unit. Each house was sent a brochure and was contacted by phone. Any member of the household age 18 and over was eligible for the screening interview, used to determine how many eligible parties reside in the house, however the meal planner/preparer or person most familiar with the family was preferred. During the screening, information was collected about the number of persons in the household, race, ethnicity, date of birth, age, sex, and relationship to screened individual of all persons living in the household. A household questionnaire was administered to homes with one or more CSFII participants. The questionnaire included questions relating education level, employment status, household income, food assistance program participation, food expenditure and other food related practices.

Each person was involved in one or two in-person interviews. Both interviews included a dietary recall from midnight to midnight. After the recall the interviewer asked probing questions to collect detailed information on all foods and ingredients used in mixed dishes. Measuring cups and pictures were used to obtain an accurate serving size. Each drink/food was recorded. Additional questions were asked about amount for water consumed, amount of television watched, salt use, dietary practices, supplementation use, medical conditions, and consumption frequency of 28 foods.

Children under the age of 6 and other sample persons who were not capable of reporting a dietary recall themselves were completed by proxy interviews. The dietary

recalls were completed by a knowledgeable adult, preferably the person who prepared the meals.

DHKS Data Collection

Data for the DHKS were collected as a follow up to the CSFII 2 to 3 weeks after the second in-person interview. DHKS participants were randomly selected from eligible respondents, age 20 years and older, who completed the first and second CSFII interview. The selected people were informed of their selection and mailed a reminder card 3 to 5 days before the interview. The reminder card included response categories appropriate for the questionnaire. Interviews were conducted over the phone or in person if no phone was available in the home. DHKS data collection included questions pertaining to self perception of adequate nutrient intake, diet-health relationships, importance of dietary guidelines, food safety and fat intake behavior, knowledge about fat and cholesterol food sources, and self perceptions of weight status. Food label reading and use was also included.

Survey Nutrient Data Base

CSFII data were processed using Survey Net, a computer assisted food coding program, developed by Agricultural Research Service and tailored for CSFII. Survey Net allowed interviewers to enter foods from both dietary records and their weight in grams. Survey Net also included a predefined recipe database, and a nutrient database. The Food coding database contained 7,300 foods, a complete description of the foods, and a

preparation method if relevant. Foods were entered in common household measurements and calculated for their nutritive value. A recipe modification of the predefined recipes was used to delete or substitute ingredients used. Modifications were important for recording the type of fat, milk and food dilution used in preparing recipes. The food coding data used for the 1989-91 CSFII was expanded to include food such as vegetables, infant formula and baby foods, margarine, butter, spreads, ethnic foods, fast foods, and homemade soups.

Study Data Collection

This study will use information collected from adolescents, between the ages of 12 and 19 who completed two CSFII 24-hour dietary recalls and parents who completed both days of the CSFII and the DHKS survey. Variables to be looked at for this study will include parent's demographic characteristics, nutrition knowledge, beliefs and attitudes about nutrition, as well as food group choices, and nutrient intake of parent-adolescent pairs.

There were 816 individuals or 408 pairs who met the qualifications for this study Parents under the age of 60 and adolescents between the ages 12 – 19 were included in the study. For families with more than one child between the ages of 12 – 19, a child was randomly selected using a random number table. The adolescent's last digit in the age was used for the random selection. Data obtained by the CSFII/DHKS study were weighted by sex, age, and income level to compensate for non-response rates, deficiencies in sampling frame, and variable probabilities of selection. Weights were

provided for both parents and children. Since the current study focuses on the dietary habits of children, statistics were computed using the weight of the children.

Information concerning parent's nutrition knowledge, attitudes, beliefs, and behaviors was found in the DHKS survey. The DHKS survey consists of 42 diet and health knowledge questions concerning knowledge, attitude, behaviors and beliefs. Ten nutritionist, registered dietitians and a social science researcher were sent a copy of the DHKS survey and asked to decide which questions were pertinent to this study and to categorize them into knowledge, attitudes, beliefs, or behavior questions. Definitions of knowledge, attitudes, beliefs, and behaviors accompanied the questionnaire. Of these 42 questions 15 were selected to be used in the study. A question was considered to fall into one of the categories (e.g. attitudes) only if the majority of respondents selected that category.

Demographics

Demographic characteristics were collected on individuals during the CSFII screening interview. The variables to be considered in this study are race/origin, education, employment, gender, age, and income. These variables influence a person's environment and have been shown by other researchers to have an impact on dietary intake. Education level for the last grade completed was self reported by respondents fifteen years and older. Income was based on a percentage of poverty threshold and categorized into three categories: 0-130% of the poverty threshold, 131-350% of the poverty threshold, and over 350% of the poverty threshold. Race was categorized as white, black, and other. Origin was classified as Hispanic and Non Hispanic.

Nutrition Knowledge

Nutrition knowledge is defined as use of the mind, intellectual ability, rational learning (e.g. recalling, remembering, and recognizing). (Chamberlain VM, Creative Home Economics Instruction. 3rd Edition 1992. MacMillan/McGraw-Hill. Peoria, IL. pg.18). Ten questions were determined to be knowledge questions. Nutrition knowledge will be scored using the USDA national nutrient database to determine the correct answers to the questions. An example of a nutrition question is Question 9c: Which has more fat: hot dog or ham? A knowledge score, out of a total of 43 possible points, will be calculated for each individual based on the number of correct responses. This knowledge score was used to examine the relationship between a parent's nutrition knowledge and their child's dietary intake through correlation analysis.

Attitudes

Attitudes have been defined as "A learned predisposition to respond in a specific way, negative or positive toward people, ideas, or situation. (Haber and Runyon 1974). The two attitude questions were scored on a 4-point scale, with 2.5 being a neutral score. The more positive the attitude the higher the score with 4 being the highest, and one being the lowest or more negative attitude. Path analysis was used to examine the direct and indirect effect of parent's attitude on the parent's food group score and nutrient intake. Path analysis also examined the indirect effect of parent's attitude on their adolescent's food group score and nutrient intake. Total scores were calculated for each individual (by summing) and compared to their child's dietary intake through correlation analysis. An example of an attitude question 4a: how important is it to use salt or sodium

in moderation? Very important, somewhat important, not too important, not at all important, don't know.

Beliefs

Beliefs are defined as "Perception of factual matters, of what is true or false or the cognitive aspects of attitudes" (Crider et al. 1989, Parraga 1990). The three questions determined to be measuring a person's beliefs were scored on a 4-point scale. The more positive the belief the higher the score with 4 being the highest, and one being the lowest or more negative belief. Question 2 was based on a 4-point scale, however scores for questions 2 c, d, and e were flipped to make a score of 4 be a positive statement and a score of 1 be a negative statement. Question 3 was based on a 3-point scale, and also had to have scores flipped to make a score of 3 a positive statement about one's own diet while a score of 1 is a negative, or bad perception, of one's diet. Path analysis was used to examine the direct and indirect effects of parent's beliefs on parent's food group score and nutrient intake. Path analysis was also used to determine the effect of parent's beliefs on their adolescent's food group score and nutrient intake. Total scores were calculated for each individual and compared to their child's dietary intake through correlation analysis. An example of a belief question is question 2b: Eating a variety of foods each day probably gives you all the vitamins and minerals you need. Strongly agree, somewhat agree, somewhat disagree, strongly disagree.

Food Group Score

The food group score was a score created using the Healthy Eating Index (HEI) to measure the number of servings the respondents consumed from each food group. This information was collected from the respondent's two 24-hour dietary recall: The food group portion of the Healthy Eating Index (HEI) was used to score the respondents food choice (USDA, 1995). This part of the HEI is based on a score of 50 points. Each of the five food groups, milk, meat, vegetable, fruit, and grains, has a maximum of 10 points possible. Points are given according to how close the respondent was to consuming the proper number of servings in that food group. The maximum number of points is given only if the respondent met the recommended number of servings. For example, the suggested number of grain servings is 6 per day. If the respondent consumed 6 servings he/she received 10 points. If the respondent only consumed three servings than he/she earned only 5 points.

Nutrient Intake

The nutrient intake of the parents was examined for their calcium, iron, folate, and energy consumption. Data were collected from the foods reported in the average of the respondent's two 24-hour recalls. These findings were compared to their child's calcium, iron, folate, and energy consumption based on the child's two 24-hour recalls.

Hypotheses

Hypothesis One: There will be a positive correlation between energy intake of the parent and the energy intake of their child.

There will be a positive correlation between calcium intake of the parent and the calcium intake of their child.

There will be a positive correlation between folate intake of the parent and the folate intake of their child.

There will be a positive correlation between iron intake of the parent and the iron intake of their child.

Statistical analysis: Pearson correlation coefficient

Hypothesis Two: Parents who have a higher nutrition knowledge score will have children who have a higher dietary calcium intake.

Parents who have a higher nutrition knowledge score will have children with a higher dietary folate intake

Parents who have a higher nutrition knowledge score will have children with a higher dietary iron intake.

Parents who have a higher nutrition knowledge score will have children with a higher energy intake.

Statistical analysis: Pearson correlation coefficient

Hypothesis Three: There will be a positive correlation between parent's attitude toward nutrition and their child's dietary calcium intake

There will be a positive correlation between parent's attitude toward nutrition and their child's dietary folate intake

There will be a positive correlation between parent's attitude toward nutrition and their child's dietary iron intake

There will be a positive correlation between parent's attitude toward nutrition and their child's energy intake.

Statistical analysis: Pearson correlation coefficient

Hypothesis Four: There will be a positive correlation between a parent's nutrition beliefs and their child's dietary calcium intake.

There will be a positive correlation between a parent's nutrition beliefs and their child's dietary folate intake

There will be a positive correlation between a parent's nutrition beliefs and their child's dietary intake

There will be a positive correlation between a parent's nutrition beliefs and their child's energy intake

Statistical analysis: Pearson correlation coefficient

Hypothesis Five: There will be a relationship between a parent's demographic characteristics (income, race/origin, education, employment, sex, and age) and their child's dietary calcium intake.

There will be a relationship between a parent's demographic characteristics (income, race/origin, education, employment, sex, and age) and their child's dietary folate intake.

There will be a relationship between a parent's demographic characteristics (income, race/origin, education, employment, sex, and age) and their child's dietary iron intake.

There will be a relationship between a parent's demographic characteristics (income, race/origin, education, employment, sex, and age) and their child's energy intake.

Statistical Analysis: Pearson correlation coefficient for education, age and income; analysis of variance for race and employment; t_test for variables sex and origin

Hypothesis Six: Parents with a higher food group score will have children who have a higher dietary calcium intake.

Parents with a higher food group score will have children who have higher dietary folate intake.

Parents with a higher food group score will have children who have a higher dietary iron intake.

Parents with a higher food group score will have children who have a higher energy intake.

Statistical analysis: Pearson correlation coefficient

Hypothesis Seven: The parents nutrient intake and food group choices will mediate the relationship between parent's demographic characteristics and the child's food choices and nutrient intake.

The parents nutrient intake and food group choices will mediate the relationship between parent's nutrition knowledge and the child's food choices and nutrient intake.

The parents nutrient intake and food group choices will mediate the relationship between parent's nutrition beliefs and the child's food choices and nutrient intake.

The parents nutrient intake and food group choices will mediate the relationship between parent's nutrition attitudes and the child's food choices and nutrient intake.

Statistical analysis: Path analysis

CHAPTER IV

RESULTS

Out of 1,879 respondents who participated in the 1994-96 CSFII/DHKS and had completed two 24-hour recalls and the DHKS study, there were only 408 parents who had children between the ages of 12 to 19 years old. A total of 816 respondents (408 parent-child pairs) were used for this study. Tables 3 and 4 give the demographic characteristics for this population. There were more male parents than female parents, while the opposite was true for children. The majority of respondents were white and non-Hispanic. The average household size was 3.9 ± 1.3. The average age of the parents was 42.6 ± 6.2 and the average years of school was 13.5 ± 2.6. Twenty four percent of the households reported income less than 130% of the poverty threshold, 41.8% reported being within the 131-350 % of the poverty threshold, and 33.7% reported being over 350% of the poverty threshold.

The majority of parents were employed full time as professionals or technicians, managers or proprietors, or craftsman or foreman. The majority of parent respondents planned the meals, shopped for food, and prepared the meals. Of the children only 6.1% planned meals, 5.6% shopped for food, and 10.0% prepared meals.

Nutrient Intake

Table 5 shows parent and child nutrient intakes. The average energy intake,

expressed as kcal, was 2003 ± 766 for parents and 2286 ± 866 for children. Average calcium intake was higher for children (960 ± 536 mg) than for parents (700 ± 382 mg). Folate intake for children was slightly higher for children (269 ± 167 μg) than for parents (244 ± 144 μg). Iron intakes of children (16.6 ± 8.6 mg) were higher than those of parents (14.7 ± 7.4 mg). Nutrient intake of parent-child pairs was significantly correlated for calcium ($r = .272$, $p \leq 0.01$), iron ($r = .217$, $p \leq 0.01$), folate ($r = .264$, $p \leq 0.01$), and energy ($r = .239$, $p \leq 0.01$).

Food and food group intake for both parents and children is presented in table 6. Children consumed more grains, fruit, milk, nuts and seeds, and sugar. Parents consumed more vegetables, meat, eggs, legumes, fat, and alcoholic and non-alcoholic beverages.

The number of servings for each food group, consumed by parents and children is presented in table 7. Food group servings are broken down into subgroups. Children consumed more grains (7.81 ± 3.56 servings) than parents (6.52 ± 3.32 servings). For both parents and children the majority of grains came from non-whole grains. Total vegetable consumption was slightly higher for parents (3.59 ± 2.00 servings) than for children (3.23 ± 2.27 servings). The vegetable consumed most by both parents and children was white potatoes followed by other vegetables, tomatoes, legumes, starchy vegetables, dark green leafy vegetables, and deep-yellow vegetables. Fruit consumption was similar between parents (1.27 ± 1.64 servings) and children (1.31 ± 1.99 servings). Dairy consumption was higher among children (2.03 ±1.56 servings) than parents (1.2 ± 1.1 servings). Milk was the most common dairy product consumed for both parents and children. Parents consumed more meat (4.77 ± 2.80 ounces) than did children (4.11 ± 2.58 ounces). Red meats were consumed most by both parents and children followed by

poultry, frankfurters, sausage, and lunchmeats. Very little soy, organ meats, or nuts or seeds were consumed. Children consumed more discretionary fat and sugar than did parents.

Food group (HEI) scores are presented in Table 8. An overall score of 50 points was possible, with 10 points possible from each of the 5 food groups. Total food group score was the same for parents and children (35.8 ± 7.6). The HEI score was higher for children for the fruit and grain groups. Parents had a higher score for the meat and vegetable group. Parents and children had the same score for the milk group.

Pearson correlation was used to examine the correlation between parent's food group score and their adolescent's calcium, iron, folate, and energy intake. Parent's food group score was significantly related to their adolescent's calcium ($r = .215$, $p \leq 0.01$), iron ($r = .189$, $p \leq 0.01$), folate ($r = .209$, $p \leq 0.209$), and energy ($r = .160$, $p \leq 0.01$) intake.

Knowledge, Attitudes, and Beliefs

Parents' scores for knowledge, attitude, and belief questions are given in Table 9. The average score for knowledge questions was 21.6 ± 4.9 out of a possible 43 points. The average attitude score was 57.8 ± 6.2 out of a possible 68 points, which indicates that a majority of respondents had a positive attitude toward their diet and dietary choices. The average belief score was 45.3 ± 6.3 out of a total of 64 points, showing that respondent's beliefs toward their diet and dietary habits were more positive than negative.

Parent's knowledge, attitude, and beliefs were correlated to their adolescent's calcium, iron, folate, and energy intake. The only significant correlation was between parent's knowledge and their adolescent's calcium ($r = .156$, $p \leq 0.05$), iron ($r = .146$, $p \leq 0.01$), and folate ($r = .156$, $p \leq 0.01$) intake. No other significant correlations were found.

Respondent's knowledge about fat is given in Table 10. When given two foods and asked to choose which has more fat, 82% of respondents correctly identified hamburger as having more fat than ground round, while 68% of respondents correctly identified pork spare ribs as having more fat than loin pork chops. Only 59% of respondents were aware that hot dogs contained more fat than ham. Eighty-six percent of respondents correctly identified peanuts as having more fat than popcorn, and sour cream as having more fat than yogurt, but only 43% correctly identified a porterhouse as having more fat than a round steak.

Parents had an easier time identifying products that contained more saturated fat than they did identifying products with specific types of fat (Table 11). Sixty-six percent of respondents correctly identified a T-bone steak as having more saturated fat than liver. Seventy-three percent of respondents identified butter as having more saturated fat than margarine, and 74% of respondents identified egg yolks as having more saturated fat than egg whites. Ninety-five percent of respondents knew whole milk contained more saturated fat than skim milk. Participants were asked about their knowledge on fat and cholesterol (Table 12). Only 37% or respondents knew that cholesterol was found only in animal products. Fifty-one percent of the respondents knew that if a food has no cholesterol it could be either high or low in saturated fat, and 47% knew that a product

labeled as containing only vegetable oil could be either high or low in saturated fat. Forty percent of respondents knew that a product labeled "Light" could be low in fat and/or cholesterol.

Participants were asked to identify any health problems they thought were associated with a particular eating behavior (Table 13). Atherosclerosis was the most commonly identified problem associated with eating too much fat, cholesterol, and being overweight. Respondents had heard of problems associated with not eating enough fiber, but most were unable to correctly identify these problems. Respondents identified hypertension as the most frequently noted problem identified with eating too much salt. A majority of respondents had heard of bone problems being associated with a low calcium intake, but very few respondents identified cavities as being a problem with consuming too much sugar.

Table 14 shows the percent of parents who correctly identified serving recommendations for each of the food groups. Fifty-nine percent of respondents correctly identified that 2 to 3 servings from the fruit group are needed daily, and 57% of participants knew that 2 to 3 servings were needed daily from the milk, cheese, and yogurt group. Sixty-two percent of respondents correctly identified that 2 to 3 daily servings are needed from the meat, poultry, fish, beans, and nuts group; and only 47% correctly identified that 3 to 5 servings are needed daily from the vegetable group. Only 3% of respondents correctly identified that 6 to 11 servings are needed daily from the bread, cereal, rice, and pasta group.

Respondents were asked attitude questions to rate factors that affect their food purchasing habits (Table 15), a score of 1 was not at all important and a score of 4 was

very important. Taste was considered to be most important with an average score of 3.82 ± 0.42. How safe the food was to eat was of next important with an average score of 3.81 ± 0.50. Nutrition had an average score of 3.54 ± 0.63, followed by how well the food keeps with an average score of 3.45 ± 0.76. Price was less important with an average score of 3.36 ± 0.75, while ease of preparation was of least importance with an average score of 3.09 ± 0.83.

Parent's attitudes toward dietary guidelines are shown in Table 16. Scores ranged from 1 (not at all important) to 4 (very important). Choosing a diet with plenty of fruits and vegetables was most important with an average score of 3.67 ± 0.65 followed by maintaining a healthy weight with an average score of 3.66 ± 0.61. Of least importance was choosing a diet with plenty of breads, cereal, rice and pasta with an average score of 3.01 ± 0.80, and eating at least two servings of dairy products with an average score of 3.02 ± 0.84. Eating a variety of foods, choosing a diet low in fat and saturated fat, eating enough fiber, and using salt and sugar in moderately were all listed as relatively important (3.48 ± 0.72 to 3.26 ± 0.80).

Participants were asked how healthy they felt their diet was by ranking nutrient intake from 1 (not good) to 3 (good). These results are shown in Table 17. Participants felt their diet was most healthy in regard to their protein intake with an average score of 2.56 ± 0.76 and fiber intake with an average score of 2.44 ± 0.65. Participants felt their diet was less healthy in regards to their fat intake with an average score of 1.76 ± 0.93 and saturated fat with an average score of 1.94 ± 0.96. Calories, salt, iron, vitamin C, sugar, cholesterol, and calcium were all rated above a score of 2 (2.34 ± 0.66 to 2.04 ± 0.97).

Parents were asked their self-perception of weight status (Table 18). A total of 213 respondents felt they were overweight and only 18 felt they were underweight. There were 177 respondents who felt they were at an adequate weight.

Table 19 shows responses to belief questions regarding how respondents felt about food choices and health status. Scores ranged from 1 (strongly disagree) to 4 (strongly agree). Respondents strongly agreed that what you eat can make a difference in your chance for getting a disease with an average score of 3.44 ± 0.79. Respondents agreed that choosing a healthy diet is just a matter of knowing what foods are good and bad with an average score of 3.19 ± 0.84. Respondents agreed that eating a variety of foods probably gives you all the vitamins and minerals you need with an average score of 2.96 ± 0.89. Respondents had more neutral beliefs about statements that some people are born to be fat or thin (2.74 ± 0.98), that starchy foods make people fat (2.74 ± 0.10) and that the things they eat and drink now are healthy (2.43 ± 0.86). Respondents disagreed that there are too many recommendations about what to eat making it hard to what to believe, with an average score of 1.85 ± 0.86.

Demographics and Intake

The influence of parent's gender and origin on their child's calcium, iron, folate and energy intake was examined using t-test. No significant relation was found between parent's gender or origin and their child's nutrient intake.

Analysis of variance examined the impact of parent's employee status on their child's calcium, iron, folate, and energy intake. No significant relation was found between parent's employment status and their child's nutrient intake.

The effect of parent's race on their child's calcium, iron, folate, and energy intake was examined using analysis of variance. Results showed that children with non-white parents had significantly lower calcium intakes (807.4 ± 411.8 mg) than children with white parents (1004.1 ± 566.1 mg). No other significant relations were found between parent's race and child's nutrient intake.

Relationship Among Variables

Path analysis using structural equation modeling (LISREL) was used to test a theoretical model (Figure 1). The original model was created to determine the relation among parent's demographic characteristics, knowledge, attitude, and beliefs and their nutrient intake and food group score. The relation among parents nutrient intake and food group score and their child's nutrient intake and food group score was also examined. Four path analyses were conducted to test how well the model fit the data for each nutrient (calcium, iron, folate, and energy). All four nutrient models had non-significant X^2 and normative fit index (NFI) of 0.97 indicating that the models fit the actual data very well (Table 20).

The theoretical model was fitted for all four models. Paths with t-values less than 1.00 were trimmed to create individual models. Figures 2, 3, 4, and 5 show the trimmed models for individual nutrients.

Calcium Model

The calcium model explained 38% of the variation in the adolescent's calcium intake. Table 21 presents the bivariate correlation matrix for the calcium model. Parent's knowledge, belief, and income had significant direct effects on their food group score (Table 22 and Figure 2). Parent's attitude and education had significant negative direct effects on their calcium intake. Parent's race had a significant positive direct effect on their calcium intake. Parent's food group score had a significant direct effect on both their calcium intake and their child's calcium intake. Parent's food group score also had a significant direct effect on their child's food group score. Parent's calcium intake had a significant direct effect on their child's calcium intake. The child's food group score also had a significant direct effect on the child's calcium intake.

Parent's knowledge and income showed significant indirect effects on their child's calcium intake and food group score. Parent's attitude had a significant negative indirect effect on their child's calcium intake. Parent's race and food group score had a significant indirect effect on their child's calcium intake.

These results show that parent's knowledge, attitude, belief, grade, income, and race had an effect on their calcium intake and food group score, which in turn influenced their child's calcium intake and food group score. This also shows that a child's calcium intake and food group score reflects their parent's.

Iron Model

The iron model explained 27% of the variation in the adolescent's iron intake. Table 23 presents the bivariate correlation matrix for the iron model Parent's knowledge,

belief, and income all had significant direct effects on the parent's food group score. (Table 24 and Figure 3). Parent's attitude had a significant negative direct effect on parent's iron intake. Parent's age and education had no significant direct or indirect effects on any variables for parents or their children. Parent's food group score had significant direct effects on parent's iron intake and on their child's food group score. Child's iron intake was significantly affected by their parent's iron intake and by the child's food group score.

Parent's knowledge, belief, and income had significant indirect effects on their child's food group score and iron intake (Table 24 and Figure 3). Parent's attitude had a negative indirect effect on their child's iron intake. Parent's food group score had a significant indirect effect on their child's iron intake.

These results show that parent's knowledge, beliefs, and income affected their food group score. Parent's food group score along with their attitude affected parental iron intake. All these factors had effects on their child's food group score and iron intake, showing that children's iron intake and food group score reflects that of their parents.

Folate Model

The folate model explained 34% of variation on the adolescent's folate intake. Table 25 presents the bivariate correlation matrix for the folate model. Parent's knowledge, belief, and income all had significant direct effects on parent's food group score (Table 26 and Figure 4). Parent's belief and age had significant direct effects on the parent's folate intake, while parent's attitude had a significant negative direct effect on parent's folate intake. Parent's food group score had a significant direct effect on the

parent's folate intake, and their child's food group score. Parent's folate intake had a direct effect on their child's folate intake and food group score. The child's folate intake was directly affected by the child's food group score.

Parent's knowledge, belief, and income had significant indirect effects on their child's food group score (Table 26 and Figure 4). Parent's belief, age, grade, and income all had significant indirect effects on their child's folate intake, and parent's attitude had a significant negative indirect effect on their child's folate intake. Parent's food group score had an indirect effect on their child's food group score and folate intake. The child's folate intake was indirectly affected by the parent's folate intake.

Results indicate that the parent's food group score and folate intake were significantly affected by all variables but the parent's grade. The child's food group score and folate intake were influenced both directly and indirectly by their parent's food group score and folate intake.

Energy Model

The energy model explained 31% of variation on the adolescent's energy intake. Table 27 presents the bivariate correlation table for the energy model. Parent's knowledge, belief, and income all had significant direct effects on the parent's food group score (Table 28 and Figure 5). Parent's attitude, knowledge, and belief all had significant negative direct effects on parent's energy intake. Parent's food group score had a significant direct effect on the parent's energy intake and on their child's food group score. Parent's energy intake and the child's food group score had a significant direct effect on the child's energy intake.

Parent's knowledge, belief, and income had significant indirect effects on their child's food group score (Table 28 and Figure 5). Parent's income had a significant indirect effect on parent's energy intake and their child's energy intake. Parent's food group score had a significant positive indirect effect on their child's energy intake.

These results are similar to those for iron indicating that parent's knowledge, belief, and income had significant effects on parent's food group score. Parent's attitude also had significant effects on the parent's energy intake. Parent's food group score and energy intake had both direct and indirect effects on their child's food group score and energy intake. However, these results also indicated that parents with higher food group scores had children with lower energy intake.

Results from the correlation matrix (phi) for knowledge, attitude, belief, parent's age, parent's grade, and percent of poverty were the same for the calcium, iron, folate, and energy model (Table 29). There were significant correlations between parent's knowledge and their attitude, age, grade, and income. There were also significant correlations between parent's attitude and their beliefs. Parent's beliefs were significantly correlated with their age, grade, and income. Parent's age was significantly correlated with their grade and income, and their grade was significantly correlated with their income.

CHAPTER V

DISCUSSION

Many studies, both recent and old, have examined the influence parents have on their child's dietary habits and intake. Parental influences on children's food preferences, amount of food consumed, and nutrient content have all been examined. Many articles focus on parent-child similarities for likes and dislikes of certain foods. Some articles focus on parental influence on the child's food preference. Others focus on similarities in the amount consumed from a particular nutrient or food group. Many articles emphasize similarities in parent-child total fat, saturated fat, cholesterol, carbohydrate, and protein intake, along with the influence of parental characteristics, such as age, race, income, knowledge, attitude, belief, and behavior, on both the parent's and child' nutrient intake.

Most of these articles focus on the parent-child intake and similarities of foods that are considered not healthy, such as fast food and sweets. Very few articles focus directly on specific nutrients, and those that do tend to focus on nutrients that are considered unhealthy if consumed in excess such as saturated fat and cholesterol. There are limited studies that examine the parent-child similarities in intake of specific nutrients and overall food group consumption. Unlike most other studies, the present study focuses on specific nutrients (calcium, iron, and folate) and energy consumption along with overall food consumption based on the food guide pyramid. The present study indicates that parental characteristics (knowledge, attitude, beliefs, age, grade, and income) influence both the parent's and their child's nutrient intake and food group score. This

study agrees with other studies in that parent's nutrient intake influences their child's nutrient intake. It also indicates that parent's food group score influences child's food group score.

Parent's Nutrient Intake and Their Child's Nutrient Intake

In the current study a significant positive correlation between parent's nutrient intake (calcium, iron, folate, and energy) and their adolescent's nutrient intake (calcium, iron, folate, and energy) was seen through Pearson correlations and pathway analysis. These results are similar to those found in earlier literature showing a positive link between parent-child nutrient intakes.

The significant positive correlation between parent and child energy intake confirms the findings of other studies. Energy intake was found to be significantly correlated between parents and their biological children as well as between foster parents and their adopted children (Perusse et al. 1988). Another study found mother-child energy intakes to be more closely related among blacks than whites (Garn et al. 1979) while another study found energy intakes of white mothers to be significantly related to their child's energy intake (Laskarzewski et al. 1980).

Studies have found differences among parent-child pairs in correlations of energy intakes. One author found energy intakes were more closely related for fathers and their children than mothers and their children (Vauthier et al. 1996), while another author found mother-daughter intakes to have the highest correlation (Oliveria et al. 1992). Patterson et al. (1998) found the strongest correlation to be among Mexican-American

mothers and their youngest children than among other Mexican American parent-child pairs and Anglo parent-child pairs. When three generations of women were studied for their resemblance in energy intake, a significant correlation was found between the younger and middle generations than between younger and older, and middle and older. (Stafleu et al. 1994).

In the current study we found a significant positive correlation between parents and their child's calcium intake. Only two studies examined the correlation between parent and child calcium intake. A significant positive correlation was found between parent and child calcium intakes (Oliveria et al. 1992). A second study found no correlation between mothers and their daughter's calcium intakes (Couturier et al. 1979).

In the current study we found a significant positive correlation between parent and child's iron intake. While no other studies were found that examined the relation between parent and child iron intakes one study found that boys between the ages of birth to 18 had a higher iron intake than girls of the same age (Kennedy and Powell 1997). A separate study also found that males consumed a higher percent of the RDA for iron than females. The same study found that when participants were grouped together based on race, all races consumed more than 100% of the RDA for iron with whites consuming the most iron and Hispanics consuming the least (Lin et al. 1996).

The current study found a significant positive correlation between parent and child folate intake. There were no other studies found that examined the correlation between parent and child folate intake. There were no studies found that examined the effect of parental characteristics, knowledge, attitudes, beliefs, behaviors, or other characteristics on a child's folate intake.

The current study did not look at the similarity in parent-child fat and cholesterol intake, however the review of relevant literature revealed many studies that looked at parent-child similarities for these particular nutrients.

Total fat and saturated fat intake were significantly positively correlated between parents and their children (Oliveria et al. 1992 and Laskarzewski et al. 1980). Fat intake was found to be closely correlated between mothers and their children (Patterson et al. 1998) and between father and daughter pairs (Fuenkes et al. 1997). Studies found significant correlations for fat intake between oldest parent-oldest child pairs, children and white mothers younger than 34 and black mothers older than 40, children and white fathers, and between middle and younger generation, and younger and older generations. (Laskarzewski et al. 1980 and Stafleu et al. 1994). However, a study conducted by Patterson et al. (1988) found no correlation between Anglo fathers and their oldest child's fat and saturated fat intake. Mexican-American fathers and their oldest child showed no significant correlation for fat intake.

Studies show conflicting results in the similarities of parent-child cholesterol intakes. A few studies show cholesterol intake to be significantly positively correlated between parents and their children (Oliveria et al. 1992), mothers and daughters (Fuenkes et al. 1997) and between middle and older generations (Stafleu et al. 1994). However, another study found no correlation in parent-child cholesterol intake (Laskarzewski et al. 1980).

There has been limited research done on the resemblance of parent-child carbohydrate and protein intake. One study looked at parent-child carbohydrate intake and found that there was a significant positive correlation. (Laskarzewski et al. 1980).

Three studies looked at parent-child protein intakes and found significant correlations in protein intake (Olivera et al. 1992, Garn et al. 1979, Patterson et al. 1998)

Overall nutrient intake was significantly correlated between parents and their children (Oliveria et al. 1992, Laskarzewsi et al. 1980). One study found nutrient intake to be more strongly correlated between mothers and their children than between fathers and their children. (Oliveria et al 1992), while another study found significant correlations between parents and their youngest children (Patterson et al. 1988).

Parent's Knowledge and Their Child's Nutrient Intake

In the current study Pearson correlations found that parent's knowledge was significantly positively correlated with their adolescent's calcium, iron, and folate intake. Parent's knowledge was not significantly related to their child's energy intake. Parent's knowledge was significantly correlated with their child's milk and fruit intake and overall food group score.

Limited studies relate parent's knowledge with their child's nutrient intake. One study found that mothers who selected food for their child based on the health value of the food were more knowledgeable about heart disease and overall health, than parents who bought food for their children based on the child's taste preferences (Contento et al. 1993)

Another study looked at the relationship between women's knowledge about basic nutrition and their calcium intake. Results showed that the group of women (among 4 groups) who scored the highest on the knowledge test also had the highest calcium

intake. The group of women who scored the lowest on the nutrition test consumed the least calcium (Fredrick and Hawkins 1992).

Parent's Attitude and Their Child's Nutrient Intake

In the current study pathway analysis showed a significant relation between parent's attitude toward nutrition and their child's calcium, iron, folate, and energy intake. Pearson correlations found no significant correlation between parent's attitude and their child's food group intake.

No articles were found that correlate parent's attitude toward nutrition and their child's dietary intake. The review of literature revealed one study that looked at the effect one's attitude toward nutrition has on one's dietary habits and intake. This study found that the more positive attitude a person had toward changing to a low fat diet the more likely they were to decrease fat intake (Lloyd et al. 1992).

Parent's Nutrient Beliefs and Their Child's Nutrient Intake

In our study we found that parent's nutrient beliefs had no significant relation with their adolescent's calcium, iron, folate, or energy intake. We also found no significant correlation between parent's nutrition beliefs and their child's food guide pyramid intake.

The review of relevant literature revealed no studies that examined the effect of parent's beliefs on their child's intake. A study conducted by Stafleu et al. (1995) found a

significant difference in beliefs about food among three generations of women. Respondents indicated their beliefs about certain foods such as "fatty", "tasty", and "causes heart disease". The middle and older generations showed a stronger similarity in beliefs about foods than older and younger generations, and middle and younger generations. Another study found no significant difference in nutrition beliefs between high and low-income respondents (Morton et al. 1997).

Parent's Demographic Characteristics and Their Child's Nutrient Intake

In the current study Pearson correlations showed no significant relation between parents' age, education level, and income and their child's nutrient intake. No significant differences were found between parent's gender, origin, and employee status and their child's nutrient intake. Pathway analysis did not examine the direct effects of parent's demographic characteristics on their child's nutrient intake.

There were few studies that examined the effect of parent's demographic characteristics on their child's nutrient intake. There were however some studies that looked at the effects of demographic characteristics on an individual's intake. One study found that male adolescents from a low socioeconomic status (SES) consumed less calcium than females from a lower SES. A low consumption of dairy products was reported by females that were of higher SES (Neumark-Sztainer et al. 1997).

Three studies looked at the effects of both gender and race on nutrient intake. One study indicated that Asian Americans and females had the lowest dairy consumption when compared to other races and males. Adolescents aged 17 to 20 consumed less dairy

products than adolescents aged 12 to 14 (Neumark-Sztainer et al. 1992). Another study found that females consumed more vegetable than males but more females than males failed to meet any of the food guide pyramid recommendations than males. Whites met more of the food guide pyramid recommendations than did blacks and Hispanics (Krebs-Smith et al. 1997). A third study found that race and gender affected the macronutrient intake of children 10 years old. Males consumed more calories from protein, while girls consumed more calories from carbohydrate (Farris et al. 1986).

One study looked at the possible effects of the age of children and family income on calorie intake of children. This study found that age of the child did not have an effect on calorie intake. Children from a household with an income more than 300% or less poverty consumed fewer calories from fat and saturated fat than children from a household income of 130% of poverty or less (Kennedy and Powell 1997).

Relation Between Food Group Scores

In the current study pathway analysis showed a significant positive correlation between parent's food group score and their child's food group score. While no studies examined food group score of parent's and children, many studies examined the similarities between food preferences of parents and their children.

Two studies examined food preferences between preschool children and their parents. One study found a significant difference between certain parent-child pairs and their preferences for fruit, vegetables, sandwiches, and snacks. Overall, they found that there was not a strong relation between parent-child food preferences (Birch 1980).

Another study examined the relationship among fathers and their preschool child's food preferences for a variety of foods. The only significant difference found between fathers and their children was in their preference for vegetables (Bryan and Lowenberg 1958).

Two studies looked at similarities in food preference between college students and their parents. Both studies found a significant similarity among parents and their child's food preferences. However, one study found food preferences between mother-daughter and father-son pairs to be more similar than opposite sex pairs (Pliner 1983), while another study found the strongest correlations between father-daughter and mother-son pairs (Rozin 1996).

Indirect Effects of Parental Characteristics on Their Child's Nutrient Intake and Food Group Score

Pathway analysis showed that parents food group score and nutrient intake mediated the relationship between parental characteristics and their child's food group score and nutrient intake. This relationship was seen through the significant indirect effects of the parent's characteristics on their child's food group score and nutrient intake.

In the calcium model the effect of parent's knowledge and income on their child's food group score was mediated by the parent's food group score. The effect of parents' knowledge, attitude, and income on their child's calcium intake was also mediated by the parent's food group score and calcium intake.

In the iron model the effect of parent's knowledge, beliefs, and income on their child's food group score was mediated by the parent's food group score. The effect of

parent's knowledge, attitude, beliefs, and income on their child's iron intake was mediated by the parent's food group score and iron intake.

In the folate model the effect of parent's knowledge, belief and income on their child's food group score was mediated by the parent's food group score and folate intake. Parent's food group score and folate intake mediated the effect of parent's attitude, belief, age, grade, and income on their child's folate intake.

In the energy model the effect of parent's knowledge, belief, and income on their child's food group score was mediated by the parent's food group score and energy intake. The effect of parent's income on their child's energy intake was also mediated by the parent's food group score and energy intake.

There were no other studies that examined the influence of parental characteristics on their child's nutrient intake through path analysis. As discussed earlier, other studies examined direct relationships between parental and demographic characteristics and their child's nutrient intake, but no studies reported any indirect effects.

Limitations of the Study

There are a number of limitations to this study. First, the survey used for this study was developed by professionals chosen by the USDA. The survey was designed to measure food intake and diet and health knowledge, not to compare parent-child intake. Second, information was self reported and the survey was not pre-tested, which may have reduced the reliability of the survey. Participants in the survey may have answered questions based on what they thought was correct and not on what they actually knew or

believed. Third, the original survey included nationally representative samples. When we selected participants from the original study to create parent-child pairs within a certain age range, a nationally representative sample could no longer be assumed. The population for the original study was chosen to be nationally representative based on age, sex, and income of respondents in households and not parent-child pairs; it was not selected for the needs of the current study. Fourth, the questions asked on the original study weren't specifically developed to meet the needs of the current study. Some information that would have been valuable to the current study, such as knowledge, attitude, and beliefs of the childr[illegible]iable. A fifth limitation involved the food group score. The food group sc[illegible] was generated by using one half of the Healthy Eating Index (HEI), possibly reducing [illegible] of the HEI and food group score.

[illegible]nificant m[illegible] their [illegible]dores [illegible] overall d[illegible] study, [illegible]ch[illegible]s were separat[illegible]ect bot[illegible]nts and chil[illegible]

F[illegible] parent's n[illegible]ient intake influence[illegible] their child's nutrient intake and paren[illegible]s food group score influenced their child's fo[illegible]d group score. The influence of parent's nutrient intake on their child's food group score and the influence of parent's food group score on their child's nutrient intake was seen in the folate and energy models only.

Parent's knowledge had an indirect influence on their child's food group score in all four models, while influencing the child's nutrient intake in the calcium and iron models. Parent's attitude indirectly influenced their child's calcium and iron intake but had no influence on their child's food group score in any model. Parent's belief had an indirect influence on their child's iron and folate intake, and influenced their child's food group score in the folate and energy model. Parent's age and grade had an effect only on their child's folate intake. In all four models parent's income indirectly influenced their child's food group score, but income only influenced their child's iron and calcium intake.

Overall, parental characteristics had a significant influence on their adolescent's food group score and nutrient intake. However, parent's knowledge, attitude, and belief were more likely to influence their child's food group score and nutrient intake than did demographic characteristics.

The four models explained approximately one-third of the variation in the adolescent's nutrient intake. This accounts for some of the variation, however as discussed earlier, adolescent's nutrient intake is affected by various factors. Adolescent's intake is affected not only by parental characteristics but by parent-child mealtime interactions and by positive or negative parental behaviors at meal time (Klesges et al. 1983, Kiovisto et al. 1994). Familiarity with foods and the atmosphere when eating have been shown to effect nutrient intake (Hertzler 1983). Eating away from home plays a large role on the types of nutrients consumed and the amount of calories and fat consumed (Lin et al. 1996). Dieting, physical activity and mood were all shown to effect the fat intake of college students. (Hertzler and Fray 1996).

This study is useful to dietitians in planning their educational strategies. The dietitian should be aware that parental characteristics, along with knowledge, attitude, belief, and food intake influence their adolescent's nutrition. Education aimed at improving child/adolescent nutrient intake should also be targeted toward the parents. Dietitians should assess these parental characteristics prior to or at the beginning of an educational session or intervention program.

This study can also be used to develop future questionnaires to measure the influence of parental characteristics on a child's dietary habits. These questionnaires can be used on particular areas or regions to determine the best educational strategy for that area.

Future studies could test the effectiveness of interventions aimed at increasing food group intake in adolescents could be done through the schools and could target the parent-child pair. Parents could provide their knowledge, attitudes, beliefs, and behavior on the subject through a take home questionnaire. Adolescents could receive education at school while parents could receive the education through take home pamphlets and telephone interviews or surveys. Education aimed at parents and their adolescent's could be conducted in the community setting at places such as health fairs, grocery stores, and malls. Parents and their adolescents could receive taste samples of foods and receive educational materials, coupons, recipes and etc. This kind of intervention could offer coupons or a gift given to those who participated in a small questionnaire at the site and another small gift for those who participated in a follow up phone interview or mailed questionnaire.

REFERENCES

Baranowski T. The knowledge-attitudes-behavior model and defining "behavior changes" *Charting the Course for Evaluation.* 1997; February, 28:26-27.

Birch LL. The relationship between children's food preferences and those of their parents. *J Nutr Educ.* 1980;12(1):14-18.

Borah-Giddens J, Falciglia GA. A meta-analysis of the relationship in food preferences between parents and children. *J Nutr Educ.* 1993;25:102-107.

Brook U, Tepper I. High school students' attitudes and knowledge of food consumption and body image: implications for school based education. *Patient Educ Counsel.* 1997;30:283-288.

Bryan MS, Lowenburg ME. The father's influences on young children's food preferences. *J Am Diet Assoc.* 1958:34:30-35.

Buttriss JL. Food and nutrition: attitudes, beliefs, and knowledge in the United Kingdom. *Am J Clin Nutr.* 1997;65:1985s-1995s.

Burt J, Hertzler A. Parental influences on the child's food preferences. *J Nutr Educ.* 1978;10: 127-28.

Chamberlain VM. *Creative Home Economics Instruction.* 3rd Edition. MacMillan/McGraw-Hill. Peoria, IL 1992;18.

Coates TJ, Barofsky I, Saylor KE, Simmons-Morton B, Huster W, Sereghy E, Straugh S, Jacobs H, Kidd L. Modifying the snack food consumption patterns of inner city high school students: The Great Sensation Study. *Prev Med.* 1985;14: 234-247.

Contento IR, Basch C, Shea S, Gutin B, Zybert P, Michela JL, Rips J. Relationship of mother's food choice criteria to food intake of preschool children: identification of family subgroups. *Health Educ Q.* 1993;20(2):243-259.

Couturier M, Imbach A. Calcium and vitamin D intakes of women and their daughters: Distribution by food groups and meals. *J Can Diet Assoc.* 1997;58(2):77-83.

Crider AB, Goethals GR, Kavanaugh RD, Soloman PR. *Psychology.* 3rd Edition. Scott, Foresman & Company. Glenview, IL 1983:6, 411.

Farris RP, Cresanta JL, Croft JB, Webber LS, Frank GC, Berenson GS. Macronutrient intake of 10-year old children, 1973 to 1982. *J Am Diet Assoc.* 1996;86(6):765-770.

Feunekes GIJ, Stafleu A, De Graaf C, Van Stavern WA. Family resemblance in fat intake in the Netherlands. *Eur J Clin Nutr.* 1997;51:793-799.

Fisher JO, Birch LL. Fat preferences and fat consumption of 3-to 5-year-old children are related to parental adiposity. *J Am Diet Assoc.* 1995;95:759-764.

Food and Nutrition Board. *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_6, Pantothenic Acid, Biotin, and Choline.* National Academy Press; Washington D.C.:1998.

Fredrick L, Hawkins S. A comparison of nutrition knowledge and attitudes, dietary practices, and bone density of postmenopausal women and female college athletes, and nonathletic college women. *J Am Diet Assoc.* 1992;92:299-305.

Garn SM, Cole PE, Bailey SM. Living together as a factor in family-line resemblance. *Hum Biol.* 1979;51(4):565-587.

Harris/Scholastic Research A division on Louis Harris & Associates, Inc. The Kellogg Children's Nutrition Survey. Kellogg Company;1989.

Hertzler A[illegible]ary RB. Family factors and fat consumption of college students. *J Am Diet Assoc.* 1996;96(7):711-714.

Hertzler AA. Chi[illegible]od patterns-a review: Family and group behavior. *J Am Diet Assoc.* 1983;83(5):555-559.

Johnson R[illegible] Effects of maternal employment on family fo[illegible]ns and c[illegible]en's diet. *J Nutr Educ.* 1993;25(3):130-133.

Kapil U, [illegible]edge amo[illegible] adolescent girls [illegible]ive value of [illegible]ncy, and lactation. *India* 1991;28([illegible]

Kearney [illegible]y A, Gib[illegible]tude[illegible]va[illegible]lief[illegible]ut n[illegible] and br[illegible] among [illegible] sa[illegible]ad[illegible] regressi[illegible]

Kennedy [illegible] Changi[illegible] patterns of American children: A view fro[illegible] 1996. *J A*[illegible] 1997;16(6):524-529.

Klesges R[illegible] Brown G[illegible] [illegible]Holdenhauer-Klesges LM, Holzer B, [illegible] influences on children's eating be[illegible]vior and relative w[illegible] *Behav.* 1983;16(4):371[illegible]

Koivisto U[illegible]s J, Sjoden P. Relations between parental mealtime practices and children's food intake. *Appetite.* 1994;22:245-258.

Korinis M, Korslund MK, Belli G, Donohue JM, Johnson JM. Comparison of calcium and weight loss information in teen-focused versus women's magazines over two 4-year periods (1986-1989 and 1991-1994). *J Nutr Educ.* 1998;30(3):149-154.

Krebs-Smith SM, Cleveland LE, Ballard-Barbash R, Cook DA, Kahle LL. Characterizing food intake patterns of American adults. *Am J Clin Nutr.* 1997;65(suppl):1264s-1268s.

Laskarzewski P, Morrison JA, Lhoury P, Kelly K, Glatfelter L, Larsen R, Gleuck CJ. Parent-child nutrient intake interrelationships in school age children ages 6 to 19: The Princeton School District Study. *Am J Clin Nutr.* 1980;33:2350-2355.

Life Sciences Research Office, Federation of American Societies for Experimental Biology. Prepared for the Interagency Board for Nutrition Monitoring and Related Research. *Third Report on Nutrition Monitoring in the United States: Volume 1.* U.S. Government Printing Office, Washington,DC, 1995.

Lin B, Guthrie J, Blaylock JR. *The Diets of America's Children: Influence of Dining Out, Household Characteristics, and Nutrition Knowledge.* Economic Research Service/USDA 1996.

Lloyd HM, Paisley CM, Mela DJ. Changing to a low fat diet; attitudes and beliefs of UK consumers. *Eur J Clin Nutr.* 1993;47:361-373.

Logue A, Logue C, Uzzo R, McCarty M, Smith M. Food preferences in families. *Appetite.* 1988;10:169-180.

Mahan LK, Escott-Stump S. *Food, Nutrition, and Diet Therapy.* Ch. 31;Nutritional care in diabetes mellitus and reactive hypoglycemia. W.B. Saunders Company. 1996.

Mitchell MK. Nutrition During Adolescence. *Nutrition Across the Life Span.* Chapter 7. W.B. Saunders Company;1997.

Morton JF, Guthrie JF. Diet-related knowledge, attitudes, and practices of low-income individuals with children on the household. *Fam Econ Nutr Rev.* 1997;10(1):2-15.

Munoz KA, Krebs-Smith SM, Ballard-Barbash R, Cleveland LE. Food intakes of US children and adolescents compared with recommendations. *Pediatrics.* 1997;100(3):323-329.

Murphy AS, Youatt JP, Hoerr SI, Sawyer CA, Andrews SL. Kindergarten student's food preferences are not consistent with their knowledge of the dietary guidelines. *J Am Diet Assoc.* 1995;95:219-223.

National Research Council. *Recommended Dietary Allowances,* 10th edition. National Academy Press;Washington,D.C.:1989.

Nelson M. The distribution of nutrient intake within families. *Br J Nutr.* 1986;55(2):267-277.

Neumark-Sztainer D, Story M, Dixon LB, Resnick MD, Blum RW. Correlates of inadequate consumption of dairy products among adolescents. *J Nutr Educ.* 1997;29(1):12-19.

Nguyen VT, Larson DE, Johnson RK, Goran MI. Fat intake and adiposity in children of lean and obese parents. *Am J Clin Nutr.* 1996;63:507-513.

Oliveria SA, Ellison RC, Moore LL, Gillman MW, Garrahie EJ, Singer MR. Parent-child relationships in nutrient intake: the Framingham Children's Study. *Am J Clin Nutr.* 1992;56:593-598.

Ortega RM, Requejo AM, Lopez-Sobaler AM, Andres P, Quintas ME, Navia B, Izquierdo M, Rivas T. The importance of breakfast in meeting daily recommended calcium intakes in a group of schoolchildren. *J Am Coll Nutr.* 1998;17(1):19-24.

Parraga IM. Determinants of food consumption. *J Am Diet Assoc.* 1990;90(5):661-663

Patterson TL, Rupp JW, Sallis JF, Atkins CJ, Nader PR. Aggregation of dietary calories, fats, and sodium in Mexican-American and Anglo families. *Am J Prev Med.* 1988;4(2): 75-82.

Perusse L, Tremblay A, Leblanc C, Clininger CR, Reich T, Rice J, Bouchard C. Familial resemblance in energy intake: contribution of genetic and environmental factors. *Am J Clin Nutr.* 1988;47:629-635.

Petchers MK, Hirsch EZ, Bloch BA. The impact of parent participation on the effectiveness of a heart healthy curriculum. *Health Educ.* 1987;14(4):449-460.

Pliner P. Family resemblance in food preference. *J Nutr Educ.* 1983;15(4):137-140.

Pliner P, Pelchat M. Similarities in food preferences between children and their siblings and parents. *Appetite.* 1986;7:333-342.

Reid DJ, Conrad SA, Hendricks SM. Tracking nutrition trends, 1989-1994: an update on Canadians' attitudes, knowledge and reported actions. *Can J Public Health.* 1996;87(2):113-118.

Rozin P. Family resemblance in food and other domains: the family paradox and the role of parental congruence. *Appetite.* 1991;16:93-102.

Rozin P. Family resemblance in food and other domains: The family paradox and the role of parental congruence. *Appetite.* 1991;16:93-102.

Shepherd R, Stockley M. Nutrition knowledge, attitudes, and fat consumption. *J Am Diet Assoc.* 1987;87(5):615-619.

Stafleu A, Van Staveren WA, De Graaf C, Burema J, Hautvast JGA. Family resemblance in energy, fat, and cholesterol intake: a study among three generations of women. *Prev Med.* 1994;23:474-480.

Stafleu A, Van Staveren WA, De Graaf C, Burema J, Hautvast JGAJ. Family resemblance in beliefs, attitudes and intentions toward consumption of 20 foods: a study among three generations of women. *Appetite.* 1995;25:201-216.

United States Department of Agriculture;Center for Nutrition Policy and Promotion. *The Healthy Eating Index*. Center for Nutrition Policy and Promotion:1995.

United States Department of Health and Human Services, Public Health Service. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives.* US Department of Health and Human Services. PHS, DHHS Publication No. (PHS) 91-50212. 1991.

United States Department of Health and Human Services. *Recommendations to prevent and control iron deficiency in the United States*. Center for Disease Control and Prevention (CDC). Morbidity and Mortality Weekly Report. 1998; 47:No. RR-3.

Variyam JN, Blaylock J, Smallwood DM. Modeling nutrition knowledge, attitudes, and diet-disease awareness: The case of dietary fibre. *Statistics Med.* 1996;15:23-25.

Vauthier JM, Lluch A, Lecomte E, Artur Y, Herberth B. Family resemblance in energy and macronutrient intakes: the Stanislas Family Study. *Int J Epid.* 1996;25(5):1030-1037.

Wardle J. Parental influences on children's diets. *Proc Nutr Soc.* 1995;54(3):747-758.

Weidner G, Archer S, Healy B, Matarazzo J. Family consumption of low fat foods: Stated preference versus actual consumption. *J Applied Soc Psych.* 1985;15:773-79.

Whitney EN, Rolfes SR. *Understanding Nutrition*. Chapter 15; Life cycle nutrition: childhood, adolescents, and aging. West Publishing Company, St. Paul;1993.

Yates AA, Schlicker SA, Suitor CW. Dietary Reference Intakes: The new basis for recommendations for calcium and related nutrients, B vitamins, and choline. *J Am Diet Assoc.* 1998;98:699-706.

Table 1. Factor analysis for attitude scores

Factor	Eigen Value
Factor 1: Importance of dietary guidelines	
Salt and sodium intake	.571
Low saturated fat intake	.801
Plenty of fruits and vegetables	.736
Sugar in moderation	.599
Adequate fiber	.727
Variety of foods	.537
Maintain of healthy weight	.669
Diet low in fat	.802
Diet low in cholesterol	.727
Factor 2: Factors that affect food buying	
How safe is the food is to eat	.533
Nutrition	.526
Price	.685
How well the food keeps	.704
Ease of preparation	.410
Factor 3: Taste considerations	
Taste influences buying choices	.717
Importance of choosing a diet high in grains	.439
Importance of eating 2 servings of dairy products a day	.722

Table 2. Factor analysis for belief scores

Factor	Eigen Value
Factor 1: Nutrients commonly consumed in excess	
Fat intake	.720
Saturated fat intake	.824
Cholesterol intake	.732
Salt or sodium intake	.475
Factor 2: Nutrients perceived to be inadequately consumed	
Calcium intake	.613
Iron intake	.601
Vitamin C intake	.561
Protein intake	.599
Factor 3: Eating a healthy diet	
Choosing good and bad foods	.513
Choosing a variety of foods provides necessary vitamins and minerals	.528
I currently eat healthy	.508
Self perception of caloric intake	.510
Self perception of sugar and sweets intake	.418
Self perception of weight status	.525
Factor 4: Food choices and disease risk	
A person is born to be fat or thin	.668
Starchy foods	.639
Too many diet recommendations	.514
Healthy eating can reduce disease risk	-.469

Table 3. Parent and child demographic characteristics

Characteristics	Parents N		Children N	Children %
Gender				
Male	219	53.6	197	48.3
Female	189	46.4	211	51.7
Race				
White	313	76.8	315	77.2
Black	52	12.8	52	12.8
Other	42	10.4	41	10.0
Origin				
Non-Hispanic	362	88.7	358	87.6
Hispanic	46	11.3	50	12.4
Age				
12			62	15.3
13			61	15.0
14			60	14.8
15			53	12.9
16			60	14.7
17			58	14.1
18			27	6.5
19			27	6.7

Table 3. Continued

Characteristics	Parents N	Parents %	Children N	Children %
Education				
Never attended	1	.2	1	0.2
Fourth grade	1	0.4	0	0
Fifth grade		0.7	0	0
Sixth grade		1.1	0	0
Seventh grade		0.6	1	0.2
Eighth grade	4	0.9	19	4.6
Ninth grade	5	1.3	49	12.0
Tenth grade		2.1	46	11.3
Eleventh grade		2.8	52	12.8
Twelfth grade	1	33.4	36	8.9
College				
One year		8.5	8	2.0
Two years		15.9	1	0.4
Three years		3.1	0	0
Four years	45	11.0	0	0
Five or More years	72	17.7	0	0
Missing	2	0.4	195	47.7

Table 3. Continued

Characteristics	Parents N	Parents %	Children N	Children %
Employment Category				
Professional and technical	95	23.4	4	1.0
Manager, office or proprietor	68	16.6	4	0.9
Farmer	11	2.8	0	0
Clerical or sales worker	37	9.0	22	5.5
Craftsman or foreman	55	13.5	1	0.3
Operative	19	4.7	2	0.5
Service worker or other similar job	37	9.1	40	9.7
Other	8	1.9	8	2.0
Not Employed	77	19.0	327	80.1
Employment Status				
Employed, full time	287	70.4	12	2.9
Employed, part time	39	9.6	67	16.4
Employed, not at work last week	8	2.0	2	0.4
Not Employed	73	17.9	132	32.4
Age < 15	0	0.0	184	45.1
Missing	1	0.2	184	45.1
Plan meals				
Yes	234	57.3	25	6.1
No	174	42.7	383	93.9

Table 3. Continued

Characteristics	Parents N	Parents %	Children N	Children %
Shop for food				
Yes	242	59.3	23	5.6
No	166	40.7	385	94.4
Prepare the Meals				
Yes	236	57.8	41	10.0
No	172	42.2	367	90.0

Table 4. Household characteristics

Characteristics	N	%
Household Size		
2	50	12.3
3	115	28.1
4	134	32.8
5	69	16.9
6	24	5.8
7	13	3.2
8	3	0.7
9	1	0.3
Poverty Category		
0-130 % of the poverty threshold	100	24.5
130-350 % of the poverty threshold	170	41.8
Over 350 % of the poverty threshold	138	33.7

Characteristics	N	Mean $\pm$ SD
Age (Parents)	408	42.6 $\pm$ 6.2
Grade (Parents)	408	13.5 $\pm$ 2.6
Income (percentage of poverty threshold)	408	216.1 $\pm$ 96.7
Household Size	408	3.9 $\pm$ 1.3

Table 5. Parent and child nutrient intakes and correlations between intakes of parents and their children

Nutrient	N	Parents Mean ± SD	Children Mean ± SD	r
Energy(%RDA)	408	79.2 ± 26.8	91.8 ± 31.4	.239**
Energy (Kcal)	408	2003.0 ± 765.9	2286.3 ± 866.1	.151**
Calcium (milligrams)	408	699.7 ± 381.7	960.3 ± 536.2	.272**
Folate (micrograms)	408	244.0 ± 144.4	268.7 ± 166.6	.264**
Iron (milligrams)	408	14.7 ± 7.4	16.6 ± 8.6	.217**

**Significant at 0.01 level

Table 6. Parent and child food and food group intakes in grams

Food and Food Group	N	Parents Mean ± SD	Children Mean ± SD
Grain	408	315.9 ± 223.1	361.7 ± 219.6
Fruit	408	140.6 ± 188.4	174.7 ± 241.4
Vegetable	408	208.9 ± 143.5	153.5 ± 139.4
Milk	408	192.4 ± 229.1	356.3 ± 323.1
Meat	408	215.6 ± 162.3	183.5 ± 141.4
Egg	408	19.3 ± 35.8	13.6 ± 33.2
Legume	408	30.8 ± 74.9	13.1 ± 38.9
Nuts and seeds	408	2.6 ± 10.5	3.3 ± 13.1
Sugar	408	20.3 ± 32.3	39.0 ± 64 7
Fat	408	15.9 ± 18.6	10.3 ± 14.5
Non-alcoholic beverages	408	1065.6 ± 790.7	764.7 ± 644.7
Alcohol beverages	408	116.7 ± 457.6	14.2 ± 132.3

Table 7. Food intake of parents and children in pyramid servings

Food Groups	N	Pyramid Servings Parents Mean ± SD	Children Mean ± SD
Total grain	408	6.52 ± 3.32	7.81 ± 3.56
Whole grains	408	0.80 ± 1.17	0.98 ± 1.32
Non-whole grains	408	5.72 ± 3.09	6.82 ± 3.25
Total vegetables	408	3.59 ± 2.00	3.23 ± 2.27
White potatoes	408	1.23 ± 1.23	1.50 ± 1.67
Other vegetables	408	1.07 ± 0.96	0.69 ± 0.72
Tomatoes	408	0.48 ± 0.49	0.48 ± 0.47
Legumes	408	0.28 ± 0.62	0.19 ± 0.49
Starchy vegetables (excluding (dry beans, white potatoes, and peas)	408	0.21 ± 0.44	0.17 ± 0.43
Dark-green leafy vegetables	408	0.17 ± 0.42	0.11 ± 0.36
Deep-yellow vegetables	408	0.15 ± 0.29	0.09 ± 0.20
Total fruits	408	0.27 ± 1.64	1.31 ± 1.99
Citrus fruits, melons, berries	408	0.67 ± 1.20	0.76 ± 1.70
Other fruits	408	0.60 ± 0.91	0.55 ± 0.84
Total dairy	408	1.21 ± 1.07	2.03 ± 1.56
Milk	408	0.74 ± 0.87	1.38 ± 1.32
Yogurt	408	0.01 ± 0.08	0.01 ± 0.06
Cheese	408	0.45 ± 0.53	0.60 ± 0.80
Cooked lean meat (ounces, all)	408	4.77 ± 2.80	4.11 ± 2.58
Cooked lean meat (ounces, beef, pork, veal, lamb)	408	2.17 ± 2.08	1.95 ± 1.99
Poultry	408	1.28 ± 1.74	1.09 ± 1.49
Frankfurters, sausage, lunch meats	408	0.87 ± 1.24	0.80 ± 1.14
Fish	408	0.45 ± 1.10	0.28 ± 0.81
Egg	408	0.42 ± 0.61	0.29 ± 0.57
Soy	408	0.01 ± 0.08	0.02 ± 0.12
Organ meats	408	0.01 ± 0.05	0.00 ± 0.06
Nuts or seeds	408	0.11 ± 0.31	0.15 ± 0.44
Discretionary fat (g)	408	56.50 ± 28.19	65.08 ± 33.29
Added sugar (Tsp)	408	20.13 ± 15.14	29.01 ± 19.06
Alcoholic beverages	408	0.47 ± 1.66	0.05 ± 0.46

Table 8. Healthy Eating Index food group scores and correlations between scores of parents and children

Pyramid Group	N	Parents Mean ± SD[1]	Children Mean ± SD[1]	r
Fruit	408	4.4 ± 3.9	4.6 ± 3.9	.324**
Grain	408	8.4 ± 2.2	9.1 ± 1.6	.158**
Meat	408	9.4 ± 1.8	9.1 ± 2.3	.246**
Vegetable	408	8.4 ± 2.5	7.5 ± 3.0	.186**
Milk	408	5.2 ± 3.4	5.3 ± 3.8	.254**

[1] HEI score (Points were given according to how close the respondent was to consuming the proper number of servings in that food group. A score of 0 indicates no servings were consumed and a score of 10 indicates the respondent met the recommended number of servings.)

** Significant at 0.01 level

Table 9. Parents' scores and subscores for knowledge, attitude, and belief categories

Score	Total Possible Points	Mean ± SD
Total knowledge score	43	21.6 ± 4.9
Total attitude score[1]	68	57.8 ± 6.2
Importance of dietary guidelines	36	30.7 ± 4.7
Factors that affect food buying	20	17.3 ± 2.1
Taste considerations	12	9.9 ± 1.4
Total belief score[2]	64	45.3 ± 6.3
Nutrients commonly consumed in excess	12	8.1 ± 2.6
Nutrients thought to be inadequately consumed	15	11.4 ± 2.7
Eating a healthy diet	21	15.0 ± 2.8
Food choices and disease risk	16	10.8 ± 2.2

[1] Refer to table 1 for question descriptions
[2] Refer to table 2 for question descriptions

Table 10. Parent's knowledge about fat

Knowledge Question	N	%[2]	% Correct
Which has more fat:			
Regular hamburger[1]	335	82.1	82
Ground round	41	10.0	
The same	16	3.9	
Don't know	16	3.9	
Loin pork chops	82	20.1	
Pork spare ribs[1]	278	68.1	68
The same	14	3.4	
Don't know	32	7.8	
Hot dogs[1]	242	59.3	59
Ham	130	31.9	
The same	11	2.7	
Don't know	22	5.4	
Peanuts[1]	349	85.5	86
Popcorn	44	10.8	
The same	2	0.5	
Don't know	13	3.2	
Yogurt	34	8.3	
Sour cream[1]	352	86.3	86
The same	9	2.2	
Don't know	13	3.2	
Porterhouse steak[1]	176	43.1	43
Round steak	119	29.2	
The same	22	5.4	
Don't know	91	22.3	

[1] Correct response
[2] Columns do not total 100 due to missing data

Table 11. Parent's knowledge about saturated fat

Knowledge Question	N	%	% Correct
Based on your knowledge, which has more saturated fat:			
Liver	91	22.3	
T-bone steak [1]	270	66.2	66
The same	3	0.7	
Don't know	44	10.8	
Butter [1]	299	73.3	73
Margarine	60	14.7	
The same	26	6.4	
Don't know	22	5.4	
Egg white	62	15.2	
Egg yolk[1]	303	74.3	74
The same	4	1.0	
Don't know	39	9.6	
Skim milk	10	2.5	
Whole milk[1]	387	94.9	95
The same	1	0.2	
Don't know	10	2.5	

[1]Correct response
[2]Columns do not total 100 due to missing data

Table 12. Parent's knowledge about fat and cholesterol

Knowledge question	N	%[2]	% Correct
Which fat is more likely to be a liquid rather than a solid:			
Saturated fats	49	12.0	
Polyunsaturated fat[1]	103	25.2	25
They are equally likely to be liquids	115	28.2	
Don't know	139	34.1	
If a food has no cholesterol it is also			
Low in saturated fat	109	26.7	
High in saturated fat	22	5.4	
Either high or low in saturated fat[1]	209	51.2	51
Don't know	67	16.4	
Is cholesterol found in:			
Vegetable and vegetable oil	8	2.0	
Animal products like meat and dairy products[1]	150	36.8	37
All foods containing fat or oil	206	50.5	
Don't know	43	10.5	
If a product is labeled as containing only vegetable oil is it:			
Low in saturated fat	143	35.0	
High in saturated fat	21	5.1	
Either high or low in saturated fat[1]	192	47.1	47
Don't know	51	12.5	
If a product is labeled "light" does that mean it is:			
Lower in calories	70	17.2	
Lower in fat	44	10.8	
Lower in calories and/or fat[1]	162	39.7	40
Something else	82	20.1	
Don't know	48	11.8	

[1] Correct response
[2] Columns do not total 100 due to missing data

Table 13. Number of parents who correctly identified health problems associated with a particular eating behavior.

Knowledge question	Yes	
	N	%
Have you heard about any health problems caused by:		
Eating too much fat	362	88.7
Atherosclerosis	272	66.7
Cancer	41	10.0
High blood cholesterol	63	15.4
Not eating enough fiber	278	68.1
Cancer	81	20.0
Colon problems/constipation	8	2.0
Eating too much salt or sodium	362	88.7
Edema	46	11.3
High blood pressure	248	60.8
Not eating enough calcium	341	83.6
Bone problems	315	77.2
High blood pressure	1	0.2
Eating too much cholesterol	373	91.4
Atheroslcerosis	315	77.2
High blood cholesterol	48	11.8
Eating too much sugar	335	82.1
Cavities	41	10.0
Being overweight	389	95.3
Atherosclerosis	309	75.7
Cancer	20	4.9
Diabetes	70	17.2
High blood pressure	104	25.5

Table 14. Parent's knowledge about serving recommendations for each food group[1]

Food Group	N	Mean ± SD	% Correct
Fruit group[2]	408	5.2 ± 14.8	59
Milk, yogurt, and cheese group[3]	408	3.9 ±12.5	57
Meat, poultry, fish, dry beans, and eggs group[3]	408	4.4 ±14.9	62
Vegetable group[4]	408	4.7 ± 13.3	47
Bread, cereal, rice, and pasta group[5]	408	4.4 ± 13.3	3

[1] Mean number of servings parents thought were recommended for good health
[2] Correct number of servings is 2 to 4
[3] Correct number of servings is 2 to 3
[4] Correct number of servings is 3 to 5
[5] Correct number of servings is 6 to 11

Table 15. Parent's responses to questions regarding factors that affect food buying

Attitude Statements		N	%	Mean ± SD
When you buy food how important is:				
Taste				
Not at all important	1	0	0.0	3.82 ± 0.42
	2	5	1.2	
	2.5	3	0.7	
	3	60	14.7	
Very important	4	340	83.3	
How safe the food is to eat				
Not at all important	1	4	1.0	3.81 ± 0.50
	2	7	1.7	
	2.5	2	0.5	
	3	50	12.3	
Very important	4	345	84.6	
Nutrition				
Not at all important	1	4	1.0	3.54 ± 0.63
	2	16	3.9	
	2.5	5	1.2	
	3	135	33.1	
Very important	4	248	60.8	
How well the food keeps				
Not at all important	1	9	2.2	3.45 ± 0.76
	2	40	9.8	
	2.5	2	0.5	
	3	114	27.9	
Very important	4	243	59.6	
Price				
Not at all important	1	11	2.7	3.36 ± 0.75
	2	34	8.3	
	2.5	2	0.5	
	3	156	38.2	
Very important	4	205	50.2	

Table 15. Continued

Attitude Statements		N	%	Mean ± SD
How easy the food is to prepare				
Not at all important	1	17	4.2	3.09 ± 0.83
	2	71	17.4	
	2.5	6	1.5	
	3	168	41.2	
Very important	4	146	35.8	

Table 16. Parent responses to questions regarding the importance of dietary guidelines

Attitude Statements		N	%	Mean ± SD
To you personally, how important is it to:				
Choose a diet with plenty of fruits and vegetables				
Not at all important	1	3	0.7	3.67 ± 0.65
	2	25	6.1	
	2.5	3	0.7	
	3	112	27.5	
Very important	4	265	65.0	
Maintain a healthy weight				
Not at all important	1	4	1.0	3.66 ± 0.61
	2	17	4.2	
	2.5	2	0.5	
	3	91	22.3	
Very important	4	294	72.1	
Eat a variety of foods				
Not at all important	1	6	1.5	3.48 ± 0.72
	2	34	8.3	
	2.5	5	1.2	
	3	120	29.4	
Very important	4	243	59.6	
Choose a diet low in fat				
Not at all important	1	7	1.7	3.42 ± 0.73
	2	35	8.6	
	2.5	4	1.0	
	3	140	34.3	
Very important	4	222	54.4	
Choose a diet low in saturated fat				
Not at all important	1	9	2.2	3.37 ± 0.77
	2	44	10.8	
	2.5	10	2.5	
	3	129	31.6	
Very important	4	216	52.9	

Table 16. Continued

Attitude Statement		N	%	Mean ± SD
Choose a diet low in cholesterol				
Not at all important	1	11	2.7	3.35 ± 0.79
	2	46	11.3	
	2.5	6	1.5	
	3	133	32.6	
Very important	4	212	52.0	
Choose a diet with adequate fiber				
Not at all important	1	5	1.2	3.34 ± 0.74
	2	47	11.5	
	2.5	10	2.5	
	3	147	36.0	
Very important	4	199	48.8	
Use salt or sodium only in moderation				
Not at all important	1	19	4.7	3.29 ± 0.85
	2	47	11.5	
	2.5	7	1.7	
	3	130	31.9	
Very important	4	205	50.2	
Use sugars only in moderation				
Not at all important	1	13	3.2	3.26 ± 0.80
	2	52	12.7	
	2.5	3	0.7	
	3	155	38.0	
Very important	4	185	45.3	
Eat at least two servings of dairy products daily				
Not at all important	1	18	4.4	3.02 ± 0.84
	2	84	20.6	
	2.5	4	1.0	
	3	172	42.2	
Very important	4	130	31.9	

Table 16. Continued

Attitude Statement		N	%	Mean ± SD
Choose a diet with plenty of breads, cereals, rice, and pasta				
Not at all important	1	14	3.4	3.01 ± 0.80
	2	84	20.6	
	2.5	1	0.2	
	3	191	46.8	
Very important	4	118	28.9	

Table 17. Parent's responses to questions about respondent's own diet

Belief Statement		N	%	Mean ± SD
Compared to what is healthy, how do you feel about your dietary intake of:				
Protein				
Too low	1	66	16.2	2.56 ± 0.76
	2	48	11.8	
About right	3	294	72.1	
Fiber				
Too low	1	36	8.8	2.44 ± 0.65
	2	157	38.5	
About right	3	215	52.7	
Calories				
Too high	1	43	10.5	2.34 ± 0.66
	2	185	45.3	
About right	3	180	44.1	
Salt or Sodium				
Too high	1	126	30.9	2.27 ± 0.90
	2	44	10.8	
About right	3	238	58.3	
Iron				
Too low	1	159	39.0	2.19 ± 0.97
	2	11	2.7	
About right	3	238	58.3	
Vitamin C				
Too low	1	159	39.0	2.19 ± 0.97
	2	12	2.9	
About right	3	237	58.1	
Sugar and sweets				
Too high	1	156	38.2	2.15 ± 0.95
	2	35	8.6	
About right	3	217	53.2	

Table 17. Continued

Belief Statement		N	%	Mean ± SD
Cholesterol				
Too high	1	172	42.2	2.11 ± 0.97
	2	21	5.1	
About right	3	215	52.7	
Calcium				
Too low	1	184	45.1	2.04 ± 0.97
	2	23	5.6	
About right	3	201	49.3	
Saturated fat				
Too high	1	201	49.3	1.94 ± 0.96
	2	31	7.6	
About right	3	176	43.1	
Fat intake				
Too high	1	237	49.3	1.76 ± 0.93
	2	30	7.4	
About right	3	141	34.6	

Table 18. Parent's self-perception of weight status

Belief statement	N	%	Mean ± SD
Do you consider yourself to be:			
Overweight	213	52.2	1.91 ± 0.97
Underweight	18	4.4	
About right	177	43.4	

Table 19. Parent's beliefs about food choices and health status

Belief statement		N	%	Mean ± SD
How do you feel about the following statements about how people eat:				
What you eat can make a difference in your chance of getting a disease, like heart disease or cancer				
Strongly disagree	1	17	4.2	3.44 ± 0.79
	2	26	6.4	
	2.5	2	0.5	
	3	122	29.9	
Strongly agree	4	241	59.1	
Choosing a healthy diet is just a matter of knowing what foods are good and what foods are bad				
Strongly disagree	1	20	4.9	3.19 ± 0.84
	2	51	12.5	
	2.5	1	0.2	
	3	168	41.2	
Strongly agree	4	168	41.2	
Eating a variety of foods each day probably gives you all the vitamins and minerals you need				
Strongly disagree	1	31	7.6	2.96 ± 0.89
	2	76	18.6	
	2.5	1	0.2	
	3	176	43.1	
Strongly agree	4	124	30.4	
Some people are born to be fat and some thin; there is not much you can do to change this				
Strongly disagree	1	50	12.3	2.74 ± 0.98
	2	109	26.7	
	2.5	6	1.5	
	3	137	33.6	
Strongly agree	4	106	26.0	

Table 19. Continued

Belief statement		N	%	Mean ± SD
Starchy foods, like bread, potatoes, and rice make people fat				
Strongly disagree	1	55	13.5	2.74 ± 0.10
	2	103	25.2	
	2.5	4	1.0	
	3	137	33.6	
Strongly agree	4	109	26.7	
The things I eat and drink now are healthy so there is no reason for me to make changes				
Strongly disagree	1	61	15.0	2.43 ± 0.86
	2	149	36.5	
	2.5	1	0.2	
	3	157	38.5	
Strongly agree	4	40	9.8	
There are so many recommendations about healthy ways to eat, it's hard to know what one to believe				
Strongly disagree	1	160	39.2	1.85 ± 0.86
	2	172	42.2	
	2.5	1	0.2	
	3	50	12.3	
Strongly agree	4	25	6.1	

Table 20. Chi Square with degrees of freedom, goodness of fit index, comparative fit index, and normative fit index for energy, folate, calcium, and iron models

	X^2 (degrees of freedom)	Goodness of Fit Index (GFI)	Comparative Fit Index (CFI)	Normative Fit Index (NFI)	P-value
Energy	21.3 (16)	0.99	0.99	0.97	0.17
Folate	21.9 (14)	0.99	0.99	0.97	0.08
Calcium	28 7 (19)	0.99	0.99	0.97	0.07
Iron	21.6 (16)	0.99	0.99	0.97	0.16

Table 21. Correlation matrix for calcium model

1.00										
.663	1.00									
.272	.189	1.00								
.210	.301	.588								
.123	.237	.118		1.00						
-.055	.095	-.058		.211	1.00					
.053	.179	.028		.023	.174	1.00				
.066	.174	.050		.162	-.009	.103	1.00			
.064	.245	.004		.39[illegible]	.027	.153	.260	1.00		
.185	.312	.082		.291	-.012	.156	.332	.462	1.00	
.234	.198	.176		.310	-.029	.035	.232	.256	.434	1.00
Label										
Parent's calcium	Parent's food group score	Children calcium	Child food group	Knowledge	Attitude	Beliefs	Parent's age	Parent's grade	Percent poverty	Race
Mean										
7.0	35.8	9.60	[illegible].8	2[illegible]	[illegible]	45.3	42.6	13.5	216.1	.44
Standard deviation										
3.82	7.6	5.36	7.6	9		6.3	6.2	2.6	96.7	.73

Table 22. Direct, indirect, and total effects for calcium model

		Direct	Indirect	Total
Parent's Food Group Score	Y_1			
Knowledge	X_1	0.13*		0.13*
Attitude	X_2	0.05		0.05
Belief	X_3	0.12*		0.12*
Parent's age	X_4	0.06		0.06
Parent's grade	X_5	0.06		0.06
Percent poverty	X_6	0.21*		0.21*
R^2=0.15				
Parent's Calcium	Y_2			
Knowledge	X_1		0.09*	0.09*
Attitude	X_2	-0.11*	0.03	-0.08*
Belief	X_3		0.08*	0.08*
Parent's age	X_4	-0.05	0.04	-0.02
Parent's grade	X_5	-0.12*	0.04	-0.08
Percent of Poverty	X_6		0.14*	0.14*
Parent's Race	X_7	0.14*		0.14*
Parent's food group score	Y_2	0.69*		0.70*
R^2=0.48				
Children's Food Group Score	Y_3			
Knowledge	X_1		0.04*	0.04*
Attitude	X_2		0.01	0.01
Belief	X_3		0.04*	0.04*
Parent's age	X_4		0.02	0.02
Parent's grade	X_5		0.02	0.02
Percent poverty	X_6		0.06*	0.06*
Parent's food group score	Y_2	0.30*		0.30*
Children's Calcium	Y_4			
Knowledge	X_1		0.03*	0.03*
Attitude	X_2		-0.02	-0.02
Belief	X_3		0.02*	0.02*
Parent's age	X_4		0.00	0.00
Parent's grade	X_5		-0.02	-0.02
Percent poverty	X_6		0.04*	0.04*
Parent's Race	X_7		0.03*	0.03*
Parent's calcium intake	Y_1	0.25*		0.25*
parent's food group score	Y_2	-0.15*	0.35*	0.20*
Children's food group score	Y_3	0.58*		0.58*
R^2=0.39				
R^2=0.09				

* $p < 0.05$

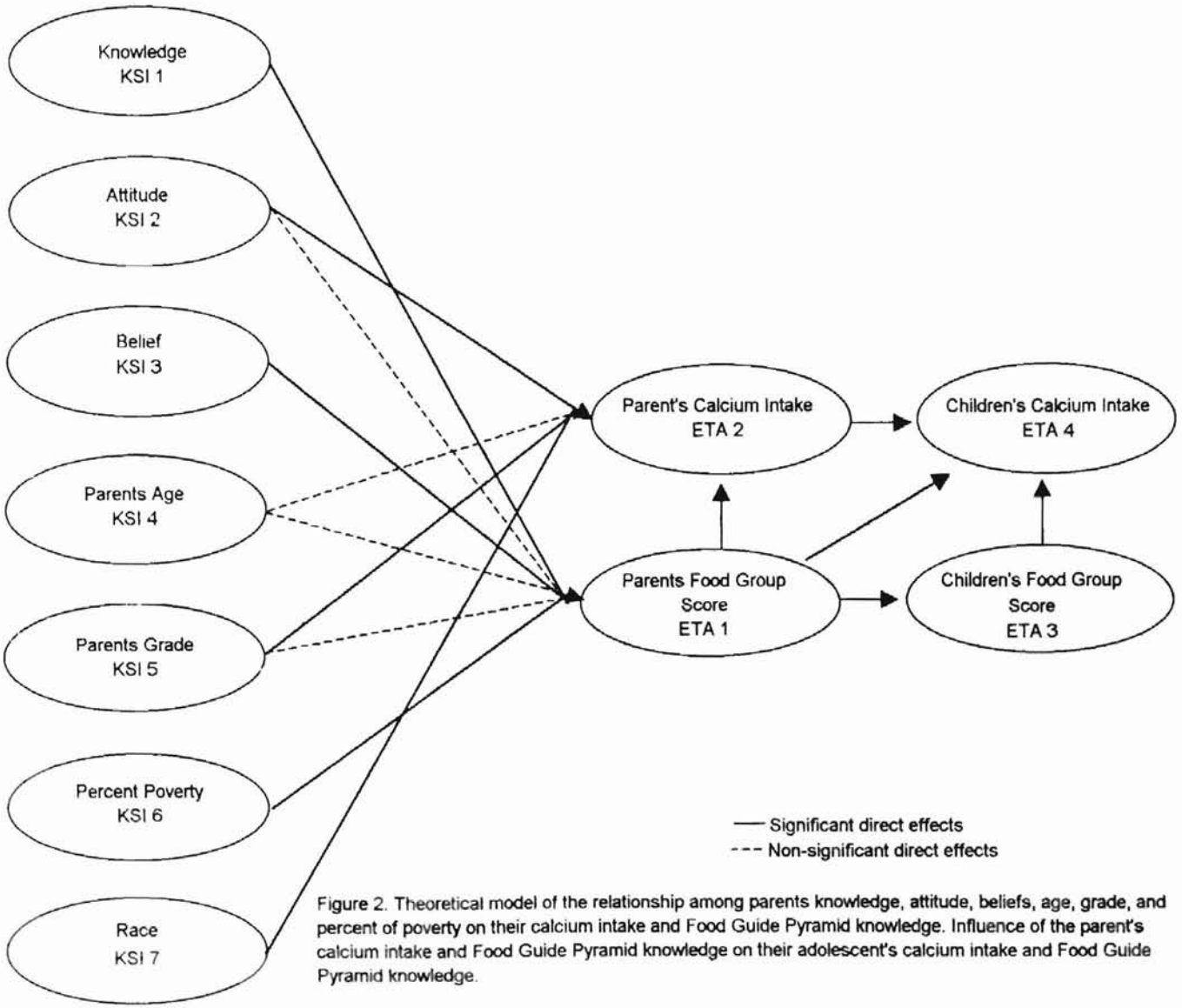

Figure 2. Theoretical model of the relationship among parents knowledge, attitude, beliefs, age, grade, and percent of poverty on their calcium intake and Food Guide Pyramid knowledge. Influence of the parent's calcium intake and Food Guide Pyramid knowledge on their adolescent's calcium intake and Food Guide Pyramid knowledge.

Table 23. Correlation matrix for iron model

1.00									
.520	1.00								
.217	.189	1.00							
182	.301	.504	1.00						
.063	237	.140	.107	1.00					
-.096	.095	.051	.017	.211	1.00				
.107	.179	.019	.062	.023	.174	1.00			
.153	.174	.033	-.056	.162	-.009	.103	1.00		
.157	.245	.027	.021	.390	.027	.153	.260	1.00	
.142	.312	-.012	.010	.291	-.012	.156	.332	.462	1.00
Label									
Parent's iron	Parent's food group score	Children's iron	Children's food group score	Knowledge	Attitude	Belief	Parent's age	Parent's grade	Percent poverty
Mean									
14.7	35.8	16.6	35.8	21.6	57.8	45.3	42.6	13.5	216.1
Standard deviation									
7.4	7.6	8.6	7.6	4.9	6.2	6.3	6.2	2.6	96.7

Table 24. Direct, indirect, and total effects for iron model

		Direct	Indirect	Total
Parent's Food Group Score	Y_1			
Knowledge	X_1	0.14*		0.14*
Attitude	X_2			
Belief	X_3	0.13*		0.13*
Parent's age	X_4	0.05		0.05
Parent's grade	X_5	0.06		0.06
Percent poverty	X_6	0.20*		0.20*
R^2=0.14				
Parent's Iron	Y_2			
Knowledge	X_1	-0.05	0.08*	0.02
Attitude	X_2	-0.14*		-0.14*
Belief	X_3		0.07*	0.07*
Parent's age	X_4	0.07	0.03	0.10
Parent's grade	X_5	0.06	0.03	0.09
Percent poverty	X_6	-0.06	0.11*	0.05
Parent's food group score	Y_2	0.54*		0.54*
R^2=0.31				
Children's Food Group Score	Y_3			
Knowledge	X_1		0.04*	0.04*
Belief	X_3		0.04*	0.04*
Parent's age	X_4		0.02	0.02
Parent's grade	X_5		0.02	0.02
Percent poverty	X_6		0.06*	0.06*
Parent's food group score	Y_2	0.30*		0.30*
R^2=0.09				
Children's Iron	Y_4			
Knowledge	X_1		0.02*	0.02*
Attitude	X_2		-0.02*	-0.02*
Belief	X_3		0.03*	0.03*
Parent's age	X_4		0.02	0.02
Parent's grade	X_5		0.02	0.02
Percent poverty	X_6		0.04*	0.04*
Parent's iron	Y_1	0.13*		0.13*
Parent's food group score	Y_2		0.21*	0.21*
Children's food group score	Y_4	0.48*		0.48*
R^2=0.27				

* $p < 0.05$

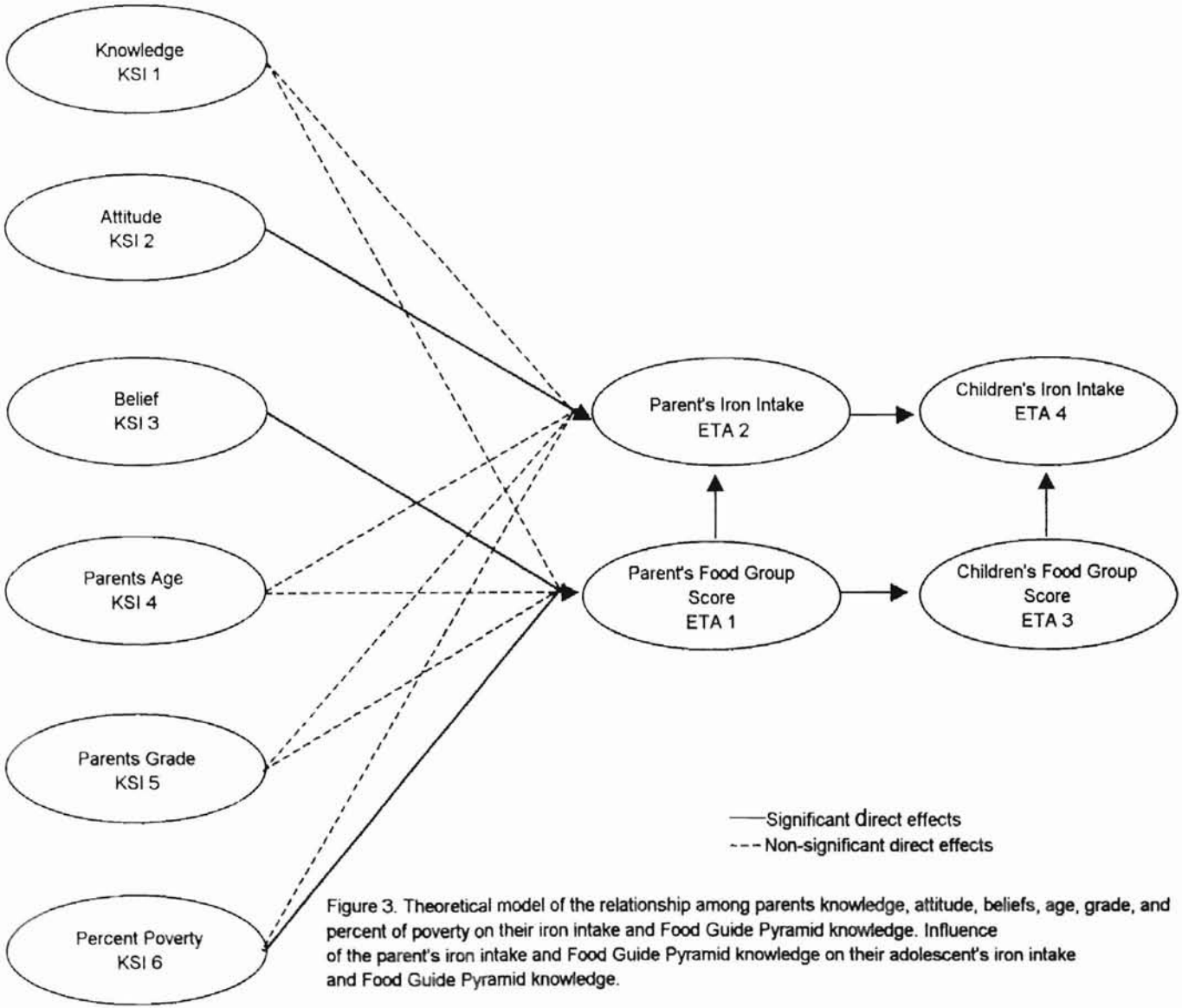

Figure 3. Theoretical model of the relationship among parents knowledge, attitude, beliefs, age, grade, and percent of poverty on their iron intake and Food Guide Pyramid knowledge. Influence of the parent's iron intake and Food Guide Pyramid knowledge on their adolescent's iron intake and Food Guide Pyramid knowledge.

Table 25. Correlation matrix for folate model

1.00									
.494	1.00								
.264	.189	1.00							
.222	.301	.566	1.00						
.057	.237	.156	.107	1.00					
-.059	.095	.032	.017	.211	1.00				
.183	.179	.046	.062	.023	.174	1.00			
.174	.174	.031	-.056	.162	-.009	.103	1.00		
.172	.245	.074	.021	.390	.027	.153	.260	1.00	
.151	.312	.049	.010	.291	-.012	.156	.332	.462	1.00
Label									
Parent's folate	Parent's food group score	Children's folate	Children's food group score	Knowledge	Attitude	Belief	Parent's age	Parent's grade	Percent poverty
Mean									
244.0	35.8	268.7	35.8	21.6	57.8	45.3	42.6	13.5	216.1
Standard Deviation									
144.4	7.6	166.6	7.6	4.9	6.2	6.3	6.2	2.6	96.7

Table 26. Direct, indirect, and total effects for folate model

		Direct	Indirect	Total
Parent's Food Group Score	Y_1			
Knowledge	X_1	0.14*		0.14*
Belief	X_3	0.13*		0.13*
Parent's age	X_4	0.05		0.05
Parent's grade	X_5	0.06		0.06
Percent poverty	X_6	0.20*		0.20*
R^2=0.14				
Parent's Folate	Y_2			
Knowledge	X_1	0.06	0.07*	0.01
Attitude	X_2	-0.11*		-0.11*
Belief	X_3	0.11*	0.06*	0.17*
Parent's age	X_4	0.09*	0.03	0.12*
Parent's grade	X_5	0.07	0.03	0.10*
Percent poverty	X_6	-0.06	0.10*	0.04*
Parent's food group score	Y_2	0.49*		0.49*
R^2=0.28				
Children's Food Group Score	Y_3			
Knowledge	X_1		0.04*	0.04*
Attitude	X_2		-0.01	-0.01
Belief	X_3		0.05*	0.05*
Parent's age	X_4		0.02	0.02
Parent's grade	X_5		0.03	0.03
Percent poverty	X_6		0.06*	0.06*
Parent's folate	Y_1	0.10*		0.10*
Parent's food group score	Y_2	0.25*	0.05*	0.30*
R^2=0.10				
Children's Folate	Y_4			
Knowledge	X_1		0.02	0.02
Attitudes	X_2		-0.02*	-0.02*
Belief	X_3		0.05*	0.05*
Parent's age	X_4		0.03*	0.03*
Parent's grade	X_5		0.03*	0.03*
Percent poverty	X_6		0.03*	0.03*
Parent's folate	Y_1	0.15*	0.05*	0.20*
Parent's food group score	Y_2		0.23*	0.25*
Children's food group score	Y_4	0.53*		0.53*
R^2=0.34				

* $p < 0.05$

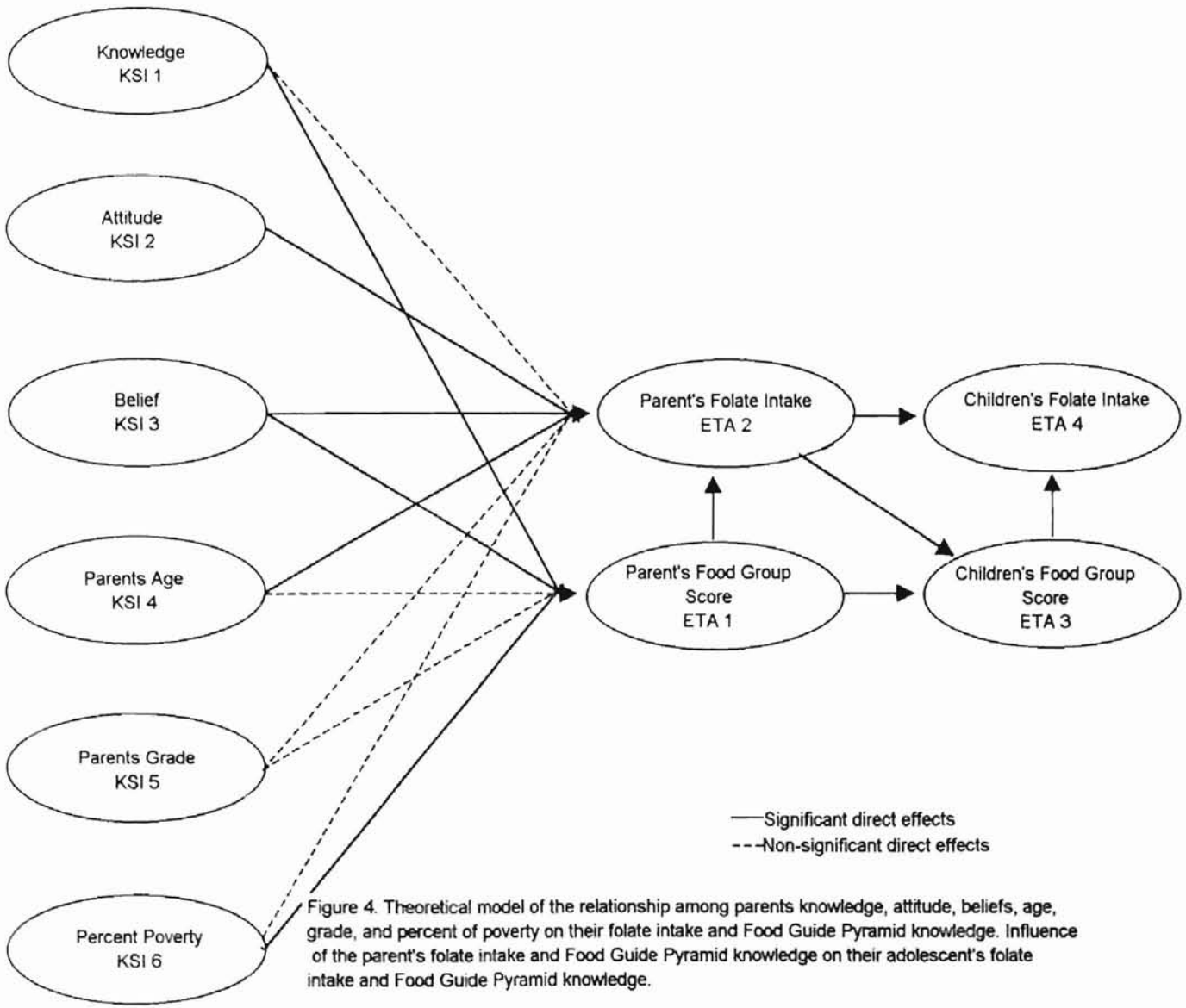

Figure 4. Theoretical model of the relationship among parents knowledge, attitude, beliefs, age, grade, and percent of poverty on their folate intake and Food Guide Pyramid knowledge. Influence of the parent's folate intake and Food Guide Pyramid knowledge on their adolescent's folate intake and Food Guide Pyramid knowledge.

Table 27. Correlation matrix for energy model

1.00									
.513	1.00								
.151	.160	1.00							
.092	.301	.556	1.00						
.003	.237	.052	.107	1.00					
-.219	.095	-.072	.017	.211	1.00				
-.036	.179	-.054	.062	.023	.174	1.00			
.054	.174	.019	-.056	.162	-.009	.103	1.00		
.090	.245	-.022	.021	.390	.027	.153	.260	1.00	
.159	.312	-.039	.010	.291	-.012	.156	.332	.462	1.00
Label									
Parent's energy	Parent's food group score	Children's energy	Children's food group score	Knowledge	Attitude	Belief	Parent's age	Parent's grade	Percent poverty
Mean									
20.03	35.8	22.86	35.8	21.6	57.8	45.3	42.6	13.5	216.1
Standard deviation									
7.66	7.6	8.66	7.6	4.9	6.2	6.3	6.2	2.6	96.7

Table 28. Direct, indirect, and total effects for energy model

		Direct	Indirect	Total
Parent's Food Group Score	Y_1			
Knowledge	X_1	0.14*		0.14*
Belief	X_3	0.13		0.13*
Parent's age	X_4	0.05		0.05
Parent's age	X_5	0.06		0.06
Percent poverty	X_6	0.20*		0.20*
R^2=0.14				
Parent's Energy	Y_2			
Knowledge	X_1	-0.08	0.08	0.00
Belief	X_2	-0.09*	0.07*	-0.02
Attitude	X_3	-0.24*		-0.24*
Parent's age	X_4		0.03	0.03
Parent's grade	X_5		0.03	0.03
Percent poverty	X_6		0.12*	0.12*
Parent's food group score	Y_2	0.57*		0.57*
R^2=0.36				
Children's Food Group Score	Y_3			
Knowledge	X_1		0.05*	0.05*
Belief	X_3		0.05*	0.05*
Parent's age	X_4		0.02	0.02
Parent's grade	X_5		0.02	0.02
Percent poverty	X_6		0.06*	0.06*
Parent's energy	Y_1	-0.09		-0.09
Parent's food group score	Y_2	0.34*	-0.05	0.30*
R^2=0.10				
Children's Energy	Y_4			
Knowledge	X_1		0.02	0.02
Belief	X_3		0.01	0.01
Parent's age	X_4		0.01	0.01
Parent's grade	X_5		0.01	0.01
Percent poverty	X_6		0.03*	0.03*
Child's Food Group Score	Y_4	0.57*		0.57*
Parent's energy	Y_1	0.14*	-0.05	0.09
Parent's food group score	Y_2	-0.08*	0.25*	0.17*
R^2=0.32				

* $p < 0.05$

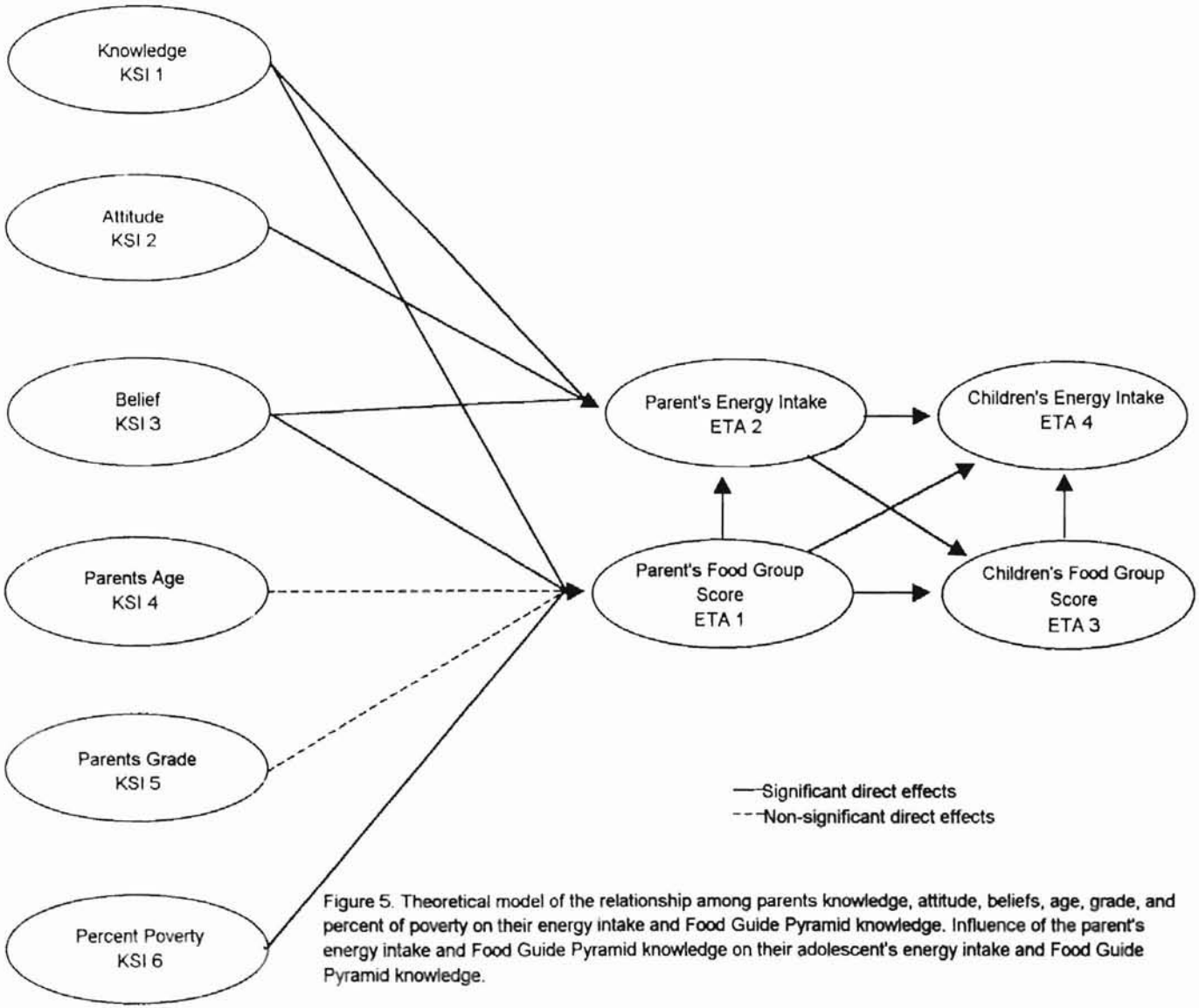

Figure 5. Theoretical model of the relationship among parents knowledge, attitude, beliefs, age, grade, and percent of poverty on their energy intake and Food Guide Pyramid knowledge. Influence of the parent's energy intake and Food Guide Pyramid knowledge on their adolescent's energy intake and Food Guide Pyramid knowledge.

Table 29. Correlation among exogenous factors (phi) for calcium, iron, folate and energy model

	Knowledge	Attitude	Belief	Parent's Age	Parent's Grade
Attitude	0.21*				
Belief	0.02	0.17*			
Parent's age	0.16*	-0.01	0.10*		
Parent's grade	0.39*	0.03	0.15*	0.26*	
Percent poverty	0.29*	-0.01	0.16*	0.33*	0.46*

*Significant at $p < 0.05$ level

APPENDIX A

WHAT WE EAT IN AMERICA: 1994-1996
CONTINUING SURVEY OF FOOD INTAKES BY INDIVIDUALS

Conducted for:

United States Department of Agriculture

Conducted by:

Westat
1650 Research Blvd.
Rockville, MD 20850

TIME STARTED _____ AM PM

SUGGESTED INTRODUCTION: [YOU MAY PARAPHRASE THE INTRODUCTION AS LONG AS THE SAME CONTENTS ARE PRESENTED.]

When I talked to you before, I said I would get back in touch with you to ask a few more questions about your opinions on your diet, health, food shopping, and related topics.

Before I begin, I would appreciate it if you could get the post card I mailed you which reminded you of the interview. It lists the answer choices and will help the interview go more quickly.

(IF RESPONDENT DOES NOT REMEMBER RECEIVING CARD OR HAS MISPLACED IT, REASSURE RESPONDENT THAT THE INTERVIEW CAN STILL TAKE PLACE AND YOU WILL SIMPLY REPEAT THE ANSWER CATEGORIES MORE FREQUENTLY. IF RESPONDENT DOES HAVE THE CARD, REFER HIM/HER TO THE APPROPRIATE CATEGORY.)

1. Let's begin by talking about the number of servings from different food groups that a person should eat each day. *How many servings from the (FOOD GROUP) would you say a person of your age and sex* should eat each day for good health? (DO NOT ACCEPT A RANGE OF SERVINGS.)

   What about the (NEXT FOOD GROUP)?

IF ASKED, SAY: "Count as a serving whatever you consider a serving to be."

START AT "X"

	FOOD GROUP	NUMBER OF SERVINGS	DON'T KNOW
	a. Fruit Group?	|__|__|	98
	b. Vegetable Group?	|__|__|	98
	c. Milk, Yogurt, and Cheese Group?	|__|__|	98
	d. Bread, Cereal, Rice, and Pasta Group?	|__|__|	98
	e. Meat, Poultry, Fish, Dry Beans, and Eggs Group?	|__|__|	98

2. Now I am going to read some statements about what people eat. Please tell me if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement: (READ STATEMENT).

What about (NEXT STATEMENT)?

IF NEEDED, SAY: "Do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement?"

START AT "X"

	STATEMENT	CATEGORY A Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
	a. Choosing a healthy diet is just a matter of knowing what foods are good and what foods are bad.	4	3	2	1
	b. Eating a variety of foods each day probably gives you all the vitamins and minerals you need.	4	3	2	1
	c. Some people are born to be fat and some thin; there is not much you can do to change this.	4	3	2	1
	d. Starchy foods, like bread, potatoes, and rice, make people fat.	4	3	2	1
	e. There are so many recommendations about healthy ways to eat, it's hard to know what to believe.	4	3	2	1
	f. What you eat can make a big difference in your chance of getting a disease, like heart disease or cancer.	4	3	2	1
	g. The things I eat and drink now are healthy so there is no reason for me to make changes.	4	3	2	1
	STATEMENT	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree

3. Next, let's talk about <u>your own</u> diet. Compared to what is healthy, do you think your diet is too low, too high, or about right in (STATEMENT)?

What about (NEXT STATEMENT)?

> IF NEEDED, SAY: "Would you say your diet is too low, too high, or about right in that?"
>
> IF NEEDED, SAY: "The question is asking about nutrients from foods, not from vitamin pills."

START AT "X"

	STATEMENT	CATEGORY B: Too Low	Too High	About Right	DON'T KNOW
	a. Calories?	1	2	3	8
	b. Calcium?	1	2	3	8
	c. Iron?	1	2	3	8
	d. Vitamin C?	1	2	3	8
	e. Protein?	1	2	3	8
	f. Fat?	1	2	3	8
	g. Saturated fat?	1	2	3	8
	h. Cholesterol?	1	2	3	8
	i. Salt or sodium?	1	2	3	8
	j. Fiber?	1	2	3	8
	k. Sugar and sweets?	1	2	3	8
	STATEMENT	Too Low	Too High	About Right	DON'T KNOW

4. To you personally, is it very important, somewhat important, not too important, or not at all important to (STATEMENT)?

To you personally, how important is it to (NEXT STATEMENT)?

IF NEEDED, SAY: "Is that very important, somewhat important, not too important, or not at all important to you personally?"
IF NEEDED, SAY: "The question is not asking about your actual eating habits, it is asking about the importance of the statement to you personally."

		CATEGORY C				
	STATEMENT	Very Important	Somewhat Important	Not Too Important	Not At All Important	DON'T KNOW
START AT "X"	a. Use salt or sodium only in moderation?	4	3	2	1	8
	b. Choose a diet low in saturated fat?	4	3	2	1	8
	c. Choose a diet with plenty of fruits and vegetables?	4	3	2	1	8
	d. Use sugars only in moderation?	4	3	2	1	8
	e. Choose a diet with adequate fiber?	4	3	2	1	8
	f. Eat a variety of foods?	4	3	2	1	8
	g. Maintain a healthy weight?	4	3	2	1	8
	h. Choose a diet low in fat?	4	3	2	1	8
	i. Choose a diet low in cholesterol?	4	3	2	1	8
	j. Choose a diet with plenty of breads, cereals, rice, and pasta?	4	3	2	1	8
	k. Eat at least two servings of dairy products daily?	4	3	2	1	8
	STATEMENT	Very Important	Somewhat Important	Not Too Important	Not At All Important	DON'T KNOW

START AT "X"	5. Have you heard about any health problems caused by (BEHAVIOR)? (ASK QUESTIONS 5A - 5G AND 6 UNTIL COMPLETE, THEN GO TO QUESTION 7.)	6. What health problems are these? Any other problems? (DO NOT READ PROBLEMS) (CIRCLE CODE IN THE APPROPRIATE ROW BELOW) 01 – Arteriosclerosis/Atherosclerosis 02 – Arthritis 03 – Bone problems/Rickets 04 – Breathing problems 05 – Cancer (All types) 07 – Cavities/Caries 01 – Clogged arteries 06 – Colitis/Colon problems 06 – Constipation 01 – Coronary disease 06 – Diabetes 06 – Digestive problems 06 – Diverticulosis 09 – Edema 10 – Fatigue 15 – Fat/Overweight 01 – Hardening of the arteries 01 – Heart problems/Heart attack 11 – High blood cholesterol 12 – High blood pressure 08 – High blood sugar 13 – Hyperactivity 12 – Hypertension 06 – Irregularity 14 – Kidney disease 10 – Lack of energy 15 – Obesity/Overweight 03 – Osteoporosis 14 – Renal disease 16 – Stroke 10 – Tiredness 07 – Tooth problems 09 – Water (fluid) retention 17 – HEALTH PROBLEMS NOT SPECIFIED 00 – Other disease/problem (SPECIFY)																		
	BEHAVIOR																			
	a. Eating too much fat? YES ..... 1 (Q6) NO 2 (Q5b)	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	00 (SPECIFY)	|_|_|
	b. Not eating enough fiber? YES ..... 1 (Q6) NO 2 (Q5c)	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	00 (SPECIFY)	|_|_|
	c. Eating too much salt or sodium? YES ..... 1 (Q6) NO 2 (Q5d)	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	00 (SPECIFY)	|_|_|
	d. Not eating enough calcium? YES ..... 1 (Q6) NO 2 (Q5e)	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	00 (SPECIFY)	|_|_|
	e. Eating too much cholesterol? YES ..... 1 (Q6) NO 2 (Q5f)	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	00 (SPECIFY)	|_|_|
	f. Eating too much sugar? YES ..... 1 (Q6) NO 2 (Q5g)	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	00 (SPECIFY)	|_|_|
	g. Being overweight? YES ..... 1 (Q6) NO 2 (Q5a)	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	00 (SPECIFY)	|_|_|

7. Do you consider yourself to be . . .

overweight,	1
underweight, or	2
about right?	3

8. Based on your knowledge, which has more saturated fat: (READ EACH PAIR STARTING AT "X" AND THEN WAIT FOR AN ANSWER. DO NOT PROBE "DON'T KNOW" ANSWERS.)

	PAIRS	
START AT "X"	a. Liver, or	1
	T-bone steak?	2
	THE SAME	3
	DON'T KNOW	8
	b. Butter, or	1
	Margarine?	2
	THE SAME	3
	DON'T KNOW	8
	c. Egg white, or	1
	Egg yolk?	2
	THE SAME	3
	DON'T KNOW	8
	d. Skim milk, or	1
	Whole milk?	2
	THE SAME	3
	DON'T KNOW	8

9. Which has more fat: (READ EACH PAIR STARTING AT "X" AND THEN WAIT FOR AN ANSWER. DO NOT PROBE "DON'T KNOW" ANSWERS.)

	PAIRS	
START AT "X"	a. Regular hamburger, or	1
	Ground round?	2
	THE SAME	3
	DON'T KNOW	8
	b. Loin pork chops, or	1
	Pork spare ribs?	2
	THE SAME	3
	DON'T KNOW	8
	c. Hot dogs, or	1
	Ham?	2
	THE SAME	3
	DON'T KNOW	8
	d. Peanuts, or	1
	Popcorn?	2
	THE SAME	3
	DON'T KNOW	8
	e. Yogurt, or	1
	Sour cream?	2
	THE SAME	3
	DON'T KNOW	8
	f. Porterhouse steak, or	1
	Round steak?	2
	THE SAME	3
	DON'T KNOW	8

DO NOT PROBE "DON'T KNOW" ANSWERS FOR Q10-14.

10. Which kind of fat is more likely to be a liquid rather than a solid . .

saturated fats,	1
polyunsaturated fats, or	2
are they equally likely to be liquids?	3
DON'T KNOW	8

11. If a food has no cholesterol is it also . . .

low in saturated fat,	1
high in saturated fat, or	2
could it be either high or low in saturated fat?	3
DON'T KNOW	8

12. Is cholesterol found in . . .

vegetables and vegetable oils,	1
animal products like meat and dairy products, or	2
all foods containing fat or oil?	3
DON'T KNOW	8

13. If a product is labeled as containing only vegetable oil is it . . .

low in saturated fat,	1
high in saturated fat, or	2
could it be either high or low in saturated fat?	3
DON'T KNOW	8

14. If a food product is labeled "light," does that mean that compared to a similar product not labeled "light" it is lower in calories, lower in fat, or lower in calories and/or fat, or does it mean something else?

LOWER IN CALORIES	1
LOWER IN FAT	2
LOWER IN CALORIES AND/OR FAT	3
SOMETHING ELSE	4
DON'T KNOW	8

15. Now think about buying food. When you buy food, how important is (FACTOR) – very important, somewhat important, not too important, or not at all important?

What about (NEXT FACTOR)?

IF NEEDED, SAY:	"How important is (FACTOR) – very important, somewhat important, not too important, or not at all important when you buy food?"

		CATEGORY C				
	FACTOR	Very Important	Somewhat Important	Not Too Important	Not At All Important	DON'T KNOW
START AT 'X'	a. How safe the food is to eat?	4	3	2	1	8
	b. Nutrition?	4	3	2	1	8
	c. Price?	4	3	2	1	8
	d. How well the food keeps?	4	3	2	1	8
	e. How easy the food is to prepare?	4	3	2	1	8
	f. Taste?	4	3	2	1	8

16. Now think about food labels. When you buy foods, do you use (SECTION) often, sometimes, rarely, or never?

What about (NEXT SECTION)?

IF NEEDED, SAY: "Do you use (SECTION) often, sometimes, rarely, or never?"

START AT "X"

SECTION	CATEGORY D: Often (Always)	Sometimes	Rarely	Never	NEVER SEEN	DON'T KNOW
a. The list of ingredients?	1	2	3	4	5	8
b. The short phrases on the label like "low-fat" or "light" or "good source of fiber"?	1	2	3	4	5	8
c. The nutrition panel that tells the amount of calories, protein, fat, and such in a serving of the food?	1	2	3	4	5	8
d. The information about the size of a serving?	1	2	3	4	5	8
e. Statements on the label that describe health benefits of nutrients or foods?	1	2	3	4	5	8

BOX 1

IN Q16 ABOVE, IS CODE 4, 5, OR 8 CIRCLED FOR EVERY ITEM (a-e)?

YES ..... 1 (Q24, PAGE 16)
NO 2 (Q17)

17. When you look for nutrition information on the food label, would you say you often, sometimes, rarely, or never look for information about (STATEMENT)?

What about (NEXT STATEMENT)?

IF NEEDED, SAY: "Would you say you often, sometimes, rarely, or never look for information about that?"

START AT "X"

STATEMENT	CATEGORY D: Often (Always)	Sometimes	Rarely	Never
a. Calories?	1	2	3	4
b. Salt or sodium?	1	2	3	4
c. Total fat?	1	2	3	4
d. Saturated fat?	1	2	3	4
e. Cholesterol?	1	2	3	4
f. Vitamins or minerals?	1	2	3	4
g. Fiber?	1	2	3	4
h. Sugars?	1	2	3	4

18. *Now think about the types of food products you buy using food labels.* When you buy (FOOD PRODUCT), do you look for nutrition information on the food label often, sometimes, rarely, or never?

What about (NEXT FOOD PRODUCT)?

IF NEEDED, SAY: "And when you buy (FOOD PRODUCT), do you look for nutrition information on the food label often, sometimes, rarely, or never?"

START AT "X"

FOOD PRODUCT	CATEGORY D: Often (Always)	Sometimes	Rarely	Never	NEVER SEEN	DO NOT BUY
a. Dessert items like cookies or cake mixes?	1	2	3	4	5	6
b. Snack items like chips, popcorn, or pretzels?	1	2	3	4	5	6
c. Frozen dinners or main dishes?	1	2	3	4	5	6
d. Breakfast cereals?	1	2	3	4	5	6
e. Cheese?	1	2	3	4	5	6
f. Fresh fruits or vegetables?	1	2	3	4	5	6
g. Salad dressings?	1	2	3	4	5	6
h. Table spreads like butter or margarine?	1	2	3	4	5	6
i. Raw meat, poultry, or fish?	1	2	3	4	5	6
j. Processed meat products like hot dogs and bologna?	1	2	3	4	5	6
FOOD PRODUCT	Often (Always)	Sometimes	Rarely	Never	NEVER SEEN	DO NOT BUY

19. Now think about the types of nutrition information on food labels. Do you think (SECTION) is very easy to understand, somewhat easy, or not too easy to understand?

What about (NEXT SECTION)?

IF NEEDED, SAY: "Would you say that is very easy to understand, somewhat easy, or not too easy to understand?"

START AT "X"

SECTION	CATEGORY E: Very Easy	Somewhat Easy	Not Too Easy	NEVER SEEN	DON'T KNOW
a. The list of ingredients?	1	2	3	4	8
b. A short phrase like "low-fat" or "light" or "good source of fiber"?	1	2	3	4	8
c. The number of calories in a serving?	1	2	3	4	8
d. The number of calories from fat in a serving?	1	2	3	4	8
e. The number of grams or milligrams of nutrients like fat and sodium in a serving?	1	2	3	4	8
f. The percent of the daily value for each nutrient?	1	2	3	4	8
g. A description like "lean" or "extra lean" on meats?	1	2	3	4	8
SECTION	Very Easy	Somewhat Easy	Not Too Easy	NEVER SEEN	DON'T KNOW

20. If a food label says a food is (DESCRIPTION), would you say you are very confident, somewhat confident, or not too confident that the description is a reliable basis for choosing foods?

What about (NEXT DESCRIPTION)?

IF NEEDED, SAY: "How confident are you that the description is reliable? Would you say very confident, somewhat confident, or not too confident?"

START AT "X"

DESCRIPTION	CATEGORY F: Very Confident	Somewhat Confident	Not Too Confident	DON'T KNOW
a. Low-fat?	1	2	3	8
b. Low-cholesterol?	1	2	3	8
c. A good source of fiber?	1	2	3	8
d. Light?	1	2	3	8
e. Healthy?	1	2	3	8
f. Extra lean?	1	2	3	8

21. As far as you know, does the government define and enforce the meaning of the phrase (PHRASE) on food labels? (DO NOT PROBE "DON'T KNOW" ANSWERS.)

What about the phrase (NEXT PHRASE)?

START AT "X"

	PHRASE	YES	NO	DON'T KNOW
a.	Low-cholesterol?	1	2	8
b.	Light?	1	2	8
c.	Extra lean?	1	2	8

22. Now think about the section of the food label that tells the amount of calories, protein, and fat in a serving of the food. If it showed that one serving of the food contained (AMOUNT OF NUTRIENT), would you consider that to be a low amount or a high amount? (DO NOT PROBE "DON'T KNOW" ANSWERS.)

What about (NEXT AMOUNT OF NUTRIENT)?

IF NEEDED, SAY: "Would you consider that to be a low amount or a high amount for one serving of food?"

START AT "X"

	AMOUNT OF NUTRIENT	Low	High	DON'T KNOW
a.	100 milligrams of sodium?	1	2	8
b.	20 grams of fat?	1	2	8
c.	15 milligrams of cholesterol?	1	2	8
d.	5 grams of fiber?	1	2	8
e.	10 grams of saturated fat?	1	2	8

23. Now I am going to read some statements. Please tell me if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement: (READ STATEMENT)

What about (NEXT STATEMENT)?

IF NEEDED, SAY: "Do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement?"

		CATEGORY A				
	STATEMENT	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	NO OPINION
START AT "X"	a. The nutrition information on food labels is useful to me.	4	3	2	1	0
	b. I feel confident that I know how to use food labels to choose a healthy diet.	4	3	2	1	0
	c. The nutrition information on food labels is hard to interpret.	4	3	2	1	0
	d. Reading food labels takes more time than I can spare.	4	3	2	1	0
	e. I read food labels because good health is important to me.	4	3	2	1	0
	f. I would like to learn more about how to use food labels to choose a nutritious diet.	4	3	2	1	0
	g. Reading food labels makes it easier to choose foods.	4	3	2	1	0
	h. Sometimes I try new foods because of the information on the food label.	4	3	2	1	0
	i. When I use food labels, I make better food choices.	4	3	2	1	0
	j. Using food labels to choose foods is better than just relying on my own knowledge about what is in them.	4	3	2	1	0
	STATEMENT	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	NO OPINION

24. Now I am going to read some statements about food labels. Please tell me if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement: (READ STATEMENT)

What about (NEXT STATEMENT)?

IF NEEDED, SAY: "Do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement?"

START AT "X"	STATEMENT	CATEGORY A: Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	NO OPINION
	a. I feel confident that I know how to use food labels to choose a healthy diet.	4	3	2	1	0
	b. The nutrition information on food labels is hard to interpret.	4	3	2	1	0
	c. Reading food labels takes more time than I can spare.	4	3	2	1	0
	d. I would like to learn more about how to use food labels to choose a nutritious diet.	4	3	2	1	0
	e. Using food labels to choose foods would be better than just relying on my own knowledge about what is in them.	4	3	2	1	0
	STATEMENT	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	NO OPINION

25. As far as you know, does the government define and enforce the meaning of the phrase (PHRASE) on food labels? (DO NOT PROBE "DON'T KNOW" ANSWERS.)

What about the phrase (NEXT PHRASE)?

START AT "X"	PHRASE	YES	NO	DON'T KNOW
	a. Low-cholesterol?	1	2	8
	b. Light?	1	2	8
	c. Extra lean?	1	2	8

26. Now think about the foods you eat. Would you say you always, sometimes, rarely, or never (HABIT)? What about (NEXT HABIT)?

IF NEEDED, SAY: "Do you always, sometimes, rarely, or never (HABIT)?"

	CATEGORY G				
HABIT	Always (Almost Always)	Some-times	Rarely	Never	DOES NOT EAT THIS FOOD
a. Eat lower-fat luncheon meats <u>instead</u> of regular luncheon meats? (IF NEEDED, SAY: "Examples of lower-fat luncheon meats are deli ham and turkey. Examples of regular luncheon meats are bologna and salami.")	1	2	3	4	0
b. Use skim or 1% milk <u>instead</u> of 2% or whole milk?	1	2	3	4	0
c. Eat special, low-fat cheeses, when you eat cheese?	1	2	3	4	0
d. Eat ice milk, frozen yogurt, or sherbet <u>instead</u> of ice cream?	1	2	3	4	0
e. Use low-calorie <u>instead</u> of regular salad dressing?	1	2	3	4	0
f. Have fruit for dessert when you eat dessert?	1	2	3	4	0
g. Eat fish or poultry <u>instead</u> of meat? (IF NEEDED, SAY: "Meat refers to beef, pork, or lamb."	1	2	3	4	0
HABIT	Always (Almost Always)	Some-times	Rarely	Never	DOES NOT EAT THIS FOOD

FOR QUESTIONS 27-31 USE CATEGORY G

27. When you eat baked or boiled potatoes, how often do you add butter, margarine, or sour cream? Would you say always, sometimes, rarely, or never?

ALWAYS (ALMOST ALWAYS)	1
SOMETIMES	2
RARELY	3
NEVER	4
DO NOT EAT BAKED OR BOILED POTATOES	0

28. When you eat other cooked vegetables, do you always, sometimes, rarely, or never eat them with butter or margarine added?

ALWAYS (ALMOST ALWAYS)	1	
SOMETIMES	2	
RARELY	3	
NEVER	4	
DO NOT EAT COOKED VEGETABLES	0	(Q30)

29. When you eat other cooked vegetables, do you always, sometimes, rarely, or never eat them with cheese or another creamy sauce added?

ALWAYS (ALMOST ALWAYS)	1
SOMETIMES	2
RARELY	3
NEVER	4

30. When you eat chicken, do you always, sometimes, rarely, or never eat it fried?

ALWAYS (ALMOST ALWAYS)	1	
SOMETIMES	2	
RARELY	3	
NEVER	4	
DO NOT EAT CHICKEN	0	(Q32)

31. When you eat chicken, do you always, sometimes, rarely, or never remove the skin?

ALWAYS (ALMOST ALWAYS)	1
SOMETIMES	2
RARELY	3
NEVER	4

32. Would you describe the amount of butter or margarine you usually spread on breads and muffins as . .

none,	1
light,	2
moderate, or	3
generous?	4

33. About how many times in a week do you eat (FOOD) – less than once a week, 1-3, 4-6, or 7 or more times?

IF ASKED, SAY: "A 'time' is any single eating occasion."

FOOD	Less than once a week (Never)	1-3	4-6	7 or More
a. Bakery products like cakes, cookies, or donuts?	1	2	3	4
b. Chips, such as potato or corn chips?	1	2	3	4

34. And at your main meal, about how many times in a week do you eat beef, pork, or lamb. Would you say less than once a week, 1-2, 3-4, or 5-7 times?

LESS THAN ONCE A WEEK/NEVER	1	
1-2 TIMES	2	
3-4 TIMES	3	
5-7 TIMES	4	
DO NOT EAT MEAT	0	(Q37)

35. When you eat meat, do you usually eat . .

IF ASKED, SAY: "The question is asking about meats, like beef, pork, or lamb."

small,	1	
medium, or	2	
large portions?	3	
DO NOT EAT MEAT	0	(Q37)

36. When you eat meat and there is visible fat, do you trim the fat always, sometimes, rarely, or never?

CATEGORY G

ALWAYS (ALMOST ALWAYS)	1
SOMETIMES	2
RARELY	3
NEVER	4
NEVER EAT MEAT WITH VISIBLE FAT	0

37. How many eggs do you usually eat in a week – less than one, 1-2, 3-4, or 5 or more?

IF ASKED, SAY: "The question is asking about plain eggs, not egg substitutes or eggs in mixed dishes or baked goods."

LESS THAN ONE/NONE	1
1-2	2
3-4	3
5 OR MORE	4

38. Before you eat fresh fruits and vegetables, do you or does someone else wash them always, sometimes, rarely, or never?

CATEGORY G

ALWAYS (ALMOST ALWAYS)	1	
SOMETIMES	2	
RARELY	3	
NEVER	4	
DON'T KNOW	8	
DO NOT EAT FRESH FRUITS/ VEGETABLES	0	(Q42)

39. When you eat fresh fruits with peels that can be eaten, do you eat the peel always, sometimes, rarely, or never?

CATEGORY G

ALWAYS (ALMOST ALWAYS)	1
SOMETIMES	2
RARELY	3
NEVER	4
DON'T KNOW	8

40. When you eat fresh vegetables with peels that can be eaten, do you eat the peel always, sometimes, rarely, or never?

CATEGORY G

ALWAYS (ALMOST ALWAYS)	1
SOMETIMES	2
RARELY	3
NEVER	4
DON'T KNOW	8

41. Do you eat the outer leaves of leafy vegetables like lettuce and cabbage? Would you say yes or no?

IF NEEDED, SAY: "What do you do most of the time?"

YES	1
NO	2
DON'T KNOW	8
DO NOT EAT LEAFY VEGETABLES	0

42. Are you the person most responsible for planning or preparing the meals in your household?

YES	1
NO	2
DON'T KNOW	8

THANK YOU FOR YOUR TIME AND COOPERATION

TIME ENDED _____ AM PM

VITA

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