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The Effect of Nutrition Education in the Form of Cafeteria Posters on Knowledge, Attitudes, and Plate Waste of Sixth Graders

Camille L. Ivey

University of Tennessee, Knoxville

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I am submitting herewith a thesis written by Camille L. Ivey entitled "The Effect of Nutrition Education in the Form of Cafeteria Posters on Knowledge, Attitudes, and Plate Waste of Sixth Graders." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Food Science and Technology.

Carol Costello, Major Professor

We have read this thesis and recommend its acceptance:

Jackie McInnis, Betsy Haughton

Accepted for the Council:

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Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)
To the Graduate Council:

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We have read this thesis and recommend its acceptance:

Carol Costello, Major Professor

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THE EFFECT OF NUTRITION EDUCATION IN THE FORM OF CAFETERIA
POSTERS ON KNOWLEDGE, ATTITUDES,
AND PLATE WASTE OF SIXTH GRADERS

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Camille L. Ivey
August 1992
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To God who gave me the talents and abilities necessary to complete this thesis.
ABSTRACT

The purpose of this research was to determine whether there was a difference in nutrition knowledge scores, nutrition attitude scores, and plate waste of 6th graders who received nutrition education in the form of cafeteria posters for a period of 19 days and 6th graders who received no nutrition education. In addition, the effects of gender, weight control action, and source of lunch on these scores were assessed.

Nutrition knowledge and attitudes regarding dietary fat were assessed in 6th grade students in 3 middle schools using pretest and posttest questionnaires. Nutrition education in 2 of the middle schools consisted of a poster with either a positive or negative message. Nutrient information on the fat and calorie contents of 4 cafeteria food items served was posted daily throughout the intervention period on the bottom portion of each poster. The third school received no nutrition education intervention.

Approximately 60-75% of students in each school were able to correctly identify the following: reducing fat intake as a safe means of weight loss or weight maintenance, skim milk as the lowest fat milk; and a meal consisting of baked chicken and 2% milk as the lowest fat meal given 4 choices. Sixty-five to 75% of the students in each school also were able to correctly answer half of the applied nutrition knowledge questions. Approximately 20-35% of students were able to correctly answer questions requiring respondents to identify low-fat and
high-fat foods and the number of calories in one gram of fat. Twenty-five to 35% of students were able to correctly answer the remaining 2 applied nutrition knowledge questions.

In general, knowledge and attitudes scores were significantly lower in the students that received negative nutrition education intervention, higher in females, and higher in students who reported trying to lose weight. There was no difference in applied nutrition knowledge scores by gender, weight control action, or lunch source. Also, it appeared that nutrition knowledge and nutrition attitudes scores generally decreased following the intervention period but the change was rarely significant. Plate waste data indicated that the students who viewed the negative poster message decreased their plate waste of the lower-fat entree and increased their plate waste of the higher-fat vegetable more so than the other students.

Although it appeared that nutrition knowledge and attitudes did not change following nutrition education intervention, dietary behaviors may have been altered. Possible explanations for the absence of change in knowledge and attitudes that could be attributed to the nutrition intervention include an insufficient intervention time period and/or lack of student involvement in the learning process.
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Obesity is a risk factor for many chronic diseases that is thought to be influenced largely by dietary fat intake. Studies have revealed that a significant percentage of Americans, including school-aged children, are overweight.

Recent recommendations suggest that all Americans 2 years of age and older limit their fat intake to no more than 30% of total calories. As it is generally thought that those individuals who limit their fat intakes as children receive greater health benefits than those who wait until adulthood, school-aged children represent an age group that would benefit greatly from low-fat eating practices.

However, surveys of nutrient intakes of adolescents have shown poor compliance with the Dietary Guideline to reduce fat, saturated fat, and cholesterol (Read et al., 1988). In one study, fat intakes of Appalachian adolescent males and females were found to be 39% and 40% of calories, respectively (Skinner et al., 1985). One important contributor to the high fat diets of many school children is traditional school lunches which have been reported to contain approximately 40% of total calories as fat (Sandoval et al., 1986; Lilly et al., 1980).

Many forms of nutrition education have been used in an attempt to reduce the fat content of schoolchildrens’ diets, including posters, nutrient information, school health promotion projects, and nutrition curricula (Simons-Morton et al.,
1991; Byrd-Bredbenner et al., 1988; Jensen et al., 1985; Martilotta & Guthrie, 1980). The effectiveness of student nutrition education has been measured in terms of changes in nutrition knowledge, nutrition attitude, and food consumption (Simons-Morton et al., 1991; Resnicow et al., 1989; Sandoval et al., 1986). Plate waste studies often have been done to measure changes in student food consumption (Jensen et al., 1985; Kirks & Wolff, 1985).

Research indicated that school-based nutrition education has been quite effective in increasing nutrition knowledge (Resnicow et al., 1989; Byrd-Bredbenner et al., 1988; Clawson et al., 1984). Both improved and unchanged nutrition attitudes and food behaviors have been reported following nutrition education (Simons-Morton et al., 1991; Resnicow et al., 1989; Byrd-Bredbenner et al., 1988; Lindholm et al., 1984; Byrd-Bredbenner et al., 1982).

Message style also may be an important factor in determining the effectiveness of nutrition education messages. Two basic approaches have been used in presenting health education: 1) the fear or threat appeal, and 2) the wellness appeal (Lawatsch, 1990; Gintner et al., 1986). The first approach appeals to the receiver's desire to avoid the negative consequences described in the message. The second approach, the wellness appeal, appeals to the receiver's desire to experience the positive consequences of the suggested action.

Little research has been done that compares the effectiveness of positively-oriented versus negatively-oriented messages in nutrition education. Available research on this topic in nutrition and other types of health education suggests
that positive messages may be more effective than negative messages when
dealing with children and young adults (Lawatsch, 1990; Gintner et al., 1987;
Kirscht et al., 1975).

The purpose of this research was to determine: 1) whether there was a
significant difference in nutrition knowledge scores, nutrition attitudes scores,
and plate waste between 6th graders receiving nutrition education through
posters and nutrient information displayed in their school cafeterias for a period
of 19 days, and 6th graders receiving no nutrition education; 2) whether 6th
graders possessed nutrition knowledge regarding nutrient information as assessed
by their knowledge scores; and 3) whether a positive or negative nutrition
education message was most effective in improving nutrition knowledge and
nutrition attitudes scores and reducing plate waste in 6th grade students.
CHAPTER II

THE REVIEW OF LITERATURE

Obesity is a risk factor for a variety of chronic diseases, including cardiovascular disease, diabetes, and some types of cancer, that characterizes Americans of all ages. Obesity is thought to be influenced largely by dietary fat intake and physical activity level (USDHHS, 1988). Studies have shown that a significant percentage of Americans, including school-aged children, are overweight (Shear et al., 1988; USDHHS, 1988; Gortmaker et al., 1987). It also was reported that, not only are children getting fatter, but fatter children are becoming more obese (Gortmaker et al., 1987).

It is generally recommended that moderation of fat in the diet is beneficial for the health of all Americans 2 years of age or older. Ideally, an individual will begin consuming a diet which includes 30% of calories or less from fat early in life, as the sooner the individual's diet is changed, the greater will be the health benefits received (Read et al., 1988). Consequently, young children and adolescents represent an age group for whom adoption of low-fat eating practices would offer substantial benefit.

Unfortunately, previous surveys of nutrient intakes of adolescents indicated low compliance with the Dietary Guidelines to reduce sugar, fat, saturated fat, and cholesterol intakes (Read et al., 1988). Possible nutritional
deficiencies in adolescents, including calcium, vitamin C, vitamin A, and iron, also have been reported (Skinner et al., 1985; Clawson et al., 1984).

Fat intakes of higher than recommended levels have been reported in Appalachian adolescents (Skinner et al., 1985). The fat content of Appalachian adolescent male and female diets was 39% and 40% of total calories, respectively. One explanation for the high fat diets of school children was the high fat content of traditional school lunches. Sandoval et al. (1986) reported traditional elementary school lunch menus as having 40% of calories from fat. Lilly et al. (1980) reported that the fat content of elementary and secondary school lunches was 39% of total calories.

There was some evidence that American children do not have sufficient knowledge of high-fat foods to make healthy food choices. Resnicow and Reinhardt (1991) conducted a study in which knowledge and attitudes concerning fat, cholesterol, and fiber were assessed using a questionnaire in students 5-18 years of age in five states. Responses of students in all grade levels indicated that, overall, students were aware that eating foods high in fiber produces positive health effects, while eating high-fat, high-cholesterol foods produces negative health effects. However, students appeared to have limited knowledge of specific foods containing fat, cholesterol, and fiber. Awareness of fat content of foods was assessed in 1st and 2nd graders only; and awareness of cholesterol content of foods was assessed in 1st-5th graders only. These results indicated that American children do not have adequate information to make
nutritious food choices. However, it should be noted that, due to the type of funding received, a representative sample was not used and lower socioeconomic status minorities were overrepresented among the study population.

Evidence also was available that indicated that adolescents were generally knowledgeable as to what foods they should and should not be eating, but often do not act based upon their nutrition knowledge. A poll of Minnesota high school students found that adolescents felt that there were many barriers preventing them from putting this knowledge into practice, including not enough time, inconvenience associated with obtaining nutritious foods, and "a lack of a sense of urgency (Story and Resnick, 1986)."

Assessment of Nutrition Education - Knowledge and Attitudes

Nutrition education has been used in an attempt to reduce the fat content of schoolchildrens' diets (Simons-Morton et al., 1991; Resnicow et al., 1989; Downey et al., 1987; Martilotta & Guthrie, 1980). Nutrition education for students has been implemented in many forms including: posters and/or nutrient information (Kubena & Carson, 1988; Mayer et al., 1986; Davis-Chervin et al., 1985; Martilotta & Guthrie, 1980), promotional kits (Jensen et al., 1985), school health promotion programs (Simons-Morton et al., 1991; Resnicow et al., 1989; Downey et al., 1987; Parcel et al., 1987), family health promotion programs (Nicklas et al., 1988), community nutrition education projects (Clawson et al.,
1984), and nutrition curricula (Simons-Morton et al., 1991; Byrd-Bredbenner et al., 1988; Byrd-Bredbenner et al., 1982).

The assessment of the effectiveness of student nutrition education has been measured by changes in the following: nutrition knowledge (Resnicow et al., 1989; Clawson et al., 1984; Lindholm et al., 1984), nutrition attitude (Sandoval et al., 1986), and food consumption (Simons-Morton et al., 1991; Kubena & Carson, 1988; Mayer et al., 1986; Davis-Chervin et al., 1985; Jensen et al., 1985; Clawson et al., 1984; Lindholm et al., 1984; Martilotta & Guthrie, 1980). Byrd-Bredbenner et al. (1988, 1982) have conducted studies in which changes in nutrition knowledge, nutrition attitude, and food consumption were measured simultaneously.

School-based nutrition education appeared to be quite effective in terms of affecting positive changes in nutrition knowledge (Resnicow et al., 1989; Byrd-Bredbenner et al., 1988; Clawson et al., 1984; Lindholm et al., 1984; Byrd-Bredbenner et al., 1982). Positive changes were observed in nutrition knowledge and food intake in 335 6th grade subjects involved in a 3-year school-based community approach to nutrition education (Clawson et al., 1984). The primary purpose of this study was to establish an effective nutrition and health program for middle school students. During this 3-year period, curriculum development, staff education and training, and student and community involvement occurred. Information on food intake was obtained using a self-administered, 2-day, food record questionnaire. Changes in food intake in
the 2-day period included: a significant decrease in the mean number of servings from the milk and dairy products category from 2.82 to 2.20 servings, a significant increase of vegetables/fruits which are excellent sources of vitamin A and moderate sources of vitamin C from .05 to .19 servings, and a significant decrease in the consumption of concentrated sweets and chips from .28 to .17 servings. The authors suggested that these subjects may still be at nutritional risk for calcium, vitamins A and C, and iron, even after accounting for their behavior changes.

Simons-Morton et al. (1991) also found improvements in nutrition knowledge and dietary behavior with education in elementary school students. Intervention in 2 elementary schools included classroom health education, vigorous physical activity, and reduced fat and sodium school lunches over a period of 2 years. Two similar elementary schools received no intervention. The health education was administered by classroom teachers using the "Go for Health Curriculum." Mean nutrient intakes were calculated from 24-hour dietary recall interviews for selected nutrients in intervention and control schools. The contribution from school and bag lunches was taken into consideration. Intervention group students reported consuming less total fat, saturated fat, and sodium than control group students in both tray and bag lunches. Energy, calcium, and vitamin A remained adequate even after school lunch modification.

In another study, 34 primary grade students with elevated serum cholesterol participated in a school-based cholesterol reduction program
(Resnicow et al., 1989). The students attended 3-5 45-minute workshops conducted by a trained health psychologist in which they were taught to identify the type and amount of fat and fiber in various foods. In addition, the students received cholesterol screenings and teacher-delivered instruction on how to make positive health decisions as part of the Know Your Body (KYB) school health program. Following the workshops these subjects demonstrated improved nutrition knowledge of foods containing cholesterol and foods which can raise or lower serum cholesterol. A comparison of preintervention and postintervention food frequencies also indicated dietary intake changes appropriate for reducing blood cholesterol levels. Mean total cholesterol in the 34 subjects dropped 9.0% from baseline over a 5-month period. Cholesterol decreased 6.6% in a matched sample of 118 comparison subjects that participated in the KYB health education only.

Positive behavior change was not always noted with nutrition education (Byrd-Bredbenner et al., 1988; Lindholm et al., 1984; Byrd-Bredbenner et al., 1982). A nutrition education program was conducted for 5th and 7th graders by high school members of the Youth Advisory Council to School Food Service. The program was supervised by school food service personnel including registered dietitians. This study examined family and child variables, such as social class, ethnicity, age, and sex, as predictors of change in children's nutrition knowledge and food intake following nutrition education. The program featured skits, educational posters in the school cafeteria, and handouts. Nutrition knowledge
was measured by administering 2 paper-and-pencil tests, one for each grade level. Registered dietitians measured dietary quality by scoring 24-hour recall dietary intake data according to the numbers of servings from the Basic Four food groups. Results of the study indicated that nutrition knowledge increased and dietary quality, as measured by the 24-hour dietary recall, remained unchanged with nutrition education (Lindholm et al., 1984).

Two studies conducted by Byrd-Bredbenner et al. (1988, 1982) revealed that nutrition education via junior and senior high school home economics curricula had little effect on food behavior. Similar experimental design and instrumentation were used in both studies. One study included 7th-9th grade home economics students and the other, 10th-12th grade home economics students. Appropriate knowledge instruments were used for students in each grade. The experimental group was pretested, taught nutrition for 3-6 weeks using the curriculum "Nutrition in a Changing World," and then posttested. One control group was pretested and posttested, but did not receive nutrition education. The second control group was posttested but not pretested or taught nutrition. An attitude scale consisting of 4 constructs was administered to all grade levels in both studies. The 4 constructs were: 1) caring about nutrition, 2) eating new foods, 3) nutrition affects health, and 4) learning about nutrition. A food frequency form was used for the assessment of dietary behavior. Results of both studies showed little change in attitude scale scores in grades 7-8 and 10-12, although 7th graders did score significantly higher on the "Nutrition
affects health" attitude scale. Ninth grade experimental students, however, scored significantly higher on the posttest for all 4 attitude scales. No significant changes were observed in posttest food frequency scores.

The authors suggested that the absence of change in dietary behavior as assessed by food frequency scores may be the result of the lack of sensitivity of the instrument used. This instrument only examined the frequency of consumption of nutrient-dense foods. Subjects may have decreased their consumption of nutrient-poor foods and the instrument was unable to detect this. It also was suggested that junior high students may not have had the option to eat foods other than what was available to them (Byrd-Bredbenner, 1982).

Sandoval et al. (1986) measured 7-10-year-old students' attitudes toward traditional school lunch menus and menus modified according to the Dietary Guidelines, and to the school lunch program in general. Students in schools using the modified menus had a significantly more positive attitude to school lunch than students in schools with traditional menus. A greater percentage of students had positive attitudes to modified menu items than to traditional menu items.

Assessment of Nutrition Education - Plate Waste Information

Plate waste studies often have been conducted to measure the effectiveness of nutrition education programs (Jensen et al., 1985; Kirks & Wolff, 1985; Graves & Shannon, 1983; Comstock et al., 1981). Jensen et al. (1985)
measured plate waste to assess the effectiveness of a nutrition-oriented school lunch promotion program for grades 1-3. The program was coordinated by school lunch managers. Nutrition education was integrated into school lunch activities for one month using kits containing posters, student handouts, suggestions for lunchroom/classroom activities, and other materials. Plate waste was measured for two days before the program, during the program, and after the program for two days. During the promotional program, plate waste decreased 16.99% in the treatment schools and increased 11.17% in the control schools.

In another study (Martilotta & Guthrie, 1980), total milk waste remained unchanged when fat and calorie content of the different types of milk served was displayed in the school lunchroom. However, there was a significant increase in the percent of junior and senior high school students that chose lowfat milk over whole milk and skim milk.

Plate waste studies also have been done to measure acceptability of menu changes (Sandoval et al., 1986; Coale & Bedford, 1984; Garrett & Vaden, 1978). Coale and Bedford (1984) used a questionnaire to measure 2nd-6th grade students’ acceptability of school lunch foods. This questionnaire was administered before and after serving fat-controlled menus for one month. Results indicated that the majority of students accepted the fat-controlled lunches, although a preference for high-fat foods remained.
Studies which compared the accuracy of different plate waste methods have found that visual estimation of plate waste by trained data collectors is highly correlated with percent waste (Dubois, 1990; Comstock et al., 1981). The weighed method is often considered impractical as it is time-consuming, and requires large amounts of space, equipment, and personpower that may not be readily available (Kirks & Wolff, 1985; Comstock et al., 1981). However, others have found that the visual method was less likely to detect significant differences between groups than the weighed method (Dubois, 1991; Kirks & Wolff, 1985), and some have felt that it was more difficult to interpret than the weighed method (Kirks & Wolff, 1985).

Message Style

Two general approaches often are used to present health education messages (Gintner et al., 1987). The rationale behind the first approach, commonly referred to as the fear or threat appeal, is that the receiver will be motivated to take the suggested action in order to avoid the negative consequences described in the message (Lawatsch, 1990; Gintner et al., 1987). For example, an individual may stop smoking in order to avoid lung cancer.

The second approach, the wellness appeal, attempts to motivate the receiver to take the suggested action by emphasizing positive consequences, such as improved health and quality of life (Gintner et al., 1987). Similar approaches include the benefit appeal and positive approach. These styles stress the positive
consequences of the recommended action in general, and not specifically positive health-related benefits (Lawatsch, 1990; Gintner et al., 1987).

Kirscht et al. (1975) found a positive message to be more effective than a threat message for increasing screening attendance at a community clinic. This effect was strongest for the young adults in the study. A possible explanation given by the authors for the reduced effectiveness of the threat message for young adults was their lack of concern about diseases for which screening was considered appropriate. Gintner et al. (1987) compared the effectiveness of threat and wellness messages by measuring participation of undergraduate students with a family history of hypertension in a blood pressure screening. Results showed that the screening attendance of individuals receiving a wellness-oriented message was more than twice that of individuals receiving a threat message.

In another study, the effect of 2 teaching strategies, benefit appeal and threat appeal, was measured on nutrition knowledge, attitude, and food behavior of 103 preschool children (Lawatsch, 1990). Nutrition information was taught using 3 traditional fairy tales that were modified to communicate basic nutrition concepts. The fairy tales using the benefit appeal stressed the positive results of eating a variety of vegetables. The fairy tales using the threat appeal stressed the health risks caused by not eating vegetables. Classes of preschool children were assigned randomly to a control group or to one of the 2 experimental
groups (benefit appeal group or threat appeal group). Control group children did not hear the modified fairy tales.

Data were collected using pictorial knowledge and attitude instruments and a checklist to assess behavior. The children were offered 2 trays of snacks at the time of pretest and posttest each of which included 2 vegetables that are recognized as both generally preferred and one vegetable that is thought to be less preferred by children. One point was recorded when a preferred vegetable was selected. Two points were recorded when a less preferred vegetable was selected.

Results revealed that the benefit appeal group had a higher mean posttest knowledge score than the threat appeal group. Mean posttest knowledge and attitude scores for both experimental groups were significantly higher than for the control group.

Results of the food behavior assessment varied with the snack choices given. Children in the benefit appeal group had significantly higher mean postintervention scores than the control group for all vegetables and significantly higher mean postintervention scores than the threat appeal group for one vegetable tray. The mean postintervention scores for the threat appeal group were higher than those of the control group for the other vegetable tray.

The published research on the effectiveness of positively-oriented and negatively-oriented messages in nutrition education was limited. Although preschool children have been assessed, there appeared to be no published
research pertaining specifically to the comparison of positive and negative
nutrition education messages with adolescents. It also appeared that no research
has been done that compares the effectiveness of positive versus negative
nutrition education messages via posters in influencing nutrition knowledge,
nutrition attitude, and food selection in the cafeteria setting.
CHAPTER III

METHODS

Study Sample

Three middle schools in Knox County, Tennessee were selected to participate in this study. Criteria in choosing these schools included that food was prepared on-site and schools had similar economic and racial balance. In these schools, the Type A lunch was offered with additional dessert items offered a la carte. Sixth grade students in 2 of these schools received nutrition education intervention aimed at reducing fat intake. Subjects in the remaining middle school received no intervention. The research protocol was reviewed and approved by the University of Tennessee Human Subjects Review Committee (Appendix A) and the Knox County Department of Public Instruction (Appendix B) prior to beginning the study.

Research Questionnaire

A questionnaire for assessing nutrition knowledge and nutrition attitudes regarding dietary fat was developed to administer to the 6th grade students in the 3 middle schools (Appendix C). The nutrition knowledge section of the questionnaire consisted of 3 parts. Questions in the first part consisted of 12 multiple-choice questions that were designed to determine the respondents' knowledge of the general relationship between dietary fat intake, caloric intake,
and body weight; ability to identify correctly low-fat and high-fat foods; and knowledge of the caloric value of fat. The second part of the questionnaire consisted of 4 multiple-choice questions to determine the respondent's ability to compare the nutrient information (i.e. fat and calorie content per serving) of 2 foods and correctly identify the most appropriate choice for weight loss. In addition, 4 demographic items were included to determine gender of respondents; whether any were trying to gain, lose, or maintain weight; whether lunch was typically brought from home, obtained from the school cafeteria, skipped, or obtained from some other source on school days; and the respondents' nutrition background in the form of classes taken. Blank lines were provided on the last demographic item to allow students flexibility in listing relevant classes.

The nutrition attitude section of the questionnaire included 18 statements adapted from an instrument developed by Byrd-Bredbenner et al. (1988, 1982) which assessed general nutrition attitudes of junior high and high school students. The statements were revised to assess attitudes of 6th graders regarding dietary fat. The nutrition attitude questionnaire was made up of 4 constructs: 1) caring about fat intake, 2) eating new low-fat foods, 3) fat affects health, and 4) learning about fat. Students were asked to rate each statement using a 5-point rating scale with the following descriptive anchors: strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree.
Pilot Test of Questionnaire

As the researchers had initially planned to assess nutrition knowledge and attitudes of 6th and 9th graders, the questionnaire was pilot tested on 9th grade students from a high school in Blount County, Tennessee. However, 9th graders were later eliminated from the study due to circumstances that were out of the researchers’ control.

The questionnaires were given to a 9th grade homeroom teacher at this school with verbal instructions on how to administer them. Thirty-eight questionnaires were returned from the pilot test. The approximate response time was 10 minutes. Results of the pilot test revealed that the questionnaire was easily understood and that at least two-thirds of the students correctly answered 13 out of 19 nutrition knowledge questions. These 13 questions were either revised or discarded for the final questionnaire in order to discriminate between learners. Alternative responses to nutrition knowledge questions also were revised as needed to include specific food items from the Knox County school lunch menu that were offered during the scheduled intervention period. This was done to ensure that respondents were familiar with all foods included in the questionnaire. No revisions were made in the nutrition attitude statements.

Posters

Two posters aimed at reducing fat intake were developed by one of the researchers and professionally printed by The University of Tennessee. The
posters were displayed in each of the 2 intervention schools' cafeterias at the beginning of the cafeteria serving lines for the duration of the intervention period (19 school days).

One of the posters used a positive message to encourage the consumption of low-fat foods and pictured 2 smiling, healthy-looking individuals (one male and one female) holding up food models of low-fat foods (Appendix D). A green traffic light and the following message also was included: "Go ahead! Eat more low-fat foods. It's a great-tasting way to take in fewer calories and keep your body looking good."

The other poster used a negative message to discourage the consumption of high-fat foods and pictured 2 unsmiling, overweight individuals (one male and one female) holding up food models of high-fat foods (Appendix E). A stop sign was included with the words: "Stop! Eating too many high-fat foods may leave you with more calories than you need and more weight than you want. Try eating low-fat foods instead." It was assumed that students would be able to differentiate between the positive and negative poster messages, however this was not assessed.

Prior to data collection, Knox County school lunch menus were analyzed for fat content in grams, calories and percentage of calories from fat using the software package, Nutritionist III. Nutrient information on selected cafeteria food items was printed on 8-1/2" x 11" sheets of paper and displayed in 2 clear vinyl envelopes attached to the bottom portion of each poster. Each sheet
contained the following information on 2 foods: serving size, calorie content, and fat content in grams per serving. Pairs of food items were selected from the Knox County school lunch menu corresponding to the dates of the intervention period (April 8, 1992-May 5, 1992) and included entrees, vegetables, and types of milk.

Before lunch on each day during the intervention period, 2 sheets of nutrient information were placed inside the vinyl envelopes on each poster by cafeteria employees. Each sheet was dated to ensure that the correct information was posted each day. Telephone calls to the cafeteria managers were made by one of the researchers to ensure that instructions were being followed.

Data Collection

Nutrition knowledge and nutrition attitude questionnaires were administered as a pretest to 6th graders in all 3 schools. After obtaining permission from each school’s principal to allow 6th grade homeroom teachers to administer the questionnaires during homeroom periods, questionnaires were separated into bundles of 30 for ease of distribution and delivered to the main school offices. The total number of questionnaires delivered to each school was equal to the number of 6th grade students enrolled in that school. A total of 924 questionnaires were administered to the students during the week prior to the date of the initial plate waste data collection.
Initial plate waste data collection was completed on April 8, 1992 by 3 teams of 3 people each. All plate waste team leaders who participated in plate waste data collection were trained beforehand by one of the researchers. The team leaders were responsible for training all other plate waste team members.

On the preceding day, all plate waste containers were pre-weighed to the nearest gram. Plate waste was measured by weighing the food waste of 4 foods from returned trays of all 6th grade students. These 4 foods included: breaded chicken patty (low-fat entree), meatloaf (high-fat entree), whipped potatoes (high-fat vegetable), and spinach (low-fat vegetable). In this study high-fat foods in a food category were considered to be the foods having the highest fat content of the 2, and low-fat foods were those having the lowest fat content of the 2. Initial serving amounts were determined by taking an average of the weights of 3 portions of each food.

In the 3 schools, lunch periods were separated by grade. As the 6th grade students went through the serving line, the number of servings they selected of each of the four foods was recorded in the form of a tally. Food waste then was collected as the 6th grade students either returned their trays to the dishroom or disposed of them in trash cans (depending on whether or not disposable serviceware was used). Food waste of the 4 foods was scraped into separate garbage bags for each item using rubber spatulas. Filled waste containers were weighed to the nearest gram. The following calculations were made to determine plate waste on each item:
1) weight of filled container - weight of empty container = weight of food item

2) \text{weight of food item} = \frac{\text{total servings waste}}{\text{actual portion size}}

3) \frac{\text{total servings waste}}{\text{total number of servings}} \times 100 = \text{o/o plate waste}

On May 5, 1992, the final plate waste data collection was completed for the 2 intervention schools. Final plate waste data collection for the school that did not receive nutrition education intervention took place on May 11, 1992 due to unavoidable conflicts in scheduling. Plate waste was collected on the same 4 foods (breaded chicken patty, meatloaf, spinach, and whipped potatoes) as in the initial plate waste data collection. All data collection procedures were identical to those of the initial data collection. A total of 892 post-test questionnaires was administered to 6th grade students in all 3 schools during the following week (May 6, 1992-May 13, 1992). Posters were taken down in the intervention schools upon completion of all plate waste data collection.

\textbf{Data Analysis}

The Statistical Analysis System (SAS, 1989) was used for all statistical analyses. A significance level of 0.05 was set for all tests of significance. Characteristics of respondents were determined using frequencies for the pretest and posttest according to type of nutrition education intervention (positive poster message, negative poster message, and no poster message) and each of the demographic items: gender, weight control action, and typical lunch
source. Percentages also were calculated to determine the relationship of gender to weight control action.

Nutrition knowledge and nutrition attitudes of 6th grade students in all 3 schools were assessed by questionnaire before and after intervention and were considered the pretests and posttests. Total nutrition knowledge scores for each respondent were derived by determining the number of correct responses to 16 questions. Of these 16 questions, 4 assessed the respondent's ability to make food choices using nutrient information. Applied nutrition knowledge scores were determined from the number of correct responses to these 4 questions. The remaining 12 questions assessed the student's cognitive nutrition knowledge. Cognitive nutrition knowledge scores were based on responses to these 12 questions. Means for these 3 scores were determined for each test and type of nutrition education intervention.

Total nutrition attitude scores were derived by summing the responses to 18 statements using the following scale: 1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, and 5=strongly agree. Questions that were stated negatively were adjusted by inverting the scale so that they were consistent with the positively stated questions. These statements were made up of 4 constructs. The first construct "Caring about fat intake" included 7 statements. The second and third constructs "Eating new low-fat foods" and "Fat affects health" each included 3 statements. The fourth construct "Learning about fat" included 5 statements. Mean adjusted scores were determined by pretest and
posttest and type of intervention for total nutrition attitude and each of the 4 constructs.

Posttest mean scores for total nutrition knowledge, applied nutrition knowledge, cognitive nutrition knowledge and total nutrition attitude were analyzed using GLM and estimate statements according to the type of nutrition education intervention to determine if there were differences among the types of intervention. GLM and estimate statements also were used to determine if there were differences according to gender, weight control action, and typical lunch source in the schools that displayed posters.

Mean differences in posttest and pretest scores were determined for each of the following scores: total nutrition knowledge, cognitive nutrition knowledge, applied nutrition knowledge, total nutrition attitude, and each of the 4 attitude constructs. Mean differences in these 8 scores were determined using GLM and estimate statements for each of the types of nutrition education intervention. Mean differences in posttest and pretest scores also were determined according to gender, weight control action, and lunch source in the schools that displayed posters.
CHAPTER IV

RESULTS AND DISCUSSION

Characteristics of Sample

A total of 922 students responded to the pretest questionnaire and a total of 897 students responded to the posttest questionnaire for a grand total of 1819 responses. Demographic characteristics of the students are presented in Table 1. In the schools that received negative or no nutrition education poster messages, approximately half of the students were male and half were female. Of the students that received the positive nutrition education poster message, approximately 60% were male and 40% were female (Table 1).

Students in all schools reported the following information regarding their weights: 45-53% indicated they were trying to maintain their current weights, 31-40% reported trying to lose weight, and 9-16% stated they were trying to gain weight (Table 1). When respondents were grouped by gender, a greater percentage of females than males reported trying to lose weight, 43.05% and 24.87%, respectively. On the other hand, a greater percentage of males than females reported trying to gain weight, 20.05% and 7.06%, respectively. The Morbidity and Mortality Weekly Report from the Centers for Disease Control (Anonymous, 1991) discussed similar findings in a survey of high school students. Approximately 44% of females and 15% of males reported trying to lose weight. Stephenson et al. (1987) also reported similar results from the
Table 1. Characteristics of sixth grade students who received positive, negative, or no nutrition education poster messages

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Nutrition education poster message</th>
<th>Positive (%)</th>
<th>Negative (%)</th>
<th>None (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>42.13</td>
<td>40.21</td>
<td>52.19</td>
<td>50.20</td>
</tr>
<tr>
<td>Male</td>
<td>57.87</td>
<td>59.79</td>
<td>47.81</td>
<td>49.80</td>
</tr>
<tr>
<td>Weight control action</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trying to gain</td>
<td>9.64</td>
<td>9.28</td>
<td>15.02</td>
<td>13.94</td>
</tr>
<tr>
<td>Trying to lose</td>
<td>40.10</td>
<td>37.63</td>
<td>39.56</td>
<td>39.04</td>
</tr>
<tr>
<td>Trying to maintain</td>
<td>50.25</td>
<td>53.09</td>
<td>45.42</td>
<td>47.01</td>
</tr>
<tr>
<td>Typical lunch source</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bring from home</td>
<td>31.05</td>
<td>34.24</td>
<td>11.15</td>
<td>10.37</td>
</tr>
<tr>
<td>Skip</td>
<td>2.11</td>
<td>3.80</td>
<td>3.72</td>
<td>6.22</td>
</tr>
<tr>
<td>Get from cafeteria</td>
<td>65.79</td>
<td>61.96</td>
<td>83.64</td>
<td>80.50</td>
</tr>
<tr>
<td>Other</td>
<td>1.05</td>
<td>0.00</td>
<td>1.49</td>
<td>2.90</td>
</tr>
</tbody>
</table>

\(^a\)Pretest number = 924; posttest number = 892.
1985 National Health Interview Survey of the youngest respondents (18-29 years of age). Of these respondents, 44% of women and 20% of men stated they were trying to lose weight.

Although some similarities were noted, there was considerable variation between schools in the student’s reported typical source of lunch (Table 1). The majority of children in all 3 schools either brought their lunches from home or got lunch in their school cafeterias. Very few children reported skipping lunch (2-6%) or obtaining lunch from another source (0-3%). The majority of students that received positive or negative nutrition education intervention reported getting lunch from their school cafeterias. Sixty-two percent of the students that received positive intervention and 81% of the students that received negative intervention reported getting their lunches from the school cafeteria. The higher level of participation among the students that viewed the negative poster was attributed to the distribution of coupons that offered a discount on school lunch foods in that school. In the school that did not receive nutrition education intervention, only 40% reported getting lunch in the cafeteria.

However, it should be noted that many of the children that reported getting lunch from their cafeteria did not select school lunch foods, but instead chose meals which included foods such as desserts, candy, and potato chips. Meals such as these typically are high in fat content. Fifty-six percent of the students in the school that did not receive nutrition education intervention and only 34% of the students that received positive intervention and 10% of the
students that received negative intervention reported bringing their lunches from home.

General Nutrition Knowledge of 6th Grade Students

The average percentage of correct responses to the posttest nutrition knowledge questions among the 3 schools was 51.4%. Sixty-two to 69% of students in each school were able to identify reducing fat intake as a safe means of weight loss or weight maintenance. The National Health Interview Survey reported high levels of knowledge in 18-29-year-old respondents regarding the relationship between caloric intake and body weight (Anonymous, 1991). It was reported that when respondents were asked to identify the 2 best ways to lose weight, 80% of females and 83% of males in this group chose the correct responses (eat fewer calories and increase physical activity). However, survey respondents were not questioned as to specific appropriate eating practices for weight loss.

At posttest, approximately 60-75% in each school were able to identify skim milk as the lowest fat milk and a meal consisting of baked chicken and 2% milk as the lowest fat meal given 4 choices. It appeared that many students were aware of the fat content of some foods. This may be due to the media’s recent emphasis on reducing fat intake. It also may be a reflection of the availability of low-fat milk and baked/grilled chicken items in many restaurants, including fast food establishments, which are patronized frequently by young children and adolescents.
Approximately 65-75% of students in each school were able to correctly answer half of the applied nutrition knowledge questions. These questions required respondents to identify the best choices for weight loss based on nutrient information provided (fat and calorie content per serving). The correct responses to the 2 questions that often were answered correctly involved food items with fat and calorie contents that were both lower than those of the incorrect responses. This may reflect their knowledge of the relationship of calories to body weight, but not necessarily of fat intake to body weight. It was obvious that some of the students did not understand how to select the appropriate foods, as they added together the fat and calorie contents of each food on their questionnaires and selected the food item in each pair with the smallest sum.

On the other hand, only 18-25% of students in each school were able to correctly answer 2 questions requiring respondents to identify low-fat and high-fat foods. These results were similar to those of Resnicow and Reinhardt's (1991) study which assessed the knowledge and attitudes of students 5-18 years of age regarding fat, cholesterol, and fiber. Although the students were generally aware of the negative health effects of a high-fat, high-cholesterol diet, they appeared to have limited knowledge of the fat, cholesterol, and fiber content of specific foods.

Approximately 25-35% of the students in each school correctly identified the number of calories in one gram of fat. About the same percentages of
students correctly answered 2 applied nutrition knowledge questions where correct responses involved food items with lower fat contents but slightly higher calorie contents than those of the incorrect responses. Again, it appeared that students may have selected responses to these questions based on calorie content alone and without consideration of fat content.

General Nutrition Attitudes of 6th Grade Students

Mean scores for individual attitude statements revealed that students' ratings were between 2.5 and 3.5 for most statements, indicating a somewhat neutral attitude toward most statements. However, students generally agreed with the following statements: eating a low-fat diet today can help prevent certain diseases, eating too much fat can cause people my own age to become overweight, and eating less fat now will help me to reach or maintain my best weight. These 3 statements made up the "Fat affects health" construct. Overall, students disagreed with the statement: I do not care how much fat I eat. This was one of the 7 "Caring about fat intake" construct statements. It appeared that most of these students were aware of the relationship between fat intake and health and were at least somewhat concerned about the amount of fat they consumed.
Effect of Type of Intervention on Nutrition Knowledge and Attitudes

Posttest scores were analyzed to determine if there were differences in scores according to the type of nutrition education intervention. Mean total nutrition knowledge and cognitive nutrition knowledge scores were significantly lower in students that received negative nutrition education intervention than in students that received positive or no intervention (Table 2). Students who received positive or no intervention correctly answered approximately 8.5 nutrition knowledge questions out of a possible 16, while students who received negative intervention correctly answered 7.6 knowledge questions. The applied nutrition knowledge and total attitude scores were significantly higher for students that received no intervention than for students that received negative intervention. The applied nutrition knowledge scores for these 2 groups were 2.1 and 1.9 out of a possible 4, respectively. Although this difference in applied nutrition knowledge scores was statistically significant, the difference was equivalent to less than 1/4 of a question and probably was not of practical significance.

Total nutrition attitude scores were 61.9 for the students that received no nutrition education intervention and 59.2 for those that received negative intervention, with higher numbers indicating a greater concern for dietary fat (Table 2). As the highest and lowest possible attitudes scores were 90 and 18, these scores indicated a fairly neutral attitude towards dietary fat. It was possible that the students that viewed negative posters had lower initial
Table 2. Mean posttest\(^a\) nutrition knowledge and attitudes scores according to type of nutrition education poster message.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Nutrition education poster message</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Total nutrition knowledge(^b)</td>
<td>8.50(^c)</td>
</tr>
<tr>
<td>Cognitive nutrition knowledge(^e)</td>
<td>6.52(^c)</td>
</tr>
<tr>
<td>Applied nutrition knowledge(^f)</td>
<td>1.99(^{cd})</td>
</tr>
<tr>
<td>Total nutrition attitude(^g)</td>
<td>61.59(^{cd})</td>
</tr>
</tbody>
</table>

\(^a\)Posttest number = 847.

\(^b\)Total nutrition knowledge score = cognitive nutrition knowledge score + applied nutrition knowledge score. Number of possible correct answers = 16.

\(^{cd}\)Means followed by different superscripts within rows are significantly different at \(p \leq 0.05\).

\(^c\)Number of possible correct answers = 12.

\(^f\)Number of possible correct answers = 4.

\(^g\)Attitudes were scored on a scale where 1 = strongly disagree and 5 = strongly agree. Scores ranged from 22 to 90 with higher scores indicating greater concern towards dietary fat.
knowledge levels as a result of receiving less classroom nutrition education than the other students.

When posttest and pretest scores were compared, overall, nutrition knowledge scores did not differ significantly either with or without nutrition education intervention except for a significant decrease in the applied nutrition knowledge score for the school that did not receive intervention (Table 3). In fact, nutrition knowledge scores almost always decreased following the intervention period regardless of type of intervention. No explanation could be determined, however, it may be that a longer intervention time period and/or a different intervention method would have been more effective in increasing nutrition knowledge in these students.

As with nutrition knowledge scores, attitudes scores frequently decreased following intervention. The construct score for "Fat affects health" decreased significantly in the students that did not view a poster. In this school, pretest and posttest mean scores for this construct were 12.4 and 12.0, respectively. Similar results were discussed in Byrd-Bredbenner et al.'s (1982) study which involved a curriculum-based nutrition education intervention with junior high school students. For the students that received nutrition education, there was no significant change in 3 out of 4 constructs; however, there was a significant increase in the construct score for "Nutrition affects health."
Table 3. Mean difference\(^a\) in nutrition knowledge and attitudes scores according to type of nutrition education poster message.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Nutrition education poster message</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Total nutrition knowledge(^b)</td>
<td></td>
</tr>
<tr>
<td>Cognitive nutrition knowledge(^c)</td>
<td>-0.24</td>
</tr>
<tr>
<td>Applied nutrition knowledge(^d)</td>
<td>-0.13</td>
</tr>
<tr>
<td>Caring about fat intake</td>
<td></td>
</tr>
<tr>
<td>Eating new low-fat foods</td>
<td></td>
</tr>
<tr>
<td>Fat affects health</td>
<td></td>
</tr>
<tr>
<td>Learning about fat</td>
<td></td>
</tr>
<tr>
<td>-0.24</td>
<td>-0.26</td>
</tr>
<tr>
<td>-0.13</td>
<td>-0.35</td>
</tr>
<tr>
<td>-0.06</td>
<td>-0.33</td>
</tr>
<tr>
<td>-0.36</td>
<td>-0.36</td>
</tr>
</tbody>
</table>

\(^a\)Mean difference = posttest score - pretest score.

\(^b\)Total nutrition knowledge score = cognitive nutrition knowledge score + applied nutrition knowledge score. Number of possible correct answers = 16.

\(^c\)Number of possible correct answers = 12.

\(^d\)Number of possible correct answers = 4.

\(^e\)Significant difference between posttest and pretest scores (p ≤ 0.05).

\(^f\)Attitudes were scored on a scale where 1 = strongly disagree and 5 = strongly agree. Scores ranged from 22 to 90 with higher scores indicating greater concern towards dietary fat.
Effect of Gender on Nutrition Knowledge and Attitudes

The posttest scores for total nutrition knowledge, cognitive nutrition knowledge, and total nutrition attitude were significantly higher for females than for males (Table 4). Females and males correctly answered approximately 8.5 and 7.5 of the 16 knowledge questions, respectively. Total attitude scores for females and males were 62.8 and 57.0, respectively, with higher scores indicating a greater concern for dietary fat. There was no significant difference between mean applied nutrition knowledge scores for males and females. It is possible that the higher knowledge levels and more positive attitudes of females regarding dietary fat is a reflection of the greater percentage of females than males who are trying to lose weight. No significant differences in pretest and posttest knowledge and attitudes scores were observed in males and females (Table 5).

Similar results were found in a study which assessed 5th grade students' general nutrition knowledge, attitudes, and practices (Foley et al., 1983). The authors of this study found that 5th grade girls' nutrition knowledge and attitudes scores were higher than for 5th grade boys.

Effect of Weight Control Action on Nutrition Knowledge and Attitudes

Posttest total nutrition knowledge scores for students who were reportedly trying to lose weight were significantly higher than those for students who were trying to gain or maintain weight (Table 6). Students who reported trying to
Table 4. Mean posttest\textsuperscript{a} nutrition knowledge and attitudes scores according to gender of students who received positive or negative nutrition education poster messages.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Total nutrition knowledge\textsuperscript{b}</td>
<td>7.48\textsuperscript{c}</td>
</tr>
<tr>
<td>Cognitive nutrition knowledge\textsuperscript{e}</td>
<td>5.60\textsuperscript{c}</td>
</tr>
<tr>
<td>Applied nutrition knowledge\textsuperscript{f}</td>
<td>1.92\textsuperscript{c}</td>
</tr>
<tr>
<td>Total nutrition attitude\textsuperscript{g}</td>
<td>56.97\textsuperscript{c}</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Posttest number = 847.

\textsuperscript{b}Total nutrition knowledge score = cognitive nutrition knowledge score + applied nutrition knowledge score. Number of possible correct answers = 16.

\textsuperscript{c,d}Means followed by different superscripts within one score are significantly different at p \leq 0.05.

\textsuperscript{e}Number of possible correct answers = 12.

\textsuperscript{f}Number of possible correct answers = 4.

\textsuperscript{g}Attitudes were scored on a scale where 1 = strongly disagree and 5 = strongly agree. Scores ranged from 22 to 89 with higher scores indicating greater concern towards dietary fat.
Table 5. Mean difference$^a$ in nutrition knowledge and attitudes scores according to gender of students who received positive or negative nutrition education poster messages.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Total nutrition knowledge$^b$</td>
<td>-0.27</td>
</tr>
<tr>
<td>Cognitive nutrition knowledge$^c$</td>
<td>-0.22</td>
</tr>
<tr>
<td>Applied nutrition knowledge$^d$</td>
<td>-0.01</td>
</tr>
<tr>
<td>Total nutrition attitude$^e$</td>
<td>-0.31</td>
</tr>
<tr>
<td>Caring about fat intake</td>
<td>+0.38</td>
</tr>
<tr>
<td>Eating new low-fat foods</td>
<td>-0.03</td>
</tr>
<tr>
<td>Fat affects health</td>
<td>-0.34</td>
</tr>
<tr>
<td>Learning about fat</td>
<td>-0.15</td>
</tr>
</tbody>
</table>

$^a$Mean difference = posttest score - pretest score.

$^b$Total nutrition knowledge score = cognitive nutrition knowledge score + applied nutrition knowledge score.

$^c$Number of possible correct answers = 12.

$^d$Number of possible correct answers = 4.

$^e$Attitudes were scored on a scale where 1 = strongly disagree and 5 = strongly agree. Scores ranged from 22 to 89 with higher scores indicating greater concern towards dietary fat.
Table 6. Mean posttest\(^a\) nutrition knowledge and attitudes scores according to weight control action of students who received positive or negative nutrition education poster messages.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Weight control action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trying to gain weight</td>
</tr>
<tr>
<td>Total nutrition knowledge(^b)</td>
<td>7.09(^c)</td>
</tr>
<tr>
<td>Cognitive nutrition knowledge(^f)</td>
<td>5.28(^c)</td>
</tr>
<tr>
<td>Applied nutrition knowledge(^g)</td>
<td>1.79(^c)</td>
</tr>
<tr>
<td>Total nutrition attitude(^h)</td>
<td>48.80(^c)</td>
</tr>
</tbody>
</table>

\(^a\)Posttest number = 847.

\(^b\)Total nutrition knowledge score = cognitive nutrition knowledge score + applied nutrition knowledge score.

\(^c,d,e\)Means followed by different superscripts within rows are significantly different at \(p \leq 0.05\).

\(^f\)Number of possible correct answers = 12.

\(^g\)Number of possible correct answers = 4.

\(^h\)Attitudes were scored on a scale where 1 = strongly disagree and 5 = strongly agree. Scores ranged from 22 to 89 with higher scores indicating greater concern towards dietary fat.
lose weight answered 8.5 nutrition knowledge questions correctly, while students who were trying to maintain weight and lose weight correctly answered 7.9 and 7.1 questions, respectively. Posttest cognitive nutrition knowledge scores were significantly higher for students that were trying to lose or maintain weight than for students that were trying to gain weight. There were no significant differences in mean applied nutrition knowledge scores among these 3 groups. It may be that the students who were trying to gain weight had lower knowledge scores because of a lack of interest in learning about weight reduction. On the other hand, students who reported trying to lose or maintain weight may have been better informed about appropriate weight loss practices due to a personal interest in this area.

There were significant differences in total nutrition attitude scores for all 3 categories of weight control actions (Table 6). Students who reported trying to lose weight had the highest score (66.2) indicating the greatest concern for dietary fat and students who were trying to gain weight had the lowest score (48.8) indicating the least concern for dietary fat. These differences in nutrition attitudes scores may be explained in relationship to Story and Resnick's (1985) mention of 3 barriers that adolescents believed prevented them from changing dietary behaviors. These barriers included lack of time, the inconvenience of obtaining nutritious foods, and a "lack of a sense of urgency." Those adolescents
that do not feel the need to lose weight may not be concerned about nutrition-related diseases in general, including obesity, as they are perceived as adult problems. Adolescents tend to think that they are too busy to eat nutritious foods which further may influence nutrition attitudes negatively. No significant differences in pretest and posttest knowledge and attitudes scores were observed in students who were trying to lose, gain, or maintain weight (Table 7).

Effect of Lunch Source on Nutrition Knowledge and Attitudes

The scores of students who reported skipping lunch or obtaining lunch from another source were not analyzed due to their small numbers. In the 2 groups that were analyzed, students that brought lunch from home and students that got lunch in the cafeteria, there were no significant differences in any of the following scores: total nutrition knowledge, cognitive nutrition knowledge, applied nutrition knowledge, and total nutrition attitude scores (Table 8). It appeared that both groups had a similar level of knowledge following nutrition education intervention, as both groups correctly answered approximately only half of the cognitive and applied nutrition knowledge questions. Questionnaire responses indicated a lack of knowledge, in particular, of the fat contents of specific foods. It is possible that, as Resnicow and Reinhardt (1991) suggested, a majority of all American children lack the necessary
Table 7. Mean difference\(^a\) in nutrition knowledge and attitudes scores according to weight control action of students who received positive or negative nutrition education poster messages.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Weight control action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trying to gain weight</td>
</tr>
<tr>
<td>Total nutrition knowledge(^b)</td>
<td>-0.33</td>
</tr>
<tr>
<td>Cognitive nutrition knowledge(^c)</td>
<td>-0.26</td>
</tr>
<tr>
<td>Applied nutrition knowledge(^d)</td>
<td>-0.06</td>
</tr>
<tr>
<td>Total nutrition attitude(^e)</td>
<td>-0.87</td>
</tr>
<tr>
<td>Caring about fat intake</td>
<td>+0.62</td>
</tr>
<tr>
<td>Eating new low-fat foods</td>
<td>-0.13</td>
</tr>
<tr>
<td>Fat affects health</td>
<td>-0.27</td>
</tr>
<tr>
<td>Learning about fat</td>
<td>-1.07</td>
</tr>
</tbody>
</table>

\(^a\)Mean difference = posttest score - pretest score.

\(^b\)Total nutrition knowledge score = cognitive nutrition knowledge score + applied nutrition knowledge score.

\(^c\)Number of possible correct answers = 12.

\(^d\)Number of possible correct answers = 4.

\(^e\)Attitudes were scored on a scale where 1 = strongly disagree and 5 = strongly agree. Scores ranged from 22 to 89 with higher scores indicating greater concern towards dietary fat.
Table 8. Mean posttest\(^a\) nutrition knowledge and attitudes scores according to typical lunch source of students who received positive or negative nutrition education poster messages.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Bring from home</th>
<th>Get from cafeteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total nutrition knowledge(^b)</td>
<td>8.44(^c)</td>
<td>7.86(^c)</td>
</tr>
<tr>
<td>Cognitive nutrition knowledge(^d)</td>
<td>6.38(^c)</td>
<td>5.98(^c)</td>
</tr>
<tr>
<td>Applied nutrition knowledge(^e)</td>
<td>2.08(^c)</td>
<td>1.91(^c)</td>
</tr>
<tr>
<td>Total nutrition attitude(^f)</td>
<td>62.62(^c)</td>
<td>59.55(^c)</td>
</tr>
</tbody>
</table>

\(^a\)Posttest number = 847.

\(^b\)Total nutrition knowledge score = cognitive nutrition knowledge score + applied nutrition knowledge score. Number of possible correct answers = 16.

\(^d\)Number of possible correct answers = 12.

\(^e\)Number of possible correct answers = 4.

\(^f\)Attitudes were scored on a scale where 1 = strongly disagree and 5 = strongly agree. Scores ranged from 22 to 87 with higher scores indicating greater concern towards dietary fat.
knowledge to make nutritious food choices. Similar attitudes scores in these 2 groups indicated neutral attitudes regarding dietary fat. These students' neutral attitudes may be a reflection of their lack of knowledge. It is possible that knowledge must increase in order for attitudes to improve (Fishbein & Ajzek, 1975).

No significant differences in pre-and posttest knowledge and attitudes scores were observed in students who reported bringing lunch from home or getting lunches in the cafeteria (Table 9). These findings are contrary to Byrd-Bredbenner et al. (1988, 1982) and others (Simons-Morton et al., 1991; Resnicow et al., 1989; Clawson et al., 1984; Lindholm et al., 1984) who reported significant increases in nutrition knowledge of schoolchildren following nutrition education. However, in all of these studies, the length of nutrition education intervention was considerably longer than in the present study. Also, several studies involved classroom education and the use of a nutrition curriculum (Simons-Morton et al., 1991; Byrd-Bredbenner et al., 1988; Clawson et al., 1984; Byrd-Bredbenner et al., 1982). It may be that an active learning environment is necessary to increase students' nutrition knowledge.

It appeared that the nutrition education intervention used here was not effective in increasing nutrition knowledge or attitudes scores. Explanations for these include those previously mentioned: insufficient intervention time period and lack of student involvement in the learning
Table 9. Mean difference in nutrition knowledge and attitudes scores according to typical lunch source of students who received positive or negative nutrition education poster messages.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Typical lunch source</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Home</td>
<td>Cafeteria</td>
</tr>
<tr>
<td>Total nutrition knowledge</td>
<td>-0.46</td>
<td>-0.17</td>
</tr>
<tr>
<td>Cognitive nutrition knowledge</td>
<td>-0.18</td>
<td>-0.13</td>
</tr>
<tr>
<td>Applied nutrition knowledge</td>
<td>-0.23</td>
<td>-0.02</td>
</tr>
<tr>
<td>Total nutrition attitude</td>
<td>-0.88</td>
<td>-0.81</td>
</tr>
<tr>
<td>Caring about fat intake</td>
<td>+0.46</td>
<td>-0.30</td>
</tr>
<tr>
<td>Eating new low-fat foods</td>
<td>-0.66</td>
<td>-0.05</td>
</tr>
<tr>
<td>Fat affects health</td>
<td>-0.22</td>
<td>-0.34</td>
</tr>
<tr>
<td>Learning about fat</td>
<td>-0.44</td>
<td>-0.26</td>
</tr>
</tbody>
</table>

*aMean difference = posttest score - pretest score.

*bTotal nutrition knowledge score = sum of the cognitive nutrition knowledge score + applied nutrition knowledge score.

*cNumber of possible correct answers = 12.

*dNumber of possible correct answers = 4.

*eAttitudes were scored on a scale where 1 = strongly disagree and 5 = strongly agree. Scores ranged from 22 to 89 with higher scores indicating greater concern towards dietary fat.
process. In addition to these, lack of learner readiness also may be a relevant concept. According to Hochbaum (1981), there must be an emotional readiness on the part of the learner to change behaviors in order for factual knowledge to be accepted. In the absence of that readiness, facts are either ignored or distorted to justify the current behavior. For example, if individuals of normal weight were told that high-fat diets may lead to obesity, they may choose to believe that they will never encounter this problem. Or, if an overweight individual was told to decrease fat intake in order to lose weight, he/she might choose to ignore this advice and believe that he/she is not really overweight or that this behavior change would not result in weight loss. Hochbaum stated that "... one can postulate that such [learner] readiness exists when a person feels motivated to achieve or obtain something strongly desired or prevent something feared from happening, and when the individual perceives that the new behavior will lead to the desired result (Hochbaum, 1981)."

Plate Waste

Examination of plate waste data indicated that dietary behaviors of students who received negative nutrition education intervention were positively altered. Plate waste data indicated that the students who received the negative poster message decreased their plate waste of the
breaded chicken patty (low-fat entree) (Table 10) and increased their plate waste of whipped potatoes (high-fat vegetable) (Table 11) more so than the other students. Although the number of servings of meatloaf selected were small, these numbers indicate that fewer of these students selected meatloaf (high-fat entree) (Table 12) following nutrition education intervention. It appeared that students that received negative nutrition education intervention ate more of the low-fat entree, less of the high-fat vegetable, and selected fewer portions of the higher-fat entree following intervention.

There was little change in plate waste of the chicken patty in the students that received positive or no nutrition education intervention, although approximately 30 fewer students that received positive nutrition education selected this item following intervention. Plate waste of whipped potatoes decreased 12.13% in students that received positive intervention indicating that students ate more of this item following intervention. One might conclude that positive nutrition education intervention was not effective in altering dietary behaviors of these students.

The nutrition education intervention used here did not seem to influence consumption of spinach (low-fat vegetable) (Table 13). This may be explained by the fact that spinach is generally not well-liked by children in this age group. Although the number of servings of spinach
Table 10. Plate waste results for breaded chicken patty\textsuperscript{a} according to type of nutrition education poster message.

<table>
<thead>
<tr>
<th>Type of poster message</th>
<th>Initial plate waste (%)</th>
<th>Final plate waste (%)</th>
<th>Percentage\textsuperscript{b} change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>9.85 (131)\textsuperscript{c}</td>
<td>9.13 (127)</td>
<td>-0.72</td>
</tr>
<tr>
<td>Negative</td>
<td>5.95 (220)</td>
<td>1.39 (209)</td>
<td>-4.56</td>
</tr>
<tr>
<td>None</td>
<td>6.30 (145)</td>
<td>5.93 (113)</td>
<td>-0.37</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Considered the low-fat entrée.

\textsuperscript{b}Percentage change = final - initial.

\textsuperscript{c}Numbers enclosed in parentheses indicate number of serving selected by students.
Table 11. Plate waste results for whipped potatoes\textsuperscript{a} according to type of nutrition education poster message.

<table>
<thead>
<tr>
<th>Type of poster message</th>
<th>Initial plate waste (%)</th>
<th>Final plate waste (%)</th>
<th>Percentage\textsuperscript{b} change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>46.20 (50)\textsuperscript{c}</td>
<td>34.07 (59)</td>
<td>-12.13</td>
</tr>
<tr>
<td>Negative</td>
<td>26.12 (121)</td>
<td>34.31 (109)</td>
<td>8.19</td>
</tr>
<tr>
<td>None</td>
<td>8.08 (99)</td>
<td>12.17 (106)</td>
<td>4.09</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Considered the high-fat vegetable.

\textsuperscript{b}Percentage change = final - initial.

\textsuperscript{c}Numbers enclosed in parentheses indicate number of servings selected by students.
Table 12. Plate waste results for meatloaf\(^a\) according to type of nutrition education poster message.

<table>
<thead>
<tr>
<th>Type of poster message</th>
<th>Initial plate waste (%)</th>
<th>Final plate waste (%)</th>
<th>Percentage(^b) change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>0 (0)(^c)</td>
<td>0 (2)</td>
<td>--</td>
</tr>
<tr>
<td>Negative</td>
<td>13.85 (13)</td>
<td>13.33 (3)</td>
<td>-0.52</td>
</tr>
<tr>
<td>None</td>
<td>10.44 (9)</td>
<td>18.80 (5)</td>
<td>8.36</td>
</tr>
</tbody>
</table>

\(^a\)Considered the high-fat entrée.

\(^b\)Percentage change = final - initial.

\(^c\)Numbers enclosed in parentheses indicate number of servings selected by students.
Table 13. Plate waste results for spinach\textsuperscript{a} according to type of nutrition education poster message.

<table>
<thead>
<tr>
<th>Type of poster message</th>
<th>Initial plate waste (%)</th>
<th>Final plate waste (%)</th>
<th>Percentage\textsuperscript{b} change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>0 (0)\textsuperscript{c}</td>
<td>65.00 (2)</td>
<td>--</td>
</tr>
<tr>
<td>Negative</td>
<td>85.00 (4)</td>
<td>90.00 (2)</td>
<td>5.00</td>
</tr>
<tr>
<td>None</td>
<td>21.11 (9)</td>
<td>34.00 (5)</td>
<td>12.89</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Considered the low-fat vegetable.

\textsuperscript{b}Percentage change = final - initial.

\textsuperscript{c}Numbers enclosed in parentheses indicate number of serving selected by students.
selected were also small, plate waste data indicated that slightly fewer
students that received negative or no nutrition education intervention
selected spinach following intervention and that they ate less of this item.
However, it was interesting to note that 2 additional students that
received positive intervention selected spinach and no plate waste was
collected.

It appeared that the nutrition education intervention used here may
have been effective in changing the food behaviors of students that
received negative nutrition education intervention. It was not effective in
altering the food behaviors of the students that received positive
intervention. Contrary to Gintner et al. (1987) and Kirscht et al. (1975),
a negative message was more successful than a positive message in
promoting desired health behaviors.
The purpose of this study was to determine whether there was a difference in nutrition knowledge scores, nutrition attitudes scores, and plate waste of 6th graders who received positive and negative nutrition education messages in the form of cafeteria posters and 6th graders who did not receive nutrition education. The effects of gender, reported weight control actions, and source of lunch on these scores also were assessed.

In each school, approximately 45-55% of the students reported trying to maintain their current weights, 31-40% stated they were trying to lose weight, and 9-16% indicated they were trying to gain weight. When respondents were grouped by gender, a greater percentage of females than males (43.05% and 24.87%, respectively) reported trying to lose weight and a greater percentage of males than females (20.05% and 7.06%, respectively) reported trying to gain weight.

The average percentage of correct responses to nutrition knowledge questions following nutrition education intervention was 51.4%. Most students (65-75%) correctly answered half of the applied nutrition knowledge questions. Twenty to 35% of students were able to correctly answer questions in which they were to identify low-fat and high-fat foods. Individual attitude statements revealed an approximately neutral attitude towards most statements. However,
students generally agreed with all 3 statements in the "Fat affects health" construct, indicating that they were aware of the relationship between fat intake and health.

Posttest scores were analyzed to determine if there were differences in scores according to the type of nutrition education intervention. Total nutrition knowledge and cognitive nutrition knowledge scores were significantly lower in students that received negative nutrition education intervention than in students that received positive or no intervention. Applied nutrition knowledge and total nutrition attitude scores were significantly higher for students that received no intervention than for students who received negative intervention. Although higher scores indicated a greater concern for dietary fat, both scores appeared to represent a fairly neutral attitude towards fat. One might attribute the lower scores of the students that received negative nutrition education intervention to their receiving less classroom nutrition education.

When posttest and pretest scores were compared, overall, there were no significant differences in knowledge and attitudes scores. In fact, nutrition knowledge and attitudes scores frequently decreased following nutrition education intervention regardless of the type of intervention. Possible reasons for the lack of change in knowledge and attitudes include: 1) an intervention time period that was too short, and 2) an intervention method that was not effective.
Posttest scores for total nutrition knowledge, cognitive nutrition knowledge, and total nutrition attitude were significantly higher for females than for males. It is possible that the higher knowledge and more positive attitudes of females regarding dietary fat is a reflection of the greater percentage of females than males who were trying to lose weight. No differences in the applied nutrition knowledge scores or in pretest and posttest knowledge and attitudes scores were observed between males and females.

Posttest scores for total nutrition knowledge and cognitive nutrition knowledge were significantly higher for students who reported trying to lose weight than for students who were trying to gain weight. There were no differences in applied nutrition knowledge scores among students trying to lose, gain, or maintain weight.

There were significant differences in attitudes scores among all 3 categories of weight control actions. Students who reported trying to lose weight had the highest score indicating the greatest concern for dietary fat, while students who were trying to gain weight had the lowest scores indicating the lowest concern for dietary fat. It may be that the students who were trying to gain weight had lower knowledge scores because of a lack of interest in learning about nutrition in regards to weight reduction. On the other hand, students who reported trying to lose weight may be better informed about appropriate weight loss practices due to the fact that they have a personal concern in this area.

There were no significant differences in posttest scores for total nutrition
knowledge, cognitive nutrition knowledge, and total nutrition attitude of students who brought lunch from home and those who got lunch in the school cafeteria. It appeared that there was a similar lack of knowledge, especially of the fat contents of specific foods in these 2 groups. It is possible that, as Resnicow and Reinhardt (1991) suggested, American children in general lack knowledge in this area of nutrition. It also appeared that attitude scores in both groups were similar, representing a neutral attitude towards dietary fat. It is possible that attitudes are related to knowledge in that knowledge scores must increase before attitudes can improve. In addition, no significant differences in posttest and pretest knowledge and attitude scores were observed in these 2 groups.

Examination of plate waste data indicated that dietary behaviors of students who received negative nutrition education intervention were altered positively. Plate waste data indicated that the students who viewed the negative poster message decreased their plate waste of the breaded chicken patty (low-fat entree) and increased their plate waste of whipped potatoes (high-fat vegetable) more so than the other students. It appeared that students that received negative nutrition education intervention ate more of the low-fat entree, less of the high-fat vegetable, and selected fewer portions of the higher-fat entree following intervention.

It appeared that although the nutrition education intervention used in this study was not effective in increasing nutrition knowledge and attitudes scores, it
may have successfully altered dietary behaviors in students who received negative nutrition education intervention. The posters were not effective in improving nutrition knowledge but may have provided the necessary daily information to influence students to consume less of the higher-fat foods. Intervention time periods that are longer and intervention methods that involved more student interaction may be necessary to positively influence nutrition knowledge and attitudes in 6th graders.
REFERENCES


APPENDIX A

HUMAN SUBJECTS REVIEW APPROVAL
April 15, 1992

CRP #: 3634-B

TITLE: Improving the nutritional composition of school lunches in Knox County

Ms. Camille Ivey  Dr. Carol A. Costello
Nutrition & Food Sciences  Nutrition & Food Sciences
229 Jessie Harris Bldg.  229 Jessie Harris Bldg.
Campus  Campus

This will acknowledge receipt of the letter of approval from Samuel Bratton, Knox County Schools and your signature on Form B, thus satisfying the contingency against the approval of the above-captioned project.

Your project is now in full compliance, and we wish you luck in your research.

Sincerely,

Edith M. Szathmary
Coordinator of Compliances

cc: Dr. Michael Zemel
APPENDIX B

KNOX COUNTY DEPARTMENT OF PUBLIC INSTRUCTION
APPROVAL
Dr. Carol A. Costello  
College of Human Ecology  
University of Tennessee  
1215 West Cumberland Avenue, Room 220  
Knoxville, Tennessee 37996-1900

Dear Dr. Costello:

You are granted permission to contact appropriate building-level administrators concerning the conduct of your proposed research study entitled, "Improving the Nutritional Composition of School Lunches in Knox County." In the Knox County Schools final approval of any research study is contingent upon acceptance by the principal(s) at the site(s) where the study will be conducted.

In all research studies names of individuals, groups, or schools may not appear in the text of the study unless specific permission has been granted through this office. The principal researcher is required to furnish this office with one copy of the completed research document.

Good luck with your study. Do not hesitate to contact me if you need further assistance or clarification.

Yours truly,

Samuel E. Bratton, Jr.  
Coordinator of Food Services  
Research and Evaluation  
Telephone: (615) 521-2194

xc: Mr. Phillip W. Clear, Coordinator of Food Services  
Mr. Bob B. Goff, Coordinator of Middle Schools  
Dr. J. W. Phifer, Coordinator of High Schools
APPENDIX C

RESEARCH QUESTIONNAIRE
PART I.

Please read each statement carefully. Circle the answer that is correct.

1. High-fat foods generally contain:
   a. fewer vitamins than low-fat foods.
   b. more calories than low-fat foods.
   c. a more concentrated form of fat than low-fat foods.
   d. a different kind of cholesterol than low-fat foods.

2. Weight gain occurs when you:
   a. eat too many starchy foods.
   b. eat or drink more calories than you need.
   c. are a couch potato.
   d. eat fast food.

3. A good and safe way to lose weight or keep from becoming overweight is to:
   a. eat fewer high-fat foods.
   b. use 100% vegetable oils in place of animal fats.
   c. not eat breakfast.
   d. reduce calories to 1000 per day.

4. Which of the following foods contains the least amount of fat?
   a. 1 cup low-fat chocolate milk
   b. 1 cup low-fat white milk
   c. 1 cup 2% milk
   d. 1 cup skim milk

5. Which of the following foods contains the least amount of fat?
   a. 1 corndog
   b. 1 hoagie sandwich
   c. 1 grilled chicken sandwich
   d. 1 slice pizza
6. Which of the following foods contains the least amount of fat?
   a. 1/2 cup broccoli with cheese sauce
   b. 1/2 cup buttered corn
   c. 1/2 cup medium baked potato (plain)
   d. 1/2 cup fried okra

7. Which of the following foods contains the least amount of fat?
   a. 1/2 cup french fries
   b. 1/2 cup tater tots
   c. 6 Saltine crackers
   d. 1/2 cup mashed potatoes

8. Each gram of fat that we eat contains:
   a. 4 calories.
   b. 9 calories.
   c. 30 calories.
   d. 100 calories.

9. Which of the following meals contains the least amount of fat?
   a. baked chicken, mixed vegetables, and 2% milk
   b. steak nuggets, mixed vegetables, and 2% milk
   c. baked chicken, french fries, and whole milk
   d. steak nuggets, french fries, and whole milk

10. Which of the following meals contains the least amount of fat?
    a. steak and gravy, corn, apple, and fruit juice
    b. chili, Saltine crackers, apple, and skim milk
    c. steak and gravy, mashed potatoes, and fruit juice
    d. chili, french fries, and skim milk

11. Which of these foods is a low-fat food? (circle one)
    a. peanut butter
    b. pretzels
    c. avocado
    d. cheddar cheese
12. Which of these foods is a high-fat food? (circle one)
   a. pretzels
   b. graham crackers
   c. Jolly Ranchers candy
   d. peanuts

PART II.

You are standing in the lunch line in the school cafeteria. Information on the fat and calorie content of the foods served is available to you in the form of cards. Please answer each question based on the information provided on the cards.

13. Circle the food that would be the best choice if you were trying to lose weight.
   a. Fried fish nuggets (serving: 5, calories: 245, fat content: 11 grams)
   b. Corn dog (serving: 1, calories: 323, fat content: 19 grams)
   c. Either, no difference

14. Circle the food that would be the best choice if you were trying to lose weight.
   a. Coleslaw (serving: 1/2 cup, calories: 170, fat content: 16 grams)
   b. Baked beans (serving: 1/2 cup, calories: 169, fat content: 1 gram)
   c. Either, no difference

15. Circle the food that would be the best choice if you were trying to lose weight.
   a. Chili (serving: 1 bowl, calories: 214, fat content: 11 grams)
   b. Chef salad (serving: 1 without dressing, calories: 202, fat content: 14 grams)
   c. Either, no difference

16. Circle the food that would be the best choice if you were trying to lose weight.
   a. Roast beef (serving: 3 ounces, calories: 308, fat content: 26 grams)
   b. Sausage pizza (serving: 1 slice, calories: 372, fat content: 17 grams)
   c. Either, no difference
PART. III.

Please answer the following questions so that we can interpret the results of this survey.

17. What is your gender?
   a. male
   b. female

18. I am currently trying to: (circle one)
   a. gain weight.
   b. lose weight.
   c. maintain my current weight.

19. Which of the following best describes you?
   a. I bring my lunch from home.
   b. I skip lunch.
   c. I get my lunch from the school cafeteria.
   d. I get my lunch from another source. Please specify________________________

20. List all the classes you have taken in which you learned about nutrition.

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________
APPENDIX D

POSITIVE POSTER MESSAGE
Eat more low-fat foods. It's a great-tasting way to take in fewer calories and keep your body looking good.

May 5

<table>
<thead>
<tr>
<th>Chicken patty</th>
<th>Meat loaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving: 1 patty</td>
<td>Serving: 1 slice</td>
</tr>
<tr>
<td>Calories 200</td>
<td>Calories 246</td>
</tr>
<tr>
<td>Fat 10 grams</td>
<td>Fat 14 grams</td>
</tr>
</tbody>
</table>

May 5

<table>
<thead>
<tr>
<th>Whipped potatoes</th>
<th>Greens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving: 1/2 cup</td>
<td>Serving: 1/2 cup</td>
</tr>
<tr>
<td>Calories 119</td>
<td>Calories 47</td>
</tr>
<tr>
<td>Fat 6 grams</td>
<td>Fat 4 grams</td>
</tr>
</tbody>
</table>
APPENDIX E

NEGATIVE POSTER MESSAGE
**Eating too many high-fat foods may leave you with more calories than you need and more weight than you want.**

Try eating low-fat foods instead.

<table>
<thead>
<tr>
<th>May 5</th>
<th>May 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chicken patty</strong></td>
<td><strong>Whipped potatoes</strong></td>
</tr>
<tr>
<td>Serving: 1 patty</td>
<td>Serving: 1/2 cup</td>
</tr>
<tr>
<td>Calories 200</td>
<td>Calories 119</td>
</tr>
<tr>
<td>Fat 10 grams</td>
<td>Fat 6 grams</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>May 5</th>
<th>May 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meat loaf</strong></td>
<td><strong>Greens</strong></td>
</tr>
<tr>
<td>Serving: 1 slice</td>
<td>Serving: 1/2 cup</td>
</tr>
<tr>
<td>Calories 246</td>
<td>Calories 47</td>
</tr>
<tr>
<td>Fat 14 grams</td>
<td>Fat 4 grams</td>
</tr>
</tbody>
</table>

1 gram = 9 calories
VITA

Camille Lenore Ivey received her Bachelor of Science Degree in Dietetics at Auburn University, Auburn, Alabama in June 1986. In the fall of 1986, she completed and passed the registration examination for dietitians and became a Registered Dietitian.

She worked as a clinical dietitian in a hospital in Dalton, Georgia for one year. For 3 years, she worked as chief clinical dietitian in a hospital in Chattanooga, Tennessee. In the fall of 1989, she began study towards a Master of Science degree in Food Systems Administration at the University of Tennessee, Knoxville. In the spring of 1990, while continuing her studies, she moved to Knoxville and worked for a food distributor as a healthcare representative for one year. In the spring of 1991 she began full-time work towards her degree. During the 91-92 academic year she worked as a graduate research assistant completing this research study under a grant from Knox County Schools.

She plans to work in the business arena of dietetics and is considering returning for doctoral studies at a later date.