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Effects of the Implementation of a Pilot Nutrition Education
Program in a Rural Appalachian County

A thesis
presented to
the faculty of the Department of Family and Consumer Sciences
East Tennessee State University

In partial fulfillment
of the requirements for the degree
Master of Science in Clinical Nutrition

by
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August 2005

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Key words: nutrition education, food labels, sports nutrition, rural, Appalachia,
integrated curriculum

ABSTRACT

Effects of the Implementation of a Pilot Nutrition Education Program in a Rural Appalachian County

by

Leigh Ann Davenport

The purpose of the study was to determine if nutrition knowledge would increase, indicated by improvements in pretest and posttest scores, following implementation of a nutrition lesson plan. The subjects included 532 fourth through eighth grade students from Johnson County, a rural county in northeast Tennessee. The lesson plans and pretests and posttests were developed to be appropriate for each grade level, with increased complexity in higher grades. The principal investigator graded the pretests and posttests and analyzed the data using SPSS. The results showed a significant improvement from pretests to posttests for all grades given a p-value of <0.05 .

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CHAPTER 1

INTRODUCTION

Background

In a nation that has become accustomed to the ease of fast food, the number of children in the United States who are overweight is on the rise. Health problems often seen only in adulthood are now being seen in children, including Type 2 diabetes, hypertension, and joint stress (1). Knowledge of nutrition and developing healthy eating habits in children is essential to manage and prevent obesity. Rural communities are often associated with poverty, which is linked to poor eating habits. In Johnson County, Tennessee 62.8% of public school children are eligible for free or reduced meals indicating a high incidence of poverty (2). An unpublished study conducted by an East Tennessee State University nursing student in 2001 found that 24% of Johnson County public school children are above the 95th percentile for weight and 18% are between the 85th and 94th percentiles for weight. These data use growth charts indicating normal weight for age is at the 50th percentile. At the time of this study, Johnson County, a rural county in northeast Tennessee, had up to date nutrition education curriculum for its elementary and middle schools.

Statement of the Problem

The purpose of this research was to update, develop, and initiate an educational program for children in fourth through eighth grades to increase their knowledge of nutrition and to provide the information and skills to make healthy food choices. This study measured changes in students' knowledge.

Hypothesis

There will be a significant difference in nutrition knowledge demonstrated by subjects as measured by pretests and posttests for each grade level following implementation of a nutrition education program in grades four through eight.

Null Hypothesis

There will not be a significant difference in nutrition knowledge demonstrated by subjects as measured by pretests and posttests for each grade level following implementation of a nutrition education program in grades four through eight.

Assumptions

- Assessment provides correct representation of the children's knowledge
- Intervention was properly presented to each subject in conjunction with the lesson plan

Limitations

- A student absent on the day of the intervention prevents the true representation of the class as a whole
- One hour time interval per grade to provide pretest, intervention, and posttest
- Results may be limited due to lack of student participation or willingness to participate in the study
- Principle investigator scored the pretests and posttests without considering grammar in determining whether students' answers were correct or incorrect

Definition of Terms

Body mass index (BMI)- weight (kg)/height (m²); a definition of the degree of adiposity (3)

Glycemic index- a ranking of the effect on blood glucose of the consumption of single food relative to a reference carbohydrate (3)

Morbid obesity- a state of adiposity in which body weight is 100% above the ideal body weight; a body mass index of 45 or greater (3)

Obesity- a state of adiposity in which body fatness is above the ideal; a body mass index of 30-30.9 (3)

Overweight- a state in which weight exceeds a standard based on height; having a body mass index of 25-29.9 (3)

Trans fat- forms when vegetable oil hardens (a process called hydrogenation), can raise LDL levels, lower HDL levels (good cholesterol) and is found in fried foods, commercial baked goods (donuts, cookies, crackers), processed foods, and margarine (4)

CHAPTER 2

REVIEW OF LITERATURE

Childhood Obesity

Excess weight gain in childhood is becoming one of the most prevalent and preventable disorders in the United States (5). The physical state of being overweight is considered to be a body mass index (the ratio of weight in kilograms to the square of height in meters) greater than or equal to the 95th percentile for age and sex (6). Obesity in children is associated with an increased risk for high cholesterol, hypertension, type 2 diabetes, dyslipidemia, sleep apnea and gallbladder disease (1). The rate of children who are overweight has doubled in the past 30 years to an estimated 15.3% for all children aged 6 to 11. Obesity in children is more prevalent in rural communities, over 20% obesity rate compared to 16% in urban communities. Among overweight children 5 to 10 years of age, 60% have at least one risk factor for cardiovascular disease (7).

Risk factors for developing obesity include a lack of physical activity and poor dietary habits. Decreased physical activity often is linked to increased television viewing, playing video games and decreased physical education in schools. Only 2% of school-aged children typically meet the USDA's Food Guide Pyramid recommendations for all food groups (8). Common dietary habits commonly seen in children include increased intakes of high calorie fast foods, lack of fruits and vegetables, and increased consumption of soft drinks (9). Drinking soft drinks may reduce the intake of other more nutritious beverages, such as milk (10). The availability of soft drinks in the home and schools is strongly correlated to consumption. In 2000 the National School Health Policies and Programs Study found that vending machines, many that contain soft drinks, are found in almost 50% of elementary schools and 75% of middle schools (11). The

Centers for Disease Control and Prevention's School Health Policies and Programs Study 2000 survey report 89.4% of middle schools and 98.2% of senior high schools either have a vending machine or have snack bar where students could purchase soft drinks (12). In 2001 the Mathematica Policy Research, Inc reported that up to 85% of school aged children consume soft drinks daily (13).

Increased intake of fast foods has also contributed to the increase in childhood obesity. Consumption of fast food by children has increased in the past decade. Fast food restaurants are evident in all communities in the United States including some public schools and hospitals (14). Dietary factors often associated with fast food include large portion size, high energy density, palatability, high content of saturated fat and trans fat, high glycemic index, and low content of fiber (14).

Discussing healthful beverage options, limited television viewing, and the parents' role as gatekeepers of the family food supply will provide the knowledge to help prevent obesity and improve family health (15).

Bowman studied the Supplemental Children's Survey 1998 for the amount of fast food consumed by subjects ages 4 to 19 who participated (15). The findings showed that 30.3% of the children consumed fast food on a typical day. Fast food consumption was evident in both genders and various ethnic populations in all areas studied. It was found that higher levels of calories, fat, sugar, and sugar-sweetened beverages were consumed by those who frequently ate fast food. Those elements of food are specifically linked to weight gain when consumed in excess. Lower intakes of fiber, milk, fruits, and vegetables were also reported, yet these are

considered healthier options. The children's intakes reflected poorer diet quality on days with fast food consumption when compared to days without fast food consumption (16).

Children aged 12-19 who are overweight have a 70% greater risk of becoming overweight adults compared to children who are not overweight (5). Obesity in adults increases the risk of various chronic diseases such as heart disease, vascular diseases, diabetes, and some types of cancer (2). Research conducted by Wang et al. reports that the economic impact of obesity in the United States was approximately \$99.2 billion in 1995, including \$51.6 billion in medical costs and \$47.6 billion in loss of productivity (17). The study conducted by Wang examined the cost benefit from nutrition education during childhood. A randomized, controlled trial was designed to reduce obesity in middle school aged children. The interdisciplinary program of nutrition education was integrated into major subject areas of language arts, math, science, and social studies. The trial found that the prevalence of obesity among female subjects in the exposure group declined from 23.6% to 20.4% during the two-year intervention, whereas in the schools where no intervention was given, the prevalence of obesity increased from 21.5% to 23.7% (17).

The study indicates that at an intervention cost of \$33,677, or \$14 per student per year, would prevent an estimated 1.9% of the female students from becoming overweight adults. Society could expect to save an estimated \$15,887 in medical care costs and \$25,104 in loss of productivity costs. The results remained cost-effective under all scenarios considered and remained cost saving under most scenarios. Thus, the investigators suggest that school-based prevention programs of this type are likely to be cost-effective uses of public funds (17).

Nutrition Education

The goal of nutrition education is to motivate students to consume a more healthful diet. It is important to teach children about nutrition because childhood and adolescence are essential times for their physical growth and cognitive development. Good nutrition promotes not only better physical health and reduced susceptibility to disease, but it has also positively contributed to cognitive development and academic success (17). Elementary schools are in an excellent position to influence and improve nutrition knowledge and possibly impact consumption among children. Incorporating nutrition education into school curriculum can provide students with the skills and knowledge necessary to make positive health decisions. Also, schools can provide the motivation, services, and support to develop and maintain healthy behaviors (8).

There have been many nutrition programs integrated into comprehensive health programs that have successfully impacted student health. An example is the Child, Adolescent Trial for Cardiovascular Health (CATCH) (19). This program introduced a three-year nutrition education and physical activity program in 56 elementary schools in California, Louisiana, Minnesota, and Texas. Age appropriate curricula were implemented at the third, fourth, and fifth grade levels, using psychosocial factors and skill building. Also, the school food service employees were trained to develop menus that were low in fat and sodium. Results of the CATCH program included decreased fat consumption among students and decreased fat content of the daily school lunches. After three years of nutrition education, CATCH students decreased their reported daily intake of calories from fat from 33% to 30% of their diets. This difference was maintained in a three-year follow-up study (19).

Assessments and the Structure of Memory

In terms of nutrition education, assessment of knowledge gained is essential in determining its effectiveness. An assessment is defined as a process of gathering information for the purpose of making judgements about a current state of affairs (20). In educational assessment, the information collected is designed to help teachers, administrators, policymakers, and the public interpret what students know and how well they know it, presumably for the purpose of enhancing future outcomes. Assessments can use oral, written or demonstration skills, but the tool should appropriately measure the participant's knowledge gain for the specific topic or material covered (20).

In nutrition education it is important to identify effectiveness in terms of knowledge retention. Retention can be addressed in terms of short-term and long-term memory. Short-term memory is limited in capacity and relatively brief in duration. Long-term memory occurs when items from short-term memory are practiced or rehearsed effectively enough to become a permanent part of behavior. Data are transferred from short-term storage to long term storage, where they can be held more permanently and protected from loss. The information must be further processed or rehearsed or it is lost (21).

School Curriculum Issues

Behaviors leading to obesity are learned early in life thus supporting the need for prevention strategies in children (15). Physical education and nutrition education in schools can provide a systematic and efficient means to improve children's knowledge and health by offering access to all children. However, physical activity and physical education has been decreased in

schools to provide additional classroom time for academic subjects. Despite schools attempts to incorporate health education into the curriculum, nutrition is usually not taught with enough frequency to influence dietary behaviors (15).

On January 8, 2002 the federal *No Child Left Behind Act* was passed into law. States must set clear and high standards for each grade outlining knowledge level and skills in math, reading, and science. Schools test students and then measure each student's progress toward those higher standards (22). The pressure of achieving adequate yearly progress places additional accountability on superintendents, principals, and teachers of small, rural schools. Instructional emphasis has shifted to preparing students to achieve high-test results, perhaps leading to lack of education in other areas such as health and wellness (23).

CHAPTER 3

DESIGN AND METHODOLOGY

Participants

The 532 subjects were Johnson County Tennessee students in grades fourth through eighth at five of the elementary schools and Johnson County Middle School. Johnson County students were chosen because they reside in an at risk rural county where children were in need of updated nutrition education.

Johnson County is located in the southern Appalachian Mountains. During winter months, it is often affected by ice and snow that leaves the roads too hazardous to conduct school. In order to complete the study before the winter months when schedules were uncertain, the pretest, intervention, and posttest were confined to a one-hour time period in each class during the fall semester.

Instrumentation

The principal investigator and a clinical nutrition graduate student at East Tennessee State University developed the lesson plans and the instrumentation for each grade level (Appendix F-J). Faculty in the Department of Family and Consumer Sciences, which consisted of individuals with backgrounds in nutrition and child development, reviewed the tools. Revisions were made to ensure that the tools would represent the content of the intervention. The instruments were pretests and posttests that were administered to the subjects prior to and following a nutritional lesson. The instruments are located in Appendices A-E.

Procedures

This study was conducted in the specified school system following a request to update and improve the current nutrition education materials and lessons in the county. The principal investigator and a clinical nutrition graduate student from East Tennessee State University reviewed previously used lesson plans and recently revised lessons to determine applicability and appropriateness for grades fourth through eighth. Lessons were either revised or updated or new materials developed as deemed appropriate by the principal investigator and thesis committee members. The topics covered in the lessons included Early American Nutrition, understanding food labels, choosing healthy beverages, the role of nutrition in sports, and healthy fast food choices. Attention was given to integrating nutrition concepts into basics of the existing curriculum including math, reading, and writing. The lessons were created to transition from grade to grade with increasing complexity, building each year on the information learned.

The principals of the schools receiving the intervention were contacted by the School Food Service Director or by the principal investigator to schedule dates for the nutrition intervention to be conducted. All interventions were provided by the principal investigator, clinical nutrition graduate student from East Tennessee State University, a dietetic intern from East Tennessee State University, Johnson County 4-H program assistant, or the School Food Service Director. The principal investigator provided the intervention initially so the other instructors could receive training by observation. A representative designated by each classroom teacher distributed the pretest prior to the intervention, and each question was read aloud by the representative. Subjects were encouraged to answer each question to the best of their ability

based upon their current knowledge. The students were discouraged from sharing answers aloud or with each other. Following the nutrition education session the designee distributed the posttest and subjects were again instructed to answer the questions to the best of their ability without discussion among themselves. Each question was read aloud. All pretests and posttests were collected by the representative for analysis by the principal investigator.

The intervention used in the fourth grade, “Early American Nutrition”, had been used by students in the Family and Consumer Sciences Department at East Tennessee State University in previous educational opportunities for elementary aged students. This lesson was presented to Johnson County’s fourth grade 4-H club, which meets monthly during a one-hour class period. The University of Tennessee Agricultural Extension Office sponsors the 4-H program in Johnson County. The pretest and posttest consisted of 10 questions including True/False, Yes/No, and listing. The fourth grade pretest and posttest are available in Appendix A. The intervention was conducted at five Johnson County elementary schools. The principle investigator and graduate student presented the intervention at the first school, while the dietetic intern presented the intervention at the second school. The remaining three schools were instructed by the 4-H program assistant and School Food Service Director. The principle investigator scored the responses to the pretests and posttests. The data were entered into a data file and the means and p-values were computed. Fourth grade lesson plan is found in Appendix F.

The fifth grade lesson, “Reading Food Labels”, had been previously used by Johnson County Tennessee Nutrition and Consumer Education Program (TNCEP). The lesson was revised and updated by the principal investigator prior to administration. The pretest and posttest consisted of eight True/False and listing questions (Appendix B). The intervention was conducted

in five fifth grade 4-H classes. The principal investigator and graduate student presented the nutrition program at the first school, while the dietetic intern conducted the intervention at the second school. The 4-H program assistant and School Food Service Director instructed at the remaining three schools. The principal investigator scored the responses to the pretests and posttests. The data were entered into a data file and the means and p-values were computed. The fifth grade lesson plan is found in Appendix G.

The nutrition intervention designed for sixth grade, “Rethink Your Drink”, was created by East Tennessee State University dietetic interns. The pretest and posttest included five True/False and identification questions (Appendix C). The intervention was presented to five sixth grade 4-H classes. The principal investigator and clinical nutrition graduate student provided the intervention at the first school, while the dietetic intern conducted the intervention at the second school. The remaining three schools were instructed by the 4-H program assistant and School Food Service Director. The principal investigator scored the responses to the pretests and posttests. The data were entered into a data file and the means and p-values were computed. The sixth grade lesson plan is found in Appendix H.

The seventh grade lesson, “Sports Nutrition”, was created by the principal investigator who presented it to one seventh grade math class. The pretest and posttest included eight Yes/No and short answer questions (Appendix D). The principal investigator scored the responses to the pretests and posttests. The data were entered into a data file and the means and p-values were computed. The seventh grade lesson plan is found in Appendix I.

The eighth grade lesson, “Fast Food”, was originally created by East Tennessee State University Family and Community nursing students. It was presented by the principal investigator

and clinical nutrition graduate student to one eighth grade math class. The pretest and posttest had eight True/False, listing and identification questions (Appendix E). The principal investigator scored the responses to the pretests and posttests. The data were entered into a data file and the means and p-values were computed. The eighth grade lesson plan is found in Appendix J.

Data Analysis Procedures

Data for each grade were collected and organized for entry into a data file using SPSS. Means were calculated for the pretest and posttest for each grade; however, data were not matched from pretest to posttest. Data were analyzed using a t-test with an alpha level of 0.05. A one-sided test was needed to determine significant improvement. Using SPSS, the output was shown only for two-sided tests. To obtain results for a one-side test, the p value for the results was divided by 2. The statistical results were used to determine if the null hypothesis should be rejected or would fail to be rejected. Data analysis is provided in Appendix K.

CHAPTER 4

RESULTS

Once all instruments were collected by school personnel, the principal investigator scored each test administered and converted the scores to a 100-point scale. Each question on the instrument was designed to have a correct or incorrect answer. An answer was graded as incorrect if it was wrong, left unanswered or was illegible.

Students in five fourth grade classes in Johnson County participated in the study. There were 178 subjects who completed the pretest and 162 usable posttests. The following table identifies all questions from the testing instrument, with the mean from all respondents provided from pretest and posttest.

Question	Pretest Mean	Posttest Mean
True or False the Indians shopped for their food at grocery stores?	95.5%	98.2%
What was the most important crop for the Indians, and is still a food item that we use in many ways today?	75.3%	88.3%
Name one vegetable the Indians ate.	81.5%	86.4%
Name one fruit the Indians ate.	80.3%	93.2%
Name one type of meat the Indians ate.	82.6%	96.3%
Name one way the Indians stored food.	18.5%	85.8%

Table 1. (continued)		
The settlers did not have napkins. How did they wipe their mouths?	1.7%	93.8%
Did the settlers eat from their forks like we do today?	74.2%	87.0%
When did the settlers eat their biggest meal?	0.6%	72.8%
How many food items would the settlers eat at their biggest meal?	23.6%	82.1%

Students in five fifth grade classes in Johnson County participated in the study. There were 152 subjects who completed the pretest and 149 students who completed the posttest. The following table identifies all questions from the testing instrument, with the mean from all respondents from pretest and posttest.

Table 2. Fifth Grade Response to Questions		
Question	Pretest Mean	Posttest Mean
What is the first thing that you will see on a nutrition food label that all of the other information is based on?	6.6%	54.1%
What percent of your calories should come from fat each day?	2.0%	48.3%
What percent of your fat calories should come from saturated fat?	2.6%	44.3%
Name a nutrient found on the nutrition food label that you should limit in your diet.	38.2%	71.8%
True or False. If a food contains 30% of the Percent Daily value of calcium, this food would be high in calcium.	38.2%	68.5%

How many calories are the percent daily values based on?	2.0%	49.7%
True or False. If a food contains 5% of the percent daily value of fat the food is low in fat.	50.7%	69.1%
True or False. Most Americans get the recommended amount of fiber daily.	46.1%	74.5%

Students in five sixth grade classes in Johnson County participated in the study. There were 161 subjects who completed both the pretest and posttest. The following table identifies all questions from the testing instrument, with the mean from all respondents from pretest and posttest.

Question	Pretest Mean	Posttest Mean
What are calories with no benefit called?	0.0%	59.0%
How many extra calories does it take to gain one pound?	0.6%	63.4%
True or False. Milk contains nutrient dense calories.	55.3%	79.5%
True or False. Milk is labeled 2%, 1%, and skim based on the amount of calcium in it.	28.6%	50.3%
Which type of milk should you drink to consume the least amount of fat?	49.1%	85.7%

Students in one seventh grade class in Johnson County participated in the study. There were 21 subjects who completed both the pretest and posttest. The following table identifies all

questions from the testing instrument, with the mean from all respondents from pretest and posttest.

Table 4. Seventh Grade Response to Questions		
Question	Pretest Mean	Posttest Mean
What is the most important nutrient that you need during exercise?	76.2%	95.2%
How much water should you drink a day?	19.0%	95.2%
When exercising or playing a sport, should you only drink water when you are thirsty?	52.4%	76.2%
Who's responsible for making sure you drink plenty of water while exercising or playing a sport?	85.7%	100%
Could not drinking enough water during exercise be life threatening?	76.2%	90.5%
Does the average American eat more protein than they need?	28.6%	85.7%
Does an athlete need extra protein from supplements to go with their diet?	28.6%	33.3%
If you eat more protein than you need where does it go?	33.3%	85.7%

Students in one eighth grade class in Johnson County participated in the study. There were 20 subjects who completed the pretest and 19 subjects who completed the posttest. The following table identifies all questions from the testing instrument, with the mean from all respondents from pretest and posttest.

Question	Pretest Mean	Posttest Mean
Give an example of the appropriate serving size of meat.	5.0%	94.7%
True or False. One serving of cheese is 3 oz.	35.0%	52.6%
What percent of calories should come from fat?	5.0%	21.0%
If you can have 2500 calories, how many calories from fat are you allowed per day?	0.0%	0.0%
How many minutes of moderate exercise should you have daily?	25.0%	21.1%
T/F Most serving sizes from restaurants are more than the recommended serving sizes.	57.9%	94.7%
Name 3 ways you can cut down on calories at fast food restaurants.		
1.	55.0%	89.5%
2.	50.0%	89.5%
3.	40.0%	78.9%

The means for each pretest and posttest for each grade were computed after each respondent's score was entered into statistical software. All questions from the tests were included in the data analysis collectively. Statistical significance was determined at the 95% confidence interval or p-value of <0.05. The following table identifies the number of respondents, pretest and posttest means, p-value for the paired t-test, p-value of the results, and statistical significance.

Grade	Pretest Mean	Posttest Mean	p-value for paired t-test	p-value of results	Statistical Significance
Fourth grade	53.5% n = 178	88.4% n = 162	<0.05	0.00	Yes
Fifth grade	22.7% n = 152	61.0% n = 149	<0.05	0.00	Yes
Sixth grade	26.7% n = 161	67.8% n = 161	<0.05	0.00	Yes
Seventh grade	49.4% n = 21	82.7% n = 21	<0.05	0.00	Yes
Eighth grade	31.1% n = 20	63.2% n = 19	<0.05	0.00	Yes

CHAPTER 5

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Discussion

Overall, the results of the nutrition intervention provided positive results on nutrition knowledge gained. Every grade examined made significant improvements in scores from pretests to posttests. Possible explanations for the knowledge gains include adequate teaching skills, age-appropriate educational materials, increased knowledge, or class participation.

The principals of the schools involved in the study allowed the principle investigator a one hour time interval per class for this intervention, during which, the pretest, nutrition education, and posttest were administered. Because the pretests and posttests were identical and given in the same hour, the participants may have focused on the answers to the questions during the presentations. The study was also limited to the inability to validate the testing tools. The interventions were scheduled in the fall semester before the winter months and potential school closings for inclement weather. There were different instructors providing the lessons, which may have affected the accuracy and consistency of the interventions. As each grade's scores indicated, there were certain questions that increased from pretest to posttest. There were also questions that had a high percent correct at the pretest. When each grade was analyzed as a whole, the results indicated significant improvements at a 95% confidence interval. A barrier to this result is that the data were analyzed collectively as a mean rather than matching pretests and posttests.

This study tested the participants' short-term memory capabilities by testing immediately after the intervention. The literature identified that information must be integrated or presented

repeatedly in order to be effectively transferred from short-term to long-term memory (20). Therefore, nutrition education must be integrated through all stages of education in order for nutrition knowledge to result in healthy lifestyle modification.

As the research indicated, the emphasis on No Child Left Behind legislation results in striving for educational standards through year-end standardized testing, thus not encouraging teachers to provide dedicated time for outside presentations and other activities (22). When each nutrition lesson was revised, developed, or selected, emphasis was placed on reading, history, or math so nutrition education could be incorporated into the standard curriculum. Calculations were incorporated into several of the lessons, which could be integrated into a math class. The Early American Nutrition lesson could be incorporated into a history class. Integrating nutrition education into academic curricula may be the most beneficial way for the students to receive this vital information. This type of curriculum may be considered as value added or beneficial because it uses nutrition education as a means to provide fundamental elements of education, essentially two benefits in one.

This was a wonderful opportunity for the students of Johnson County to be introduced to timely valuable nutrition information. The topics discussed in each grade level were chosen because of current nutritional problems that children encounter, such as increase in fast food and soft drink consumption, which have contributed to childhood obesity (9). Also, the children learned to read nutrition labels that may help them make healthier food choices throughout their lives.

Nutrition during the childhood years provides an essential opportunity to establish life-long behaviors of healthy eating (18). Healthy behaviors can make a positive impact on the

incidence of chronic, life-threatening diseases and are cost-effective to not only the individual but to society (17).

Conclusions

The nutrition intervention conducted in Johnson County elementary and middle schools had a positive impact on nutrition knowledge of subjects based on significant improvement in posttest over pretest scores. Therefore, the null hypothesis was rejected and the hypothesis was supported. Every grade made a significant increase from pretest to posttest means; however, there were some questions from the testing instruments that resulted in less than 50% correct response after the intervention. Further research would be needed to determine if the lessons or aspects of the lessons were too complex for the grade level, the testing instrument did not adequately state the question, or that the lesson was not effectively presented.

Recommendations

It would be beneficial to current and future health status of Americans to incorporate nutrition education into public schools. With the increased incidence of childhood obesity, school settings provide the most opportune times to educate children on healthy behaviors and prevention of chronic disease. Because this study was confined by time, it would be beneficial for a follow-up study to validate the testing tools and advocate that the lessons be incorporated into current curricula so that students would be introduced to nutrition education without limiting their time preparing for standardized testing.

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APPENDIX A

Fourth Grade Testing Tool

Pre/Posttest
4th grade

1. True or False. The Indians shopped for their food at grocery stores?
2. What was the most important crop for the Indians, and is still a food item that we use in many ways today?
3. Name one vegetable the Indians ate.
4. Name one fruit the Indians ate
5. Name one type of meat the Indians ate.
6. Name one way the Indians stored food.
7. The settlers did not have napkins. How did they wipe their mouths?
8. Did the settlers eat from their forks like we do today?
9. When did the settlers eat their biggest meal?
10. How many food items would the settlers eat at their biggest meal?

APPENDIX B

Fifth Grade Testing Tool

Pre/Posttest
5th grade

1. What is the first thing that you will see on a nutrition food label that all of the other information is based on?
2. What percent of your calories should come from fat each day?
3. What percent of your fat calories should come from saturated fat?
4. Name a nutrient found on the nutrition food label that you should limit in your diet.
5. True or False. If a food contains 30% of the Percent Daily value of calcium, this food would be high in calcium.
6. How many calories are the percent daily values based on?
7. T/F If a food contains 5% of the percent daily value of fat the food is low in fat.
8. T/F Most Americans get the recommended amount of fiber daily.

APPENDIX C

Sixth Grade Testing Tool

Pre/Posttest
6th grade

1. What are calories with no benefit called?
2. How many extra calories does it take to gain one pound?
3. True or False. Milk contains nutrient dense calories
4. True or False. Milk is labeled 2%, 1%, and skim based on the amount of calcium in it.
5. Which type of milk should you drink to consume the least amount of fat?

APPENDIX D

Seventh Grade Testing Tool

Pre/Posttest
7th Grade

1. What is the most important nutrient that you need during exercise?

2. How much water should you drink a day?

3. When exercising or playing a sport, should you only drink water when you are thirsty? Circle the right answer.

Yes

No

4. Who's responsible for making sure you drink plenty of water while exercising or playing a sport?

5. Could not drinking enough water during exercise be life threatening?
Circle the right answer.

Yes

No

6. Does the average American eat more protein than they need? Circle the correct answer.

Yes

No

7. Does an athlete need extra protein from supplements to go with their diet? Circle the correct answer.

Yes

No

8. If you eat more protein than you need where does it go?

APPENDIX E

Eighth Grade Testing Tool

Pre/Posttest
8th grade

1. Give an example of the appropriate serving size of meat.
2. True or False. One serving of cheese is 3 oz.
3. What percent of calories should come from fat?
4. If you can have 2500 calories, how many calories from fat are you allowed per day?
5. How many minutes of moderate exercise should you have daily?
6. True or False. Most serving sizes from restaurants are more than the recommended serving sizes.
7. Name 3 ways you can cut down on calories at fast food restaurants.
 - 1.
 - 2.
 - 3.
8. Name one disease that can develop after having high fat diets for many years.

APPENDIX F

Fourth Grade Lesson Plan

Early American Nutrition

Goal: Provide students with background information in relation to early American foods and the evolution of the current American diet.

Objective: Students will discuss the Native American influence on nutrition.
Student will become aware of the major crop, corn, and its uses.
Students will understand how settlers adapt to “living off the land.”
Students will compare food storage from then and now.
Students will discuss meal times and types of food eaten.

Materials: Dried fruits
Small taste test cups
Chalk board
Foods made from corn

Instructional Technique:

1. Ask the students, “Does anyone know of any foods that Indians or Native Americans ate?”
2. Native Americans came to America from Asia very long ago. In fact, they arrived 20,000 years ago.
3. Ask the students, “How do you think the Native Americans got their food?” “Did they go to the grocery store and buy their food like we do today?”
4. The Native Americans did not have grocery stores or fast food restaurants. Native Americans had to find their own food. They did this by hunting, fishing, and farming.
 - Some of the foods that the Native Americans grew were corn, pinto beans, green beans, pumpkins, peas, squash, potatoes, peanuts, avocados, peppers, and tomatoes.
 - The Native Americans also went into the woods and picked berries and fruit to eat. They enjoyed berries and fruits such as wild strawberries, blackberries, and plums.
5. We mentioned many foods that the Native Americans grew. Can anyone guess which food we use today to make many, many other foods from?
 - Corn was the most important crop that the Native Americans grew. So many of the foods that we eat today actually come from corn.
 - Can anyone name a food that comes from corn?
6. The Native Americans discovered many different ways to use corn. They made succotash-corn and lima bean mixture, hominy-corn that is cooked to remove the outside layer, maize cakes-similar to cornbread, and also tortillas-like we have today as burritos and tacos. (Show students foods made from corn.)

7. When the settlers starting arriving in America, the Native Americans taught them many things about farming, hunting, and preserving food. The friendly Native Americans helped the settlers to survive.
8. Draw a timeline on board. In 1492 Christopher Columbus came to America. The first Thanksgiving was in 1621. Johnson County was settled in 1792.

SETTLERS INVASION:

1. Around the year 1500, the Europeans began to settle in America; many people such as the Vikings, Spanish, French, and English came to North America to visit. Spanish settled in regions such as South America, Mexico, and Florida. French settled in the Great Lakes region.
2. Europeans brought new things to Native Americans such as metal equipment, guns, liquor, cattle, and horses. Native Americans also contracted diseases from the settlers such as measles, smallpox, and tuberculosis.
3. Living off the land was difficult for the English because they were unwilling to work at manual tasks and they did not know how to hunt or fish like the Native Americans did. Because they were unwilling to hunt, fish, or farm the settlers often became very ill and sometimes died.
4. Due to the poor health and poor eating habits of the English many died the first years in America. After some time, some friendly Native Americans taught many of the new settlers how to use the land to obtain food. They taught them many things about hunting and farming.
5. The first Thanksgiving in 1621 was to celebrate that they made it though the year.

FOOD PRESERVATION

1. The Native Americans and the Settlers did not have refrigerators to keep their food from spoiling so they had to think of other ways to preserve food.
 - Does everyone know what the word preserve means?
 - Preserve just means that you do something to keep it from spoiling, or going bad. Some of the ways that you can preserve food are by adding sugar to fruits to make jelly, salt to vegetables to make braut or pickles, smoking meat such as ham, or drying meats or fruits.
 - Has anyone ever had beef jerky? Dried fruit? These are examples of preserved food.
2. Most foods were eaten on a seasonal basis because they could not be kept for long periods of time.
 - Winter-dried fruits and root vegetables
 - Spring- mushrooms, asparagus, salad greens and began drying fruits and preserving them in sugar.
 - Summer-fresh vegetables
 - Fall-dried apples, pumpkins, and smoked meat.
3. The Native Americans and the Settlers also made a cooling room for storing foods. The cooling room was made by cutting ice from frozen rivers. The room was dug into the ground where the dirt could help to “insulate” or keep the room cool.

- The cooling room was similar to the cellars that some people have today. Has anyone ever been in a cellar or basement? Do you have one in your house? Have you ever noticed how cool the room is?
- They were able to store smoked meats and vegetables, butter, cheese, and cider. But the room was not cold enough for storing things like fresh meat and milk. The settlers stored fresh meat and milk in very cold rivers or creeks.

SETTLERS UTENSILS AND DISHES:

1. When the settlers came to America they brought new things. One of the things they brought was metal. Instead of using forks with 3 prongs like we do today, the settlers had two-pronged forks and a knife.
 - However, they used the knife blade to eat with, rather than using the fork.
 - The fork was used to hold the meat still on the plate while cutting with the knife.
2. The settlers also had pewter (metal) and wooden bowls. Dishes like we use today came later.
3. The early Americans did not have napkins to wipe their mouths and hands. Instead, they used the end of the tablecloth
 - Now wouldn't we get in trouble today if we tried to wipe our mouths with the end of the tablecloth?

MEALTIME

1. The settlers had very small meals in the morning and in the evening. They ate foods like leftover cold meats, bread, coffee, tea, and chocolate.
2. The biggest meal was served in the middle of the day, or lunchtime. They often enjoyed 10-20 different items at this meal. That is a pretty big lunch.
 - How many of you had 20 different items for lunch yesterday?
 - The settlers had soup at the beginning of every meal. The soup was always made from fresh vegetables.
 - Some of the side dishes that they enjoyed were pickles, sweet potatoes, corn, squash, and pumpkin.
 - Fruits were also served for lunch. They had fruitcakes, plum pudding or gingerbread.
 - The meats were mostly rabbits, squirrels, chicken, turkey, wild duck geese, deer and fish. Later they raised hogs and had pork.
 - They had bread made from cornmeal.
 - They also gathered nuts and berries from the woods.
 - Some of the drinks that the settlers enjoyed were water or sassafras (root beer or gingerale without the carbonation). (Write sassafras on the board.)

CONCLUSION

1. Do you think the Native Americans were overweight? Why? The Native Americans were not overweight because they had to work hard to find food and keep up crops. The Native Americans were very active. Today we should increase our physical activity so that we do not become overweight.
2. Allow the children to taste dried fruit
3. Ask if there are any questions or comments.
4. Distribute posttest

APPENDIX G

Fifth Grade Lesson Plan

Reading Food Labels

Goals: Students will be able to choose foods based on the information provided on the food label

Objectives: Students will identify serving sizes on food labels.
Students will identify calories from fat on a food label.
Students will identify percent daily value, total fat, cholesterol and sodium, carbohydrates, protein, vitamins A&C, calcium, and iron from food labels.

Materials: Copy of food label

Instructional Technique:

1. Food labels can tell us a lot about the foods we eat. Using the food labels to make food choices can help us make good decisions in the food we eat. Today we are going to talk about the parts of the nutrition food label and how to use the label so that you can make good decisions about what food you eat.

DISCUSSION

1. Pass out copy of food labels to students.
2. The first thing you will see on the food label is the serving size. Serving size is given first because everything else on the label is based on this amount of the food. If you are going to eat more than the serving size just realize you are also eating more of everything else on the label. It is important to check the serving sizes because the same foods made by different companies could have different serving sizes. The servings per container tell you how many servings are in the whole package.
3. The next thing you see on the food label is the calories per serving. This is how many calories you will get if you eat that serving size.
4. Next to the calories is how many of those calories are from fat. If the majority of the calories are from fat this is probably not a good choice of food. You should only get 30% or less of your calories each day from fat. Later we will figure out how many calories you should get from fat each day.
5. After calories, the individual nutrients are listed. Total fat tells you how much fat is in a single serving of this food. Fat is a necessary nutrient, but it should be eaten in small amounts. Saturated fat is listed under the total fat. Only 10% of your fat calories should come from saturated fat. This is the worst kind of fat for your heart and blood vessels and leads to heart disease.
6. Cholesterol and Sodium are listed next on the label. These are measured in milligrams. You should limit your intake of these to prevent diseases later in life such as heart disease, cancer, and high blood pressure. You should get less than 300 mg of cholesterol per day and less than 2400 mg of sodium per day.

7. Total carbohydrate is listed next. This number tells you how much carbohydrate is in a single serving of this food. Carbohydrate is your body's primary source of energy so it is very important. Fiber is listed under carbohydrates. Most Americans do not get enough fiber. More fiber on a label is a good thing. There are two types of fiber soluble and insoluble. Soluble fiber comes from oatmeal, beans, apples, pears, strawberries, and blueberries. Insoluble fiber comes from whole grains, seeds, cucumbers, tomatoes, zucchini, and celery. Under carbohydrates you will also see sugar. Less total sugar is a good thing.
8. The next item, protein, tells you how much is in a single serving of this food. It is measured in grams. Protein can be used to build, muscle, keep organs strong, and fight off disease. Most people get plenty of protein in their diet. Even though protein is good, more is not better.
9. Vitamin A and Vitamin C are two especially important vitamins. Eating enough of these can help reduce your risk of some diseases and can improve the health of skin and eyes plus prevent some diseases. These are measured in percent daily values, so if a food has 80% of vitamin A, you're getting 80% of the vitamin A you need for the day.
10. Calcium and Iron are also listed in percent daily values. These are two important minerals for bones, teeth, and our blood supply. Iron helps carry oxygen through the blood to all body parts and organs.
11. The percent daily value is listed on the right side of the label. This shows how much of the recommended daily amount of a nutrient is in a single serving of food. This is based on a 2000 calorie diet. A general guide to using this is to remember if a food has 5% or less of a nutrient the food is low in this nutrient and 20% or more of a nutrient means that food is high in this nutrient. This means that 5% is low for those nutrients you want to limit such as fat, saturated fat, cholesterol, and sodium. 20% is high for nutrients you want to consume in greater amounts such as fiber and calcium.
12. At the bottom of the food label it tells how many calories are in each gram of fat, carbohydrate, and protein. This information is the same for every food. There are 4 calories per gram of protein and carbohydrate and 9 calories per gram of fat. If a food has 3g protein to figure out the calories you would multiply $3 \times 4 = 12$ calories from protein.
13. Now let's figure out how many calories you should get per day from fat, carbohydrates, and protein. Remember we said you should get 30% of calories per day from fat, you should get 15-20% from protein and 50-55% from carbohydrates.
For a 2000 calorie diet:
 $2000 \times .30 = 600$ calories from fat
 $2000 \times .15 = 300$ calories from protein
 $2000 \times .55 = 1100$ calories from carbohydrates
14. Discuss with students the copy of food labels. Ask students which labels they think represent good food choices? Explain to students that the third food label is high in total fat, saturated fat, and sodium. This food is also low in fiber, and vitamins. Explain to students that the second food label is high in cholesterol. The first label is a good source of Vitamin A and C. The last label is a good source of calcium Vitamin D, and protein.
14. Ask if there are any questions and distribute posttest

APPENDIX H

Sixth Grade Lesson Plan

Rethink Your Drink

Goals: To educate learners on the impact of beverages on their nutritional status.

Objectives: The learner will visualize the sugar content in certain beverages.
The learner will acknowledge that sodas and high fat milk can contribute to weight gain.
The learner will calculate how much weight they could gain from drinks alone in a year.

Materials: Sugar
Empty coke and mountain dew bottles
Empty Large tea cup 32 oz
Gallons of 2%, 1%, skim milk
Small taste test cups

Instructional Technique:

INTRODUCTION

1. All of us make choices about what we eat and drink every day. The things that we choose to eat and drink affect our lives and nutrition, which affects our overall health. If we have proper nutrition then our body has the ability to fight off colds and infections and many diseases can be prevented. Our nutrition also affects the way we feel and what we think about our bodies. Today we are going to talk about some of the choices we can make with beverages.

IMPORTANCE OF NUTRITION

1. How many of you have heard about calories or know what they are?
 - o Calories are a measure of energy that food contains. Each of our bodies needs a certain amount of calories to survive. If we take in more calories than we need they are stored in the body as fat. Over a period of time, if someone continues to get too many calories, they will become overweight.
 - o The calories we consume are the primary factor in our body weight. These excess calories contribute to obesity that in turn increases the risk for diabetes, high blood pressure, stroke and heart disease. These diseases are occurring more in young people in recent years.
 - o Not only do the foods we eat have calories that contribute to our weight but also the drinks we drink have calories that we need to be aware of.
 - o *Ask audience:* What do you like to drink? How many of you drink soda? Do you drink it every day? What kinds of sodas do you usually drink?
 - o Did you know that most **12 oz** sodas contain about **40 grams** of refined sugar? That is about 10 teaspoons of pure sugar!

EMPTY CALORIES

- *Ask audience:* What do you think the term *empty calories* means?
- Most foods provide calories and all calories provide energy. But the source of the calories is important. Some foods have calories along with other nutrients, which are healthy for you such as protein, fiber, vitamins and minerals. However, other foods give you calories with no other benefit from protein, vitamins, minerals and fiber. Calories with no benefit are called *empty calories*.
- A donut could be used as an example of a food with *empty calories* but we are going to focus on soda that is nothing but *empty calories*.
- Demonstration
 - *Show of hands:* How many people drink Coke or Pepsi?
 - Show the bottle of Coke with pre measured sugar to represent how much sugar it contains.
 - Continue with Mountain Dew, large Tea, etc.
 - Ask for a volunteer who drinks one of the above drinks: How many times a day/week do you drink this drink? Let everyone calculate how much sugar they are getting from soda alone in the day/week.
- Now let's look at that in terms of weight gain.
 - It takes an extra 3500 extra calories to gain 1 pound.
 - Math Problem: If you drink 1 large sweet tea per day every day of the week, how many extra calories would you get in a week? Month? Year?
 - Now calculate how many extra pounds that means per month? Year?
 - Example: $160 \text{ cal} \times 7 = 1120 \times 4 = 4480 \times 12 = 53760 \text{ calories per year} / 3500 = 15.36 \text{ extra pounds per year from 1 sweet tea per day.}$
- Now is any one ready to rethink their drink?
 - We can consider alternatives to drinking soda and sweet tea. Does anyone know what they can drink instead? Water is the best alternative but diet soda, un-sweet tea, and milk are also wonderful choices.
- Now, that brings us to milk.
- By a show of hands how many of you drink whole milk? 2%? 1%? Skim?
- Is milk an empty calorie food? No.
- What nutrients does milk contain?
 - Milk has many benefits for our bodies. Milk contains calcium, Vitamin D, protein, and phosphorus, which are essential nutrients for our bodies. Milk provides nutrient dense calories verses the empty calories that many soft drinks do. That makes milk a good beverage!
 - We can get all the benefits of milk and fewer calories by choosing milk with decreased fat content.
 - Milk is labeled 2%, 1%, and skim according to the amount of fat it contains.
 - Fat is an essential nutrient, but it is needed in small amounts and most of us are getting too much of it which increases our risk for high cholesterol, heart attacks, strokes, and obesity to name a few. These used to be only common in older people, but we are seeing these more in younger people today.
 - Label milk caps x,y,z

- *Taste Test. Ask:* Which milk did you like the best x, y, or z?
 - Which one do you think is 2%, 1%, skim?
 - Talk about results.
- Our personal nutritional habits make a huge impact on our bodies and our health. By rethinking our drinks, we can become healthier and have a better view of our bodies.
- Ask for questions or comments
- Distribute posttest

Drink calculations:

Coke: 250 calories per 20 oz bottle:

1 Per Day $1750 \text{ cal/week} \times 52 = 91000/\text{year} / 3500 \text{ calories per } \# = 26 \text{ lbs. per year weight gain}$

2 Per Day $3500 \text{ cal/week} \times 52 = 182000/\text{year} / 3500 \text{ calories per } \# = 52 \text{ lbs. per year weight gain}$

Dr Enuf: 150 calories per bottle:

1 Per Day: $1050 \text{ cal/week} \times 52 = 54600/\text{year} / 3500 \text{ calories per } \# = 15.6 \# \text{ per year}$

Mountain Dew: 275 cal per 20 oz bottle:

1 Per Day: $1925 \text{ cal/week} \times 52 = 92400/\text{year} / 3500 = 26.4 \# \text{ per year}$

Milk: 2% = 120 cal, 5 g Fat = 43680 cal = 131040 cal/year

Skim = 90 cal = 32760 cal = 98280 cal/year = 9.36#

1% = 100 cal = 36400 cal = 109200 cal/year = 6#

APPENDIX I

Seventh Grade Lesson Plan

Sports Nutrition

Goals: Teach the importance of nutrition in relation to exercise and sports activities.

Objectives: Students will know how much water is needed before, during and after exercise. .

Students will be able to identify signs, symptoms and treatment of heat cramps, heat exhaustion and heat stroke.

Students will be able to calculate the amount of protein needed for activity.

Materials: Bottles of water equaling 2 quarts

Bottles of water to show up to 16 ounces of water.

How much protein do I need?

Letter to parents

Instructional Technique:

1. Tell the students "Today we are going to discuss nutrition for exercise and sports."
2. Ask, "Does anyone know what the most important nutrient that you need during exercise?" (*The answer is water.*)
3. "Water is the most important factor in sports nutrition. Water makes up 60% of your body weight. Your body cannot make or store water, so you must replace what you use (sweat, urine). Everybody needs to drink at least 2 quarts of water everyday. (*Show 2 quarts of bottled water.*) Does anyone here drink this much water a day? Athletes need even more. It is important to drink plenty of water before, during and after exercise."
4. "How much water should athletes drink?" (*For every time frame show students how much water it is equivalent to by using the water bottles*)
1-2 hours before activity: 10-14 ounces
10-15 minutes before activity: 10 ounces
During exercise: 6-8 ounces every 15-20 minutes
After exercise: at least 16 ounces
5. "Should you drink water only when you are thirsty when exercising? NO. Thirst is not a reliable way to tell if your body needs water. You won't start to feel thirsty until you are already experiencing dehydration."
6. "Dehydration is the loss of body fluids. It will effect your performance and could be life threatening. Dehydration is only the beginning. There are also other serious conditions you could get by not getting enough water during exercise"
"Heat cramps- Symptoms of heat cramps are thirst, chills, clammy skin, muscle pain, and nausea (feeling like you want to throw up). Treatment is drinking 4-8 ounces of cold water every 10-15 minutes."

“Heat exhaustion-Symptoms of heat exhaustion are reduced sweating, dizziness, headache, shortness of breath and fatigue. Treatment is drinking at least 16 ounces of water and putting ice on your head.”

“Heat stroke- Symptoms are lack of sweat, hot skin, swollen tongue and fainting. Treatment is calling 911, place ice on your head or taking a cold shower.”

“Drinking enough water will prevent these life threatening conditions. It is your responsibility to make sure you get enough water”

7. “Is there anything besides water to drink? Sports drinks are good to drink if you exercise longer than 90 minutes. They help to rebuild your energy and provide important nutrients lost in your sweat.”
8. “Another important nutrient needed for exercise is protein. Sources of protein include milk, yogurt, cheese, fish, meat, peanut butter, nuts and eggs. Protein is needed for overall health, growth and development. High-protein diets are unnecessary for any athlete, especially for young athletes, since most Americans usually eat more protein than they need.”
9. “How much protein do I need?”

(Give the students the handout with the steps provided. Demonstrate on board as an example)

Step 1: First take your weight in pounds

Example: 100 pounds

Step 2: Divide by 2.2 to get your weight in kilograms

Example: $100/2.2=45.5$

Step 3: Calculate how many calories per day you need

For boys ages 11-14 multiply by 55

For girls ages 11-14 multiply by 47

Example: $45.5*55=2502$ (boy) $45.5*47=2138$ (girl)

Step 4: Calculate calories from protein you need

Multiply calories by 15% (multiply by 0.15)

Example: $2502*0.15=375$ (boy) $2138*0.15=320$ (girl)

Step 5: Calculate grams of protein (1 gram of protein = 4 calories)

Example: $375/4=94$ (boy) $320/4=80$ (girl)

Answer: Boy in example needs 94 grams of protein per day

Girl in example needs 80 grams of protein per day

10. “Now it is your turn to find out how much protein you need.”
(Have the children follow the same steps from the example to calculate the amounts by using long division and multiplication.)
11. “The amount of protein you figured up can be easily reached by eating a normal diet including milk, eggs, cheese, yogurt, meat, chicken, grains and peanut butter. For example if you have 6 ounces of meat, 3 cups of milk or other dairy products, and 6 servings of bread or grains that’s already 78 grams of protein. Protein from extra sources, such as supplements, is not needed. Protein intake more than you need is stored as fat.”
12. “For any activity it is important to make sure you eat a balanced diet and drink plenty of water. Let’s make it a goal that everyday we drink about 2 quarts of water a

day. This can be easy to do. You can drink water with meals, before, during and after exercise.”

13. “Are there any questions?”

14. *Handout contract for students to fill in the blanks and sign. Distribute posttest.*

How much protein do I need?

1. Your weight in pounds _____

2. Calculate your weight in kilograms (kg)

$$\frac{\text{your weight}}{\text{your weight}} \quad / \quad 2.2 = \frac{\text{your weight in kg}}{\text{your weight in kg}}$$

3. Calculate your total calorie needs:

If you are a boy:

$$\frac{\text{your weight in kg}}{\text{your weight in kg}} \quad \times \quad 55 = \frac{\text{total calories}}{\text{total calories}}$$

If you are a girl:

$$\frac{\text{your weight in kg}}{\text{your weight in kg}} \quad \times \quad 47 = \frac{\text{total calories}}{\text{total calories}}$$

4. Calculate calories needed from protein (15%)

$$\frac{\text{total calories}}{\text{total calories}} \quad \times \quad 0.15 = \frac{\text{protein calories}}{\text{protein calories}}$$

5. Calculate grams of protein you need (1 gram = 4 calories)

$$\frac{\text{protein calories}}{\text{protein calories}} \quad / \quad 4 = \frac{\text{grams of protein}}{\text{grams of protein}}$$



Today at school I learned about nutrition for sports and exercise. I learned that I am supposed to drink _____ of water everyday. I can try to meet this goal by drinking water with my meals and anytime that I exercise and play sports. I will try to drink more _____ instead of _____.



I also learned that I should eat a balanced diet to meet my protein needs. I calculated the amount of protein I need and found I need _____ grams everyday. I found out that I don't need any protein supplements because I get all I need from my diet. I can get my protein from eating cheese, yogurt, milk, peanut butter and meats.

Signed _____



APPENDIX J

Eighth Grade Lesson Plan

Fast Food

Goals: Students will be able to make healthy decisions regarding their food intake and exercise.

Objectives: Students will be able to determine the amount of fat in the foods they eat at restaurants.
Students will be able to list ways to cut down on the fat they eat at fast food restaurants.
Students will be able to describe a normal serving size for foods.
Students will be aware of diseases that are linked to high fat diets.
Students will be aware of an adequate program of regular exercise

Materials: Deck of cards
Tennis ball
Hockey puck
Baseball
Hardee's menu
McDonald's menu
Burger King menu
Calculators

Instructional Technique:

INTRODUCTION (BASICS OF NUTRITION)

1. What are calories? Calories are a unit of energy
2. Where do we get calories? Calories are found in the food that we eat, we get 4 calories per gram of carbohydrate and protein, and 9 calories per gram of fat.
3. An important part of eating healthy includes eating appropriate serving sizes for foods. (Show visual aids for serving sizes.)

Meat: 3oz. the size of a deck of cards or the palm of your hand

Fruits and Vegetables: one serving is about the size of a tennis ball

Grains: half a bagel about the size of a hockey puck or ½ cup noodles (the size of baseball)

Dairy: 1 oz cheese about the size of a 9-volt battery

RECOMMENDED ALLOWANCES

1. For 11-14 year olds the recommended daily allowances are 2200-2500 calories if within a normal weight range.
2. For a healthy diet, the recommendations are no more than 30% of calories from fat, 15-20% calories from protein and 55-60% calories from carbohydrates.
3. Do calculation of daily fat grams using calories and percentages: "If you may have 2200

calories per day, and only 30% of that can be from fat, how many calories from fat are you allowed in a day?"

$$2200 \times 0.30 = 660 \text{ calories}$$

"If one gram of fat equals 9 calories, how many grams of fat are in 660 calories?"

$$660 \text{ divided by } 9 = 73 \text{ grams of fat}$$

"You are allowed 73 grams of total fat per day"

"If you may have 2200 calories per day and 15% is protein how many calories from protein are you allowed in a day?"

$$2200 \times .15 = 330 \text{ calories}$$

"If one gram of protein equals 4 calories, how many grams of protein are in 330 calories?"

$$330 \text{ divided by } 4 = 82.5 \text{ grams of protein.}$$

"You are allowed 82.5 grams of protein per day"

"If you may have 2200 calories per day and 55% is carbohydrate how many calories from carbohydrate are you allowed in a day?"

$$2200 \times .55 = 1210 \text{ calories}$$

"If one gram of carbohydrate equals 4 calories, how many grams of carbohydrate are in 1210 calories?"

$$1210 \text{ divided by } 4 = 302.5 \text{ grams of carbohydrate}$$

"You are allowed 302.5 grams of carbohydrate per day."

INTERACTIVE MENU EXERCISE

1. Distribute menus from local fast food restaurants. Ask students what their typical meal would be. Determine fat and calories from meal. Using the same example determine fat and calories from super-sized portions. May do 2 or 3 examples. Discuss serving sizes vs. what they are eating.

EXERCISE

1. Ask questions about students' current daily exercise. This may include school activities (gym class, sports, etc), chores they do around the house, or other extracurricular activities. It is recommended that adolescents have at least 60 minutes of moderate exercise daily. Examples of moderate exercise (activities that burn about 150 calories) are:

Give handout of these activities

Washing and waxing a car for 45 to 60 minutes

Playing volleyball for 45 minutes

Playing touch football for 30 to 45 minutes

Walking 1.5 miles in 35 minutes

Basketball (shooting baskets) for 30 minutes

Bicycling 3 miles in 30 minutes

Raking leaves for 30 minutes

Walking 2 miles in 30 minutes

Swimming laps for 20 minutes

Basketball for 15 to 20 minutes

Bicycling 4 miles in 15 minutes

Running 1.5 miles in 15 minutes

Fast social dancing for 30 minutes
Pushing a stroller 1.5 miles in 30 minutes

Shoveling snow for 15 minutes
Climbing stairs for 15 minutes

Discuss how much exercise they would need to do if they, for example, ordered super-size fries (610 calories) instead of small fries (210 calories). This is a difference of 400 calories. How much exercise would you have to do to burn these calories? $400 \div 150 = 2.6$ so you would have to do any of these activities 2.6 times. Can anyone tell me how long you would have to rake leaves to burn these extra calories? 78 minutes

MENU MODIFICATIONS

1. Discuss examples of alternative foods and ways to reduce fat intake in the foods they eat:

Breakfast

1. Order a plain bagel with jam instead of a breakfast sandwich, add a fruit and yogurt parfait and small coffee (490 cal)
2. Order an Egg sandwich with no cheese or meat or Egg McMuffin, and a small orange juice to drink (430 cal)

Lunch/Dinner

3. Drink water, iced tea, or diet soft drinks (saves 310 cal)
4. Order a side salad with lowfat dressing instead of fries (saves 175 cal)
5. Use half the packet of regular salad dressings (saves 60-145 cal)
6. Don't supersize (saves 430 cal)
7. Hold the mayo (saves 100 cal)
8. Hold the cheese (saves 100 cal)
9. Use low fat dressings (saves 80-250 cal)

DISEASES

1. A high fat diet can increase your risk for many diseases. Diets high in fat clog your arteries, increase fat in your blood, cause high cholesterol and lead to diseases such as high blood pressure, heart attack, and cancer.
2. Modifying your diet now to include lower fat choices can reduce your risk of the diseases later in life.

CONCLUSION

1. Review importance of making good decisions when choosing a meal at a fast food restaurant, you don't have to eliminate fast food, you just need to think about what you're ordering and remember ways to reduce the fat in your fast food meal. Also, remember that you might be able to eat 2500 calories a day, but that is with the provision that you also get plenty of exercise each day.
2. Ask if there are any questions
3. Distribute posttest

Activities that Burn 150 Calories

Washing and waxing a car for 45 to 60 minutes

Raking leaves for 30 minutes

Playing volleyball for 45 minutes

Walking 2 miles in 30 minutes

Playing touch football for 30 to 45 minutes

Swimming laps for 20 minutes

Walking 1.5 miles in 35 minutes

Basketball for 15 to 20 minutes

Basketball (shooting baskets) for 30 minutes

Bicycling 4 miles in 15 minutes

Bicycling 3 miles in 30 minutes

Running 1.5 miles in 15 minutes

Fast social dancing for 30 minutes

Shoveling snow for 15 minutes

Pushing a stroller 1.5 miles in 30 minutes

Climbing stairs for 15 minutes

APPENDIX K
Statistical Analysis

Fourth Grade

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Fourthpre	53.4568	162	16.87812	1.32607
	Fourthpost	88.3951	162	14.48553	1.13809

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	fourthpre & fourthpost	162	-.010	.898

Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	fourthpre – fourthpost	-34.93827	22.35365	1.75627	-38.40656	-31.46998	-19.893	161	.000

Fifth grade

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Fifthpre	22.7349	149	15.03471	1.23169
	Fifthpost	60.9899	149	26.86902	2.20120

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Fifthpre & fifthpost	149	.018	.831

Paired Samples Test

	Paired Differences				t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower			

Sixth grade

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Sixthpre	26.7081	161	20.24155	1.59526
	Sixthpost	67.8261	161	27.58386	2.17391

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	sixthpre & sixthpost	161	.129	.102

Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	sixthpre – sixthpost	-41.11801	32.03502	2.52471	-46.10407	-36.13195	-16.286	160	.000

Seventh grade

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	seventhpre	49.4048	21	16.04495	3.50130
	seventhpost	82.7381	21	10.80812	2.35853

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	seventhpre & seventhpost	21	.388	.082

Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	seventhpre - seventhpost	-33.33333	15.47848	3.37768	-40.37905	-26.28761	-9.869	20	.000

Eighth grade

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	eighthpre	31.0526	19	23.30826	5.34728
	eighthpost	63.1579	19	17.01393	3.90326

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	eighthpre & eighthpost	19	.005	.983

Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	eighthpre - eighthpost	-32.10526	28.78637	6.60405	-45.97985	-18.23068	4.861	18	.000

VITA

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