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Exploring Nutrition in the Community: The Effects of Nutrition Education

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Exploring Nutrition in the Community: The Effects of Nutrition Education

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The prevalence of obesity in the United States is a topic in healthcare that is extremely relevant, yet not fully understood. It is strongly believed that obesity is influenced by many environmental factors, but research is still needed to confirm this belief. It is largely thought that ethnicity and socioeconomic status all play a large role in contributing to the obesity pandemic seen around the world⁶.

When examining obesity rates, obvious differences among races and ethnicities are present. According to the BRFSS study, there are significant differences in the rates of obesity present between ethnic groups. Hispanic and White citizens experience around the same rate of obesity at 26.6% and 25.6% respectively. These rates are much higher than the “other” category in the survey, which only sees 19.1% obesity. The most alarming, however, is the statistic for African Americans, which claims that 36.7% of African Americans are obese⁹. When examining childhood obesity rates, data is scarce and more research is needed. According to the CDC, 20.7% of American Indian and 17.9% of Hispanic children aged 2 to five years are considered to be obese. In females aged 2-19 24% of Non-Hispanic blacks, 19% of Mexican Americans and 14% of whites are obese^{3,7}. These statistics are extremely alarming as obvious disparities are present and such a large number of obese child are likely to become obese adults. This, consequently, leads to chronic health risks such as type 2 diabetes and cardiovascular complications. It is true that health disparities are present among races, yet a definite reason is not known as to explain exactly why this is the case; a possible reason for this presence is a difference in socioeconomic status⁶.

Socioeconomic status is a combination of measurements, which includes education, income and occupation. Essentially, it is the combination of a person’s sociological interaction with their community and their economic status. This can prove to be a helpful statistic when

attempting to understand obesity. When examining income level and its association with obesity, it is evident that those with a lower income have higher rates of obesity⁶. According to the BRFSS survey, those who earn less than \$15,000 annually experience a 32.4% rate of obesity. This rate decreases as income increases and culminates with those who make \$50,000 or more experiencing a rate of 24.2%. These statistics clearly show that there is a negative correlation between income and obesity rate. Secondly, the BRFSS data reveals another significant association. According to the BRFSS, those with less than a high school education experience a rate of 29.7% obesity, while college graduates only experienced 21.4% obesity. The survey shows that there is also a negative correlation between education level and obesity, meaning that as education increased, the rate of obesity decreased⁹. Both of these statistics reveal that there is an associated between lower socioeconomic and obesity, however, the studies do not establish why this is the case.

Following the examination of the previous two topics, it is simple to see disparities in obesity rates in the United States. The previous two studies are observational studies and can only prove an association; they are unable to produce a cause and effect relationship. Because it is an observational study there is much debate as to why these disparities exist and ultimately it is the shortcomings of the food and farming industry in the United States. Simply put, foods that are of greater nutritional value are often more expensive than food which is harmful to the body. For example, in January of 2012 the average national cost for one pound of broccoli was \$1.64, which is greater than the cost of many hamburgers and fried items found on \$1 menus at various fast food restaurants². Broccoli and many other healthful foods are drastically more expensive than unhealthy food and this can account for the differences present in income and obesity levels. Those who do not have the money cannot afford to eat healthily. Additionally, this could explain

the differences in obesity rates present among races and ethnicities. According to the most recent census data, the median income for African Americans and Hispanics was lower than all other races, measuring at \$38,409 and \$39,730 per family. This is well below the value for Caucasians, \$62,545, and the median of all families in the United States, \$60,088¹¹. The shortcomings of the food industry have largely contributed to the obesity epidemic in the United States; healthy food is more expensive than unhealthy food. This being said, it is necessary to closely examine what can be done to prevent obesity levels from rising in the future.

An immediate fix to the obesity problem around the world would be to make healthy foods much cheaper and more readily available than unhealthy foods, but this option is nearly impossible⁴. As a result, other measures must be taken.

Preventive Medicine

In 2010, healthcare costs in the United States amounted to 2.6 trillion dollars and if divided evenly among the public, this figure amounts to \$3,209.32 per citizen. This value is the amount of money spent in just one year on healthcare, and unfortunately, this number has been rising in past years with no end in sight⁵. With Medicare funds running low, in addition to the poor economic condition of the United States, it is evident that healthcare costs must be addressed. The increasing strain on federal and state budgets, along with other factors detrimental to the country's economy, has resulted in politicians deliberating over the issuing of a national healthcare policy. However, there is a much simpler fix to the increasing medical costs in the United States and the answer is an increase in preventative healthcare and public awareness related to health.

Preventative healthcare is a field of medicine, which refers to the measures taken to prevent illnesses from occurring. By preventing the illness from occurring, it is possible to avoid

curing and treating symptoms, consequently cutting healthcare costs⁶. Beginning on September 23, 2010, if one has a new health insurance plan or health insurance policy they are entitled to healthcare screening under the Affordable Care Act without a copayment or meeting of a deductible. The preventative measures, which are included under this act, vary between adults, women and children. While the included screenings and counseling sessions are similar, after a close examination it is evident there are major differences between the three groups.

Preventative screening services for adults which are included under the Affordable care act include, but are not limited to: depression screening, blood pressure screening, type 2 Diabetes screening for adults with high blood pressure, and diet counseling for adults at higher risk for chronic disease¹⁰. A key difference between the adults and children category is that children are only entitled to screening for obesity and not nutrition counseling prior to being classified as overweight or obese. The major problem presented in this difference is that the majority of children start out at an early age from a healthy weight, but due to a lack of nutritional knowledge among the parent and the child, it is extremely difficult for the child to break habits once they have already become obese. The ideas presented by the Affordable Care Act are ideas aimed at positive benefits, however, the rules must be manipulated to optimize the intent of the program.

The screening processes present in the Affordable Care Act have positive intentions, however, it would be more beneficial to send a message to the youth of the country in order to prevent expanding healthcare costs and rising rates of chronic diseases. The key risk factor that the country must focus on is obesity. Obesity is considered to be a risk factor for type 2 diabetes, high blood pressure, lipid abnormalities – often resulting in cardiovascular damage, hepatobiliary disorders, cancers, reproductive disorders, and premature death. In addition to these

physiological effects, obesity is often credited for effecting people with a great amount of emotional turmoil⁶. Today's society creates a great amount of psychosocial pressure to produce a skinny, glamorous body and failure to create this image can result in feelings of guilt, depression, anxiety and low self-esteem. The previously listed physiological and emotional issues can all result in an increasingly large medical bill; this negatively affects the economy in the United States and its effects are preventable⁵. Obesity can be prevented through a number of methods, and the most effective would be to create a rigorous nutrition education program for elementary school students. The program could teach children the negative effects of a poor diet and encourage them to begin making healthy decisions at a younger age. Unfortunately, children are not completely in control of their diet and parents must be educated as well.

The education of parents is essential in preventing obesity and its morbid effects. Parents are often the sole contributor to the diet of a child, meaning that from a young age they may have unintended, negative effects on their children. This can be seen through statistics gathered by the center for disease control and prevention, which has found that 10.4% of children between the ages of 2-5 and 19.6% of children aged 6-11 were found to be obese. These numbers were extrapolated via the Nutrition Health and Nutrition Examination Survey, and compared to CDC growth charts; to be considered obese, a child must have a BMI which is at the 95th percentile or higher¹. It is simple to see that a child under the age of 11 cannot completely control the contents of his diet. However, with an increase of nutritional education, as early as age five, a child is able to explain to his parents that the food he is being served is unhealthy and detrimental to his health. This could perhaps lower the previously stated statistics, which have doubled for the age group of 2-5 and tripled for the age group of 6-11 in the past thirty years⁷.

Nutrition education is not, however, the only way to prevent obesity levels from continuing to rise in the future. Another essential aspect needed to prevent illness is physical activity. Type 2 diabetes is a costly condition, which may result in many visits to doctor's offices and possibly eye disease, vascular disease, kidney disease and many more complications. The CDC estimates that this costly condition is preventable in 58% of people by losing about 5%-7% of their body weight and increasing their physical activity to the suggested standards. The recommended level of physical activity varies for adults and children. For adults, the recommended amount of physical activity can be achieved via three methods. The first includes 150 min of moderate intensity aerobic activity and muscle strengthening activities, such as weight lifting, two days a week. The second method includes 75 minutes of vigorous intensity aerobic activity every week and muscle strengthening activities two days a week. The final way to reach the recommended level of physical activity is to achieve any adequate combination of the previous requirements. For children, it is recommended that the child exercises for 60 minutes a day and the child should be encouraged to participate in intense aerobic activity at least 3 days a week. Additionally, it is recommended that children participate in muscle strengthening and bone strengthening activities at least three times a week. Muscle strengthening activities for children include push-ups or gymnastics, while bone strengthening activities include jumping rope or running⁸. Unfortunately, according to 2008 BRFSS data collected by the CDC it was determined that 27.3% of the adults in Tennessee were classified as inactive⁹. Even more discouraging news is that this would indicate that the state of Tennessee has fallen short of the 2010 healthy people physical activity goals⁶. Both of these statistics must be reversed, and a contributing factor to this reversal could be increasing the knowledge of elementary school students on the effects of physical activity.

Knox County Demographics and Classroom Demographics

In order to understand the population that is being studied, it is necessary to know the demographic identity of Knox County and of the classrooms that are being studied. Many of the measured categories that will be examined vary from the statistics that were listed previously for the United States.

According to the 2010 census, Knox County has a population of 432,226, 21.9% of whom are under the age of 18. The county is made up of 85.6% Caucasians, 8.8% African Americans, 3.5% Hispanics, 1.9% Asians, 1.9% reporting two or more races, 0.3% American Indian and Alaska Native, and 0.1% Native Hawaiian or other Pacific Islander. When examining education levels, the census data reveals that 88.3% of the county are high school graduates, and 33.8% of the county has a bachelor's degree or higher. Finally, to understand the study it is necessary to understand statistics related to income. The U.S. census data explains that the median household income is \$46,759, however, this statistic can be misleading. The data reveals that the "per capita money income in past 12 months" is \$27,349, much lower than the household median. This suggests that there is a significant gap between the wealthy and poor citizens of Knox County¹¹. Finally, the Census has revealed that 13.7% of the county lives below the poverty level, which is dependent upon the size of the family and also the age (the poverty threshold for a 2 person family is 14,218 and for a four person family is 22,314)^{6,11}.

The demographics of the classroom are similar to those of Knox County and the United States. The classroom is predominantly Caucasian, 78.9%, but also consists of 10.5% African Americans, 7.9% Hispanics and 2.6% other. There were no attempts to gain educational information about the parents of the students, but it was possible to obtain financial information about the students. The information was based upon participation in the free lunch and breakfast

program run my Knox County. In the classrooms, 39.4% of the students participate in the free lunch and breakfast program, which suggests that 39.4% of the class has a family income lower than 180% of the aforementioned poverty threshold.

Objective

The purpose of this project is to increase the awareness of the benefits of a nutritionally sound diet in order to prevent or lower the chance of chronic diseases from affecting the participants of the study. The study occurred at West Hills Elementary School in two first grade classrooms and occurred over a period of eight weeks.

Methods

Knox County school systems lack a formal, structured nutrition education program in their elementary schools. While efforts have been made to increase the nutritional wellness of the students, for example removing unhealthy snack machines from high schools, the school system lacks an early education plan, which could be most beneficial to students. In order to increase the nutritional awareness of students at an early age, this project is focused on first graders at West Hills Elementary School. First grade was chosen because it is important to reach out to children at an early age so that the foundations of nutrition can be introduced and reinforced on many occasions before they are able to make their own decisions about food. Repetition is important, and if the children hear a great message about nutrition from an early age, hopefully the effects of nutrition will be seen through a beneficial diet.

The study lasted eight weeks and consisted of a nutrition lesson each week composed and taught by a senior-level university student studying nutrition. The children also received a take home letter, which was a brief review of what was covered in class and a small lesson for the parents. Each of the children's and parent's nutrition lesson can be seen in its appropriate

appendices. To begin the study, a pre-test was given to the children and parents, collected and graded. The results of this pre-test were compared to the results of the post-test, given following the eight-week course. The comparison was completed using a one-tailed, paired t-test. The tests can also be found in their appropriate appendices and the results can be found in the results section of the paper. The nutrition lessons were short, about 20-30 minutes, and consisted of basic nutrition advice and time for students to ask questions.

The outcome of the study was based upon the post-test results of the students and the parents. It would be unethical to obtain anthropometric data without the consent of parents; therefore, the only measurement made is the difference in scores between the pretest and posttest. While the quantitative goal of the study was to increase the scores from the pretest, the general goal of the study has been completed and can be considered a success regardless of the posttest scores. The main objective of this eight-week program is to expose children to nutrition education and the benefits of a healthy diet.

Results

The children produced pre-tests with an average score of 85. The most missed question was question 4, "What is the best to eat for your bones?" with options being French Fries, Milk, Hamburger or Strawberries. A complete display of the children's scores can be seen on the following page in Table 1 and Table 3. The data comparing the student's pre-test and post-test results can be found in Table 2.

Table 1- Students Test Results

	Pre-test Score	Questions missed	Post-test Score	Questions missed
Student				
1	90	6	90	10
2	40	4,5,6,7,8,9	70	4,5,10
3	90	10	90	5
4	100	0	90	4
5	100	0	90	10
6	90	4	100	0
7	90	4	100	0
8	70	1,6,10	50	1,4,5,6,8
9	80	5,8	80	6,8
10	100	0	100	0
11	90	10	90	10
12	70	3,5,10	90	5
13	100	0	100	0
14	80	1,8	70	1,3,9
15	90	4	100	0
16	50	1,4,5,8	50	1,4,5,8
17	100	0	100	0
18	90	4	100	10
19	90	10	100	6
20	80	3,10	70	6,7,9
21	40	3,4,5,6,8	60	2,5,8,10
22	100	0	100	0
23	80	1,10	90	1
24	90	1	80	1,7
25	100	0	100	0
26	100	0	90	6
27	90	4	100	0
28	80	1,5	100	0
29	100	0	80	4,10
30	90	4	100	0
31	90	4	90	4
32	60	4,5,7,10	90	4
33	80	1,4	80	9, 10
34	100	0	100	0

Table 2 – Statistical analysis of student results

	Pretest	Posttest		
N	34	34		
Average	85	87.94117647	P-value	0.084452568
StDev	16.56026643	14.51841292		

Table 3-Frequency of incorrect answers

Question number	Pretest		Question Number	Post Test	
	Frequency of incorrect answer	% class who missed question		Frequency of incorrect answer	% class who missed question
1	7	20.59	1	5	14.71
2	0	0	2	0	0
3	3	8.82	3	1	2.94
4	12	35.29	4	7	20.59
5	7	20.59	5	6	14.71
6	4	11.76	6	4	11.76
7	1	2.94	7	2	5.88
8	5	14.71	8	4	11.76
9	1	2.94	9	3	8.82
10	8	23.53	10	5	14.71

The parents produced pre-tests with an average score of 61.15%. The most frequently missed question was question number 4, “For the benefit of your heart, what type of fat should you and your child consume?” The options were Trans fat, Unsaturated fat, Saturated fat, and cholesterol. A complete set of results can be seen below in Table 4 and Table 6. The comparison of the parents’ pre- and post-test can be found in Table 5.

Table 4-Parents Test Results

	Pre-test Score	Questions missed	Post-test Score	Questions missed
Parents				
1	100	n/a	100	0
2	80	2,3	100	0
3	80	3,7	90	7
4	80	6,7	90	7
5	40	1,2,3,5,9,10	80	5,10
6	40	1,3,5,6,7,10	60	5,6
7	60	1,3,7,10	70	3,7,10
8	50	1,3,4,5,7,	80	3,7
9	90	7	100	0
10	30	1,2,3,4,5,8,10	80	4,5
11	70	3,5,7	70	5,7,9
12	40	2,3,4,5,6,7	60	2,4,6,7
13	70	2,4,5,	80	4,5
14	70	1,2,3	90	3
15	60	1,2,3,6	100	0
16	50	1,2,3,6,8	80	3,6
17	30	2,3,4,5,7,9,10	70	2,9,10
18	70	1,2,7	100	0
19	60	1,2,5,10	80	2,10
21	70	2,3,5	90	5
22	60	3,5,6,8	70	3,5,8
23	80	3,5	70	3,5,9
24	80	2,3	100	0
25	80	2,3	90	2
26	50	1,2,3,4,5	70	1,3,5

Table 5- Statistical analysis of parents' results

N	26	26		
Avg. Score	61.15384615	82.8	P-value	2.47017E-07
Standard deviation	18.68154169	13.07669683		

Table 6- Frequency of missed questions

Question #	Frequency of incorrect answers	% of parents who missed question	Question#	Frequency of incorrect answers	% of parents who missed question
1	11	42.30	1	1	3.85
2	15	57.69	2	4	15.38
3	18	69.23	3	7	26.92
4	6	23.08	4	3	11.54
5	12	46.15	5	9	34.62
6	6	23.08	6	3	11.54
7	10	38.46	7	5	19.23
8	3	11.54	8	1	3.85
9	2	7.69	9	2	7.69
10	6	23.08	10	4	15.38

Discussion

The main objective of this experiment was to raise the nutritional awareness of the children and parents who participated in this study. The students' pre-test score average was an 85. This average was surprisingly high, and it showed that the children already have a basic understanding of nutrition. Still, though, there is room for improvement in the children's scores. Improvement was seen, as the student's average score rose to 87.94 following their eight-week education program. The rise in average score from pre-test to post-test, however, cannot be considered significant. It cannot be considered significant because the p-value produced from the student's t-test was 0.08. While this is only slightly above 0.05, it is still not considered statistically significant. Even though the results from the quiz were not statistically significant, the attitudes of the children towards nutrition rose exponentially throughout the eight-week program. To begin the semester, the children were apprehensive and did not wish to share a great deal of information related to their experiences with food. By the end of the semester, however, the children were eager to share with the class the new, "everyday" foods that they tried the previous week. The test results may not be statically significant, but the experiment

should be considered a success. At the end of the semester the students were being thoughtful about what they ate, making smarter choices in the cafeteria, asking their parents to buy healthier foods, and even eating from a vegetable garden they had been growing outside of their classroom. As a whole, the children are more aware of the benefits of eating healthy and this was the final goal of the experiment.

The change in attitude, which resulted from the experiment, is an aspect that nutrition educators must build upon in order to see positive results in the community. Unfortunately, this experiment was only able to last for eight weeks. To see greater effects on children, it is necessary to continue this program for all elementary school children for an entire school year. It is possible that once summer arrives, the children will forget what they have learned in these eight weeks. This is discouraging, but this reveals to community health departments and school systems that more education is needed. Currently, nutrition is only vaguely discussed in Knox County gym classes. For the benefit of the children, it is necessary to bring the nutrition education out of the gymnasium and into the classroom. School systems need to adopt a plan of action to educate their children about eating healthily. If this plan were executed for every grade and throughout every school year, the children would be less likely to forget the lessons they have learned. In order to build habits of thoughtful eating, the children must be exposed to nutrition education every year of elementary school.

Similar to the children's scores, the parents' scores were surprising but for a different reason. The results from the parents' pre-test produced a shockingly low average of 61.15. An average this low is frightening, as parents are ultimately in charge of what their children eat at home. The pre-test would lead one to believe that the parents could be considered fairly unaware of the effects of food on our bodies. The parents' post-test scores produced an amazing

improvement; the parents' average score for the final test was an 84.45. It is clear that the program greatly increased the nutritional knowledge of the parents, and the student's t-test confirms this result by producing a p-value of less than 0.01. This result is statistically significant and suggests that the nutritional handouts given to the parents were associated with an increase in the parents' awareness of nutrition.

As previously mentioned, the results from the parents' pre-tests were extremely alarming. Parents are solely in control of their children's diet at home. It is necessary to provide children with a healthy diet in order to build healthy habits and minimize the risk of chronic diseases. The results of the pre-test suggest that the parents are incapable of providing these meals, simply as a result of a lack of nutritional knowledge. Currently, Knox County schools make no attempt to provide nutrition education for the parents of their students. Additionally, searching for a nutrition education program in Knoxville is a difficult search, perhaps so difficult, that it may be discouraging for the parents. Nutrition education must be more easily accessible for parents, as they are the sole caretakers of their children. The method in which the parents receive their nutrition education, whether it is through handouts from their school or from after school lectures delivered at schools, is insignificant. The significant lesson that must be learned from this experiment is this: parents need nutrition education in any form that we, as professionals, are able to offer. If the obesity epidemic in the United States is to digress, it is necessary to make nutrition education easily accessible to parents across the country.

The final results for both the children and the parents were extremely encouraging, but it is necessary to remember the meaning of the results. It is true that the attitudes of the children greatly improved throughout the semester, and the parents' knowledge appeared to improve, but this does not directly correlate to an improvement in the diet. The parents and children now

know more about nutrition, but this is meaningless if they are not improving their diet. For example, when grocery shopping, the parents now have a greater amount of knowledge that will help them to purchase their groceries, but they may not actually be purchasing the healthier options. This could be a result of taste preference or, as previously mentioned, a result of the broken food supply system in the United States. Sadly, the children also know what foods they need to eat but they cannot make the decision for themselves; they must rely on their parents. Now, the parents know more, but they need to apply their newly acquired knowledge. It is necessary that the parents begin serving meals that are nutrient dense for their families. This course may have revealed to the parents that our diet is vital to our health, but the course is unable to help the parents every step of the way. Money, stress, time, and old habits may all contribute to the continuation of a poor diet present in a family. In order to ensure that parents are making wiser decisions, it is necessary that more be done in the field of community nutrition.

In the near future, our society needs to make more of an effort to promote healthy eating. This help may come in several forms, the first of which is to increase nutrition education for adults. The pre-tests for this experiment clearly showed that there was a large deficit in the nutritional knowledge of the polled adults. The post-tests results showed that a simple, eight-week nutrition guidance program would likely produce a significant increase in their level of knowledge. Now, it is necessary to build on these results and produce experiments of a larger sample size. Once these experiments show significant results, lobbying for funding may begin. The approach for this study was simple, and had a group of experts in nutrition designed this course, the results could have been even more significant. Secondly, with more funding, it would be possible to provide the children with better resources, such as food supplements, allowing the children to taste healthy food. Regardless of how the children receive their nutrition

education, this experiment makes it evident that more is needed. Our nation has set goals for reversing an upward trend in obesity, but now we must take the proper actions to ensure that we meet these goals. The first step needed to reverse the trend is a comprehensive, well-funded effort supporting nutrition education for youth and parents. This movement will change the world one community at a time, but it cannot wait any longer; now is the time to act.

Appendix A- Lesson Plan Outlines for Students

Week 1- Introduction to MyPlate

- Begin the class period by introducing yourself and explaining that you will be teaching lessons about food and how it affects one's body. Then administer the pretest (10 min)
- Explain the basic ideas behind MyPlate, and bring print off to class of what the plate should look like. Emphasize to the children vegetables and fruits should consist of half of the plate (5-7 min)
- After the structure of the plate has been discussed, go around the classroom and ask each child to name one food and where it falls under MyPlate (5 min).
- Now pass out copies of paper with a circle and ask the children to build their own plate by drawing their favorite foods of each category in its proper section of the plate (5-10 min).
- Take questions from the students (5 min)

Week 2- Heart Health/ Fruits and Vegetables

- Begin the lesson by asking the children to flex their arm muscle, asking them if they want to have big muscles. Then ask the children what they think is the strongest, and most important muscle in their body? If no one guesses the heart, explain that the heart is the most important muscle in the body (2 min)
- Now explain to the children that just like their arm muscles, we have to work out our heart. Then ask the students to name two things that we can do to make our heart healthy and strong. Explain to the children that they must eat correctly and exercise 60 minutes a day in order to keep their heart healthy. Emphasize the importance of 60 minutes of exercise per day and then ask the children if they exercise and to explain their favorite exercise. Encourage the children who share their favorite exercise (5 min)
- Ask the children, “What foods are healthy for your heart?” Explain that fruits and vegetables are good because they are low in fat and salt. Then explain to the children that they should try to have 5 servings of vegetables and fruits (combined) in one day. Now ask the children to share their favorite fruit or vegetable. Encourage the children who share their favorite fruit or vegetable (5 min)
- Now do an activity involving exercise and fruits and vegetables. Explain that all the children will have to stand up and the instructor will call out either a fruit or a vegetable. If the instructor calls out a vegetable the children will run in place, and if a fruit is called the children will do jumping jacks. The instructor will continuously call out fruits or vegetables and if a child does the wrong action or stops their exercise they are out from the game. After the game is over ask the children how they felt about exercising and ask

everyone to come back next week and tell the class about a new exercise, fruit or vegetable that they tried (8 min).

- Take questions from the students (5 min)

Week 3- Protein

- Building on the lesson from last week, ask the children to share the new exercise, fruit, or vegetable that they tried the last week. Positively reinforce the children who shared their new experience with the class (5 min).
- Following this sharing experience, explain to the class that today we will be talking about another section of MyPlate, protein. Ask the children, “What foods provide protein?” Encourage all who answer the question and afterwards explain that meats (including fish), nuts, and dairy are our main sources of protein (3 min).
- Explain that while proteins are good for energy and growth they have negative effects as a result of their high saturated fat and cholesterol content. Explain to the children that the fats in red meat are bad for our heart and this is why they should make up such a small portion of our diet. Then explain to the children that fish and nuts are great sources of protein that do not have high amounts of saturated fat. Explain to the children that they actually have fats, which make our heart stronger. Then go over examples of healthy protein and protein which should only be eaten sometimes (5 min).
- Ask the children who wants to try fish or nuts in the next week, and encourage the children who raise their hand and ask them to tell the class about it next week (1 min).
- Now take the children out side and mark out a square and divide it into two. Then explain to the children that when I call out a healthy source of protein to run to side A and when I call out an unhealthy protein to run to side B. If a child runs to the wrong side they are eliminated. After the game is complete, come back inside for questions (10 min).

Week 4- Dairy and Bone Health

- Begin by asking the children to share their experiences with healthy sources of protein. Also ask the children if they tried any sort of exercising last week (5-7 min)
- Then explain to the children, that this week we will be talking about dairy products and our bones. Take a moment to introduce the skeletal system, explaining that our bones are 4 times stronger than cement, and in order to keep them this strong we must do two activities, eat healthy and exercise (5 min).
- Ask the children if they know what makes a product a dairy product. Then explain that foods and drinks that come from a cow's milk are considered to be dairy products. Then ask the children to share some dairy products (2-3 min).
- Following this explanation ask the children why we need dairy products and what nutrients it contains. Explain to them that dairy products contain calcium and vitamin D, which are both essential for strong bones. Then explain to children that vitamin D is the only vitamin that our body can produce naturally on our own. Tell the children that all they have to do is be in the sun for 15 minutes a day in order to get a proper serving of vitamin D (5 min).
- Following this explanation, begin talking about milk. Explain that milk has some of the bad fats that we talked about last week which are a part of protein sources. Then ask them about the different types of milk. Explain to the children that the different types of milk are whole milk, 2% milk, 1% milk and skim milk. Ask the children what type of milk they drink, and to go home and check. Then explain that drinking 1% milk or skim milk can make the heart much stronger because it does not have the bad fats (4-6 min).

- Finally, explain to the children that exercising 60 minutes a day is just as important for our bones as eating properly and drinking the right type of milk. Remind the children to check what type of milk they have and to ask their parents if they could try skim milk (2 min)
- Take questions (5 min)

Week 5- Grains

- Ask the children to share their experiences from the last week about their milk and about any exercises that they might have tried (5 min)
- Now explain to the children that we will be spending this week talking about the final section of MyPlate, grains. Before the lesson on grains, ask the children to name all the parts of the plate that have been discussed in class (1-2 min).
- Now, ask the children what foods are grain products. Explain to the children that breads, desserts, and chips are large sources of grains in our diets. Then explain to the children that similar to protein and dairy products there are a group of grains that are extra healthy for our hearts, whole grains. Share with the children some sources of whole grain and explain to them that consuming these dietary sources contain fiber, which will help to keep our heart and intestinal tract healthy. Secondly, explain that because the whole grains do not contain any fat it is okay to consume them in order to keep our heart healthy (5-7 min).
- Now that the children all know the sections of MyPlate go outside for an activity period where their knowledge will be tested. Divide out the square, similar to the square of the prior week. Label each square as a section of MyPlate and have the children start outside of the square. The instructor will call out a food and the children will have to run to the section of the square that this food belongs to. Play this game several times, eliminating children who do not correctly identify the food (10 min).
- Come inside and ask the children to try a whole grain or a new exercise this week and then take time inside in order to take questions (5 min).

Week 6- Everyday foods vs. Sometimes foods

- Ask the children to share their experiences from the last week dealing with whole grain products or a new exercise. Positively reinforce those who shared their experience with the class (5 min).
- Ask the children “What is the number one health problem the United States?” Then explain to the children that obesity is the number one problem in the United States and it may lead to many other health problems such as heart problems, diabetes, and cancer (2-3 min).
- Now explain to the children that foods can be thought of in two different ways; they can be thought of as everyday foods or sometimes foods. Explain that everyday foods are those that can be eaten every single day of the week and will help to keep us healthy. Then explain that sometimes foods are those, which are thought of as junk food. Explain that it is not necessary to eliminate the foods from our diet, but they should only be eaten a couple of times per week (3 min).
- Then ask the children to share some ideas of examples of everyday foods and examples of sometimes foods. Give the children ideas for each food group and remind them that the more everyday foods they eat, the healthier their heart will be and the better job they will do of avoiding obesity (5 min).
- Now bring cut outs of food products and put them in a brown paper bag. Let each child draw a cut out of the food product from the bag then ask them to identify if the food is an everyday food or a sometimes food (10 min).

- Ask the children to think about everyday foods that they eat in the following week, in order to share with the class before the next lesson. Then take questions from the class (5 min).

Week 7 – Beverages

- To begin the class, ask the children to share their experiences with everyday and sometimes foods in the past week (3-5 min)
- Now, ask the children about what kind of beverages they drink. Make sure to ask what they like to drink after they play games outside and what they like to drink at dinner. (2 min)
- Review with the children the ideas covered about hidden calories in milk, and explain that these hidden calories are found elsewhere. Begin a discussion about fruit juices and PowerAde, making sure to emphasize that while these drinks have good intentions, consuming them too much will lead to problems for your body. Explain to the children that it is necessary to do what we can to limit our consumption of these juices and try drinking more milk and water when we are thirsty (5-7 min)
- After this take the children outside to play a game promoting their exercise, such as freeze tag or a relay race (10 min)
- Return inside and take questions from the children and encourage them to pay close attention to what they are drinking during the next week (5 min)

Week 8- Review

- To begin this lesson, share stories about the beverages that the students drank last week and stories about what kind of drinks they were able to find in our homes (3-5 min)
- Following this story, quickly review what was covered this semester, making sure to briefly cover MyPlate, the benefit of exercising, the importance of everyday foods (including fruits and vegetables), and the need to think about what we eat (10 min)
- After the review, answer any questions that the students have before taking their posttest (10 min)
- Allow the students to complete the eight week lesson by completing a post-test (10 min)

Appendix B-Letters to Parents

Hello Parents!

Your children look up to you and follow your lead in all facets of life, including nutrition and the way you eat! With that being said it is extremely important for you to **lead by example** and eat healthy for the benefit of your health and your child's health! Did you know that in 2010 67.8% of the adult population in Tennessee was considered to be overweight or obese? This statistic is extremely alarming, as weight control issues lead to complications such as type 2 diabetes, heart disease, stroke, certain types of cancers, and emotional suffering.

So what can we do to help lower this number?

The solution is simple! Modify your diet and increase physical activity!

In order to check adults for overweight and obesity please refer to this website:

<http://www.nhlbisupport.com/bmi/>

This is a good assessment of your nutritional status. If you find yourself on the high end of the spectrum, that is okay because it is something that is completely modifiable!

In order to adhere to a healthy diet, the best suggestion that I can give is to follow the national movement, MyPlate. ChooseMyPlate.gov is an incredible resource, which can help you plan out healthy diets and increase your physical activity!

In short, MyPlate suggests that your plate and your child's plate should look something like this:



MyPlate advises that half of your plate should be made of fruits and vegetables! That sounds like a lot but next week I will explain why this is necessary. MyPlate also suggests that about $\frac{1}{4}$ of your plate be made of grains and about $\frac{1}{4}$ (or a little less) consist of protein. Finally it is important to remember to get your required dairy through a glass of skim milk!

Next week we will narrow our focus and talk more specifically about fruits and vegetables!

Thank you for your time and I look forward to next week!

Best wishes,
Andrew

Week 2-Heart Health/Fruits and Vegetables

This week I spoke to your children about keeping a healthy heart through eating fruits and vegetables! Read below for more...

Did you know that you and your child should consume 5 fruit and vegetable servings per week? While this may seem difficult to attain, it is necessary to come as close as possible everyday! Fruits and vegetables are great for multiple reasons. The first is that they are “nutrient-dense.” This means that they provide your body with valuable vitamins and nutrients but low amounts of calories; this will help you control weight and stay healthy! The benefits of fruits and vegetables are too numerous to list here, but they are essential for fighting chronic disease (such as cancer) and also acute diseases (like a cold). Additionally, they are necessary to obtain proper amounts of energy for your children to grow! Try your best to lead by example and show your children how to eat fruits and vegetables!

While a great diet is essential to healthy living, physical activity is just as important. It is suggested by MyPlate that adults complete 2.5 hours of moderate aerobic physical activity or 1 hr and 15 min of vigorous physical activity. For children (ages 6-17) it is recommended that they exercise for 60 min per day. Proper exercise can produce benefits such as: living longer, increasing self-esteem, decreasing chance of becoming depressed, sleeping better at night, being stronger, staying at a healthy weight, and decreasing chance of experiencing chronic disease.

Recipe for the week:

Fruit/Vegetable collage

Buy 5 of your favorite fruits or vegetables and chop them into bite size pieces. Then pull out a baking sheet or a large serving dish. Now have fun! Invite your child or children to make shapes with the fruits to create a collage. Previously used ideas have been to make a big smiley face, spell out a name, or simply create shapes and fill them with different fruits. One could even create a landscape picture using broccoli as trees, carrots as flowers, cauliflower as clouds and squash for sun. This idea may seem silly, but encouraging your child to participate in the food prep they are often more willing to try something new. Additionally, it is important to remember that if your child wishes to have a dipping sauce to use a low-fat or fat free ranch dressing. Finally, don't become discouraged if your child is not fond of the vegetables, just trying them is making progress. It generally takes about 8-10 exposures to a food before a child will openly accept it!

For more information on fruits and vegetables check out this website:

<http://www.fruitsandveggiesmatter.gov/index.html>

It even has some really great recipes!

Thanks for your time!

Best wishes,

Andrew

Week 3-Protein

Today I spoke with your children about the importance of protein! Protein is a portion of the MyPlate program and should make up about $\frac{1}{4}$ of your total plate. It is important though, to choose the correct type of protein!

Protein is essential for growth and to provide proper energy for our body. One can find protein in any form of meat, dairy products, fish, and legumes (like beans or nuts). Unfortunately, protein is often found in combination with saturated fats and cholesterol. Current research suggests that saturated fats, trans fats and cholesterol are all detrimental to the health of your heart! These fats are highest in red meats and because of this fact, it is important to keep our consumption of red meats to less than 11 oz per week. Red meats should be a food that we only offer sometimes!

While saturated fats are bad for our hearts, unsaturated fats are good for our hearts. Some forms of unsaturated fats include omega 3 fatty acids and omega 6 fatty acids. Unsaturated fats serve an amazing purpose for our body. They are able to travel through our blood and collect saturated fats and send them out from the body. This means we need to consume more unsaturated fats! So where can we find these? These fats are found in fish at very high levels. Try serving fish for your family, as it provides a great deal of protein and healthy fats for our body!

I already mentioned that it was important to serve your children protein, in order to help them grow. Additionally, I mentioned that unsaturated fats are healthiest for our body and we need to avoid saturated fats. Luckily, there is one more action we can take to help our heart fight these saturated fats and that is to exercise! Exercising raises our body's level of HDL, which is a healthy fat in our body (like the unsaturated fats). Ensuring that you get 30 minutes of exercise a day and your child gets 60 minutes a day will naturally help the body fight heart disease!

In conclusion, avoid saturated fats found in red meats and try serving fish to your children. Lastly, don't forget to exercise!

Fun fact of the week: Current research has shown that consuming three to four 1 oz pieces of dark chocolate a week can be better than any prescription medication for lowering cholesterol and lowering your risk for a heart attack.

Thanks for your time!

Best wishes,
Andrew

Week 4- Dairy and Bone Health

This week I spoke to your children about the health of their bones and dairy products!

Many people think of our bones as cement blocks or rocks, but our bones are constantly building themselves and always changing! With this being said, it's important to do what we can to make our bones as strong as possible. So what can we do?

In order to keep our bones strong we need to acquire adequate amounts of calcium and vitamin D. Calcium is a mineral that is found in company with vitamin D in dairy products! A dairy product is one that comes from the milk of a cow. This includes everyday foods such as cheese, yogurt, and milk. It is necessary to consume 3 servings of dairy a day in order to get the proper nutrients we need for our bones! In order to determine a serving, just look at the calories on the nutrition label and check the serving size!

Before we leave the topic of milk, it is important to point out that there is a giant difference between the amount of fats that are present in whole milk, 2% milk, 1% milk and skim milk. As previously mentioned, obesity is an epidemic in the United States and we need to cut back on calories. Cutting back on the fat we consume in milk will help us to control our caloric intake, and also help our heart. The fats found in milk are not healthy for our heart, and switching from whole milk to skim milk can save you nearly 75 calories per glass of milk! Switching to skim milk, also known as fat free, is essential for the health of your child and family.

Now that we're done talking about milk, we can return to the health of our bones. It is necessary to get plenty of calcium in our diet, but there is another way to help our bones. Did you know that being in the sun for 15 minutes a day, without sunscreen, allows your body to produce enough vitamin D for one day? This means that you don't have to change anything you're eating! All you have to do is go outside for a couple of minutes and you will be making your bones stronger!

Now for women, pay close attention! Women are extremely susceptible to weak bones as they age. It's necessary to get 2000 mg of calcium per day. This may sound like a lot, and you may be unable to obtain this amount through your diet, so consider supplementation! 50% of women will experience an osteoporosis related bone fracture at some point in their life, but this is completely preventable if we remember to get our proper amounts of calcium and vitamin D!

Thanks for your time!

Best wishes,
Andrew

Week 5-Grains

Today I spoke with your children about the importance of grains in our diet!

Grains are a type of food that make up a giant portion of our diet. Grains include breads, desserts, chips and anything else that is made of bread products. As you can now realize this makes up a giant portion of our diet! Unfortunately, many of the grains we consume are empty calories or energy dense foods. This means that they provide us with little nutritional value and mainly give us large amounts of extra calories.

Many forms of grains provide us with a great deal of carbohydrates, but the other nutrients they provide us with are negligible. It is well known through fad diets that consuming excess amounts of carbohydrates can contribute to rapid weight gain. As a community we need to work towards giving our food purpose! By this I mean, when we eat something it should always have a healthy purpose for our body. This means that carbohydrates that aren't whole grains should be limited to about half of our total grain intake because they do not serve the purpose that we need!

Whole grains can be found in food products such as whole bread, brown rice, or some forms of cereal. The wonderful thing about whole grains is that they provide more than just calories for our body! They provide essential B vitamins and fiber that are not found in other grain products, such as white bread. B vitamins are extremely important for producing energy for yourself and your children. Additionally, B vitamins at an early age are necessary to maintain the proper function of your brain! Finally, fiber is a necessary part of the diet that is hard to find elsewhere. It can be found in fruits and vegetables, but it is most easily found in whole grain products! Fiber is necessary for the proper health of our stomach, intestines and our heart. Eating 25 g of fiber a day will result in better health and more energy for you throughout your day!

Don't forget to exercise 30 minutes a day and encourage your children to exercise 60 minutes a day!

Thanks for your time

Best wishes,
Andrew

Week 6- Everyday foods vs. Sometimes foods

Today I talked to your children about the idea of everyday foods and sometimes foods!

Throughout the semester I have been beating around the bush, and I've hinted to the children that it is tough to control obesity once we are older. Therefore, it is important to control our eating habits now. Obesity is a problem that leads to more problems and eventually a life filled with medical bills and chronic illnesses. We must remember that we only have one body, so let's take care of it!

The idea of nutrition education may be frustrating because you may think, "This stinks; this nutritionist told me I can't have any of the foods that I love." This is untrue though! Long-term nutrition is all about long-term healthy habits. With this being said, it's important to build these habits starting from a young age! This is where the idea of sometimes foods and everyday foods come into play.

Like I said last week, we need to start eating with purpose. All of our foods must provide us with healthful benefits and we need to avoid empty calories. This being said, it's impossible to do this 100% of the time! That's where sometimes foods come in to play. We all know that we need to eat fruits, vegetables, milk, and whole grains everyday, but what about all of the other foods? Well, we can eat those sometimes!

If a nutritionist has ever told you that you can never have potato chips or fast food, they are wrong! You can still have these foods, but it's important to remember only sometimes! We need to limit these foods to once or twice a week, as they are empty calories. Limiting this will build the habit of eating right.

Often when dealing with patients seeking nutrition counseling it is tough to immediately cut back on fast food items or sodas, so let's just start by decreasing these sometimes foods! If you're currently consuming a soda everyday, that's okay but let's work together towards the goal of making it a food you only consume sometimes!

This week try a couple of these fixes:

Instead of using white bread, purchase breads that are whole wheat!

Rather than drinking regular sodas, try drinking diet!

When you go to fast food restaurants, try to substitute your French fries and regular soda for a diet soda and a side salad.

All of these changes will make a difference over time; you just need to stick to these habits!

Thanks for your time!

Best wishes,

Andrew

Week 7-Beverages

Hello parents! Today I gave your children their last formal lesson in nutrition, and this will be your last nutrition handout of the semester! Today in class, we spoke about beverages. Please read below for more helpful information related to the consumption of beverages.

As we have discussed all semester, in order to control the obesity epidemic our country is facing, it is necessary to eat thoughtfully. In addition to thinking about what we eat, we must think about what we drink! Unfortunately, useless calories are hidden everywhere, even our drinks. It is necessary that when consuming beverages of your own and distributing beverages to your children, that you pay close attention to the amount of sugars that are present in your beverage!

Did you know that a normal can of coke has 39 grams of sugar? This equates to 156 extra calories, which serve very little purpose to our body. Imagine the wonderful effects that may result from decreasing the cokes you drink in a week! Try tasting a coke zero or a diet coke to begin your movement towards a soda free diet; both of these beverages have zero calories!

While it may be obvious to many that coke is bad for your health, have you ever thought about the amount of calories in a healthier drink such as orange juice or apple juice? A 12 oz glass of orange juice has 33 grams of sugar, and a glass of apple juice has 39g of sugar! This amounts to 132 calories and 156 calories, respectively. This number seems very high for such a healthy drink, right? Well the good news is, unlike coke, orange juice and apple juice provide us with a serving of fruit, vitamin C, and calcium (in supplemented orange juices). This is great, however, you must remember that we only need one serving of fruit juice a day. Giving your child too many glasses of juice will result in them consuming way too many calories, which should be consumed in other places.

Our final topic of discussion for this week is sports drinks. A common misconception is that following sports activities, it is necessary to consume a Gatorade or a PowerAde in order to properly recover. This, however, is simply a result of good marketing; our body does not actually need this to recover. A full bottle of Gatorade has 35 grams of sugar! No one needs this much sugar in order to recover from his or her activities. Try watering down the Gatorade in a separate cup. This will give your children electrolytes to recover with a lower, healthier intake of sugar.

Remember to check nutrient labels even on you beverages and try to cut back on the sugars you consume through liquids.

Thank you for all of your time!
Best wishes,
Andrew

Appendix C- Pre and Post Tests

Children's Pre and Post Test

1. How many times should you eat fruits in one WEEK?

A lot
☺

Sometimes
☺

Never
☹

2. Should you eat breakfast every day?

Yes
☺

No
☹

3. How often should you have fast food (like McDonald's, Chick-fil a, and others)?

A lot
☺

Sometimes
☺

Never
☹

4. What is the best to eat for your bones

A. French Fries

B. Milk

C. Hamburger

D. Strawberries

5. Circle the food that does not belong in this list of healthy foods

Orange

Broccoli

Fish

Jolly Rancher

Wheat Bread

6. Circle the healthy food to eat for lunch

Fruit Rollup

Celery

Potato Chips

7. How often should you drink soda?

A lot
☺

Sometimes
☺

Never
☹

8. Which drink is best for you?

Water

Coke

Gatorade

9. What is best for your heart?

Watching TV

Playing Video Games

Exercising

10. Circle the things that help you stay healthy

Exercise

Wash Your Hands

Eat Right

Parents' Pre and Post Test

- 1. How many minutes a week should you and your child exercise?**
A. 60 min B. 90 min C. 120 min D. 150 min

- 2. In general (and assuming that you and your child are otherwise healthy) what type of milk is the healthiest milk for yourself and your child?**
A. Whole milk B. 2% milk C. 1% milk D. Skim milk

- 3. How many servings of fruits and vegetables should you and your child consume in one day?**
A. 5 B. 4 C. 3 D. 1

- 4. For the benefit of your heart, what type of fat should you and your consume?**
A. Trans fat B. Unsaturated fat C. Saturated fat D. Cholesterol

- 5. Where can you find an abundance of these fats?**
A. Steak B. Pork C. Fish D. Chicken

- 6. Added sugars should consist of less than ___% of your and your child's diet**
A. 25% B. 33.333% C. 10% D. 50%

- 7. In what foods will you find an abundance of fiber (circle all that apply)?**
A. Whole wheat bread B. Hamburger Patty C. Fruit & Veggies

- 8. When packing potato chips in your child's lunch, what could be a healthy lower calorie, healthier substitute?**
A. Fruit Roll up B. Pretzels C. Pizza D. Donut

- 9. When purchasing fruit and vegetables, which type should be avoided?**
A. Organic B. Frozen C. Canned D. Fresh

- 10. When modifying your own diet and the diet of your child what nutrients should be decreased (circle all that apply)?**
A. Fiber B. Added Sugars C. Saturated Fat D. Calcium

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