The Stoplight Healthy Eating Program

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Abstract

Twenty-eight ninth grade students in a small, rural school in a Midwest state participated in this study. The purpose of this study was to determine if students were provided information about healthy food choices, would it be effective in influencing or changing the students’ food choices. The study was conducted during a six week period between February and April 2011. The data collection tools were the cafeteria’s Pearson Education School Dining System and a questionnaire. The results of the study suggested that there was minimal variation in students’ cafeteria choices when comparing results from pre and post assessment.
This work is dedicated to Joe and Connie Adams, who created me and instilled in me a love of learning, a passion for adventure, and the audacity to believe that I could have practically anything I want (just not everything).
Acknowledgements

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Chapter I: Introduction

Statement of the Problem

The purpose of this project was to determine if 9th grade students in a rural comprehensive high school were provided information about healthy food choices if it would influence or change their food selection. Research questions were:

1. How did the professional literature define healthy eating for adolescent students?
2. According to the professional literature, what strategies have been utilized in helping adolescent students make healthier food choices and what strategies have proven ineffective?
3. Was providing information about healthy food choices effective in influencing or changing students’ food choices in a rural comprehensive secondary school?

Justification

The researcher first became interested in the benefit of nutrition education when working for the Navy as a civilian Fitness Specialist. In this role, the researcher observed benefits to sailors including weight loss and improved blood pressure when they were provided information about the healthiest options were at a particular meal. The researcher then wondered if adolescent students would respond in a similar manner and make healthy choices after being made aware of the healthier option. If this approach is effective, it could provide insight into how to encourage students to make healthier food choices, thus addressing the obesity epidemic (Peterson, 2010) facing students today.
Definition of Terms

Healthy Eating – Healthy eating is consuming foods with high nutritional value: high in nutrients and vitamins, high in fiber, and low in fat (Snelling & Kennard, 2009).

Nutrition Education – Nutrition education is clear instruction on healthy food choices at a particular meal.

Rural Comprehensive Secondary School – A rural comprehensive secondary school is a school that includes grades 9th – 12th located in a country setting with a low population density.

Limitation and Appropriate Use of Results

This project was designed by the researcher to better understand effective means of promoting healthy eating habits among adolescent students and was limited by many factors. Some factors that limited this project included the small number of students assessed and the lack of diversity within the participant group. The project spanned a 9 week period. Accordingly, the results may vary if implemented over a longer or shorter period of time. Because this project was implemented in a 9th grade health and science classroom in a rural comprehensive secondary school with limited diversity and a relatively small number of students, the results may or may not be similar to those obtained in other secondary school settings.
Chapter II: Review of Literature

The purpose of this project was to determine if 9th grade students in a rural comprehensive high school were provided information about healthy food choices if it would influence or change their food selection. Research questions were:

1. How did the professional literature define healthy eating for adolescent students?
2. According to the professional literature, what strategies have been utilized in helping adolescent students make healthier food choices and what strategies have proven ineffective?
3. Was providing information about healthy food choices effective in influencing or changing students’ food choices in a rural comprehensive secondary school?

Research Question #1: How did the professional literature define healthy eating for adolescent students?

Foods Consumed

According to the professional literature reviewed, it was determined that healthy eating for adolescent students was widely defined by the United States Government, researchers, and health organizations (Snelling & Kennard, 2009; Robinson-O'Brien, Burgess-Champoux, Haines, Hannan, & Neumark-Sztainer, 2010; United States Department of Agriculture, 2010). There are some commonalities these groups generally agreed upon relative to the basic concepts of healthy eating for adolescent students. In the literature, healthy eating was described as consuming foods that are nutritionally dense (high in fiber, rich in vitamins and minerals) (Snelling & Kennard, 2009). In addition healthy eating consisted of eating fruits and vegetables, lean proteins, whole grains (carbohydrates), and oils (polyunsaturated and monounsaturated fats) in appropriate
proportion to the number of calories the food contains, in the appropriate quantity to maintain a healthy weight for a person’s height (Robinson-O’Brien, Burgess-Champoux, Haines, Hannan, & Neumark-Sztainer, 2010; United States Department of Agriculture, 2010). Therefore, according to the professional literature, the food types necessary for healthy eating were fruits and vegetables, lean proteins, whole grains (carbohydrates), and oils (polyunsaturated and monounsaturated fats) (Robinson-O'Brien, Burgess-Champoux, Haines, Hannan, & Neumark-Sztainer, 2010; United States Department of Agriculture, 2010).

**Fruits and Vegetables**

The research from Robinson-O'Brien, Burgess-Champoux, Haines, Hannan, and Neumark-Sztainer (2010) and Williams (2010) has indicated that fruits and vegetables are being consumed by adolescent students at an alarmingly low rate. The United States Department of Agriculture (USDA) (2010), has recommended that the average person consume 5-9 servings of fruits and vegetables each day. The USDA (2010) has determined that the fruits and vegetables may be cooked or raw; frozen, fresh, dehydrated, or canned; can be whole, mashed, or cut-up; and can be of the 100% juice variety in order to qualify as a serving of fruit or vegetable. According to Robinson-O'Brien, Burgess-Champoux, Haines, Hannan, & Neumark-Sztainer (2010) and Williams (2010), the average student is consuming between 2-5 servings of fruits and vegetables per day. As a result, these students are missing-out on the nutritional benefits associated with fruits and vegetables. Some of these benefits include reduced risk of stroke, cardiovascular disease, diabetes, cancer, and coronary heart disease (United States Department of Agriculture, 2010). Additionally, fruits and vegetables are rich sources of fiber. This helps consumers feel fuller longer and helps to limit between meal, unhealthy snacks (United States Department of Agriculture, 2010). Fruits and vegetables are typically lower in calories than
many other foods and can be useful in creating a lower calorie diet (United States Department of Agriculture, 2010).

**Lean Proteins**

The USDA (2010) has stated that lean protein can be found in the forms of beef and pork that are 90% lean, skinless chicken and turkey, fish (such as salmon, trout, and herring), dry beans or peas, and fat-free or low-fat milk, cheese, and yogurt. The USDA (2010) has determined that lean proteins are essential for muscle and bone growth and development. Also, proteins serve as the building blocks for skin, cartilage, blood, hormones, vitamins, and enzymes (United States Department of Agriculture, 2010).

**Whole Grains**

The USDA (2010) has determined that whole grains can come from a variety of sources including oatmeal, brown rice, cracked wheat, whole-wheat flour, and whole cornmeal. Whole grains are made up of the entire grain kernel; the endosperm, germ, and bran (United States Department of Agriculture, 2010). The benefits of consuming whole grains include reduction in risk of coronary heart disease, high blood pressure, diabetes, and cancer; relief of constipation as a result of whole grain fiber content; and weight management resulting from the filling effect of fiber (United States Department of Agriculture, 2010).

**Oils (Polyunsaturated and Monounsaturated Fats)**

According to the USDA (2010), “oils are fats that are liquid at room temperature”. These oils include most plant, fish, and nut oils and are classified by the USDA (2010) as healthy fats. They are typically high in polyunsaturated and monounsaturated fats and low in saturated fats.
There are a few exceptions to this rule and they include coconut oil and palm kernel oil which are high in saturated fat (United States Department of Agriculture, 2010). For this purpose, these two oils are classified by the USDA (2010) with animal fat and fall under the heading of solid fat. Solid fats should be consumed sparingly as they are high in saturated fat (United States Department of Agriculture, 2010).

**Caloric Consumption**

The literature also suggested that it is important to ensure that adolescents are consuming adequate energy (calories) so that they are able to partake in physical activity while supporting growth and metabolism (Williams, 2010). Williams (2010) notes that childhood obesity plagues adolescents because this energy balance is poorly regulated and young people are consuming more calories than they are expending, leading to “gradual increases in body fat, as stored energy” (pg. 1).

**Components of Healthy Eating**

The USDA has acknowledged that to attain this balance there are several components that must be considered (United States Department of Agriculture, 2010). First, they stated that it is important to determine the appropriate number of calories for a person to consume in any given day. The average adolescent student requires between 1,600 – 3,200 calories per day depending of the student’s gender, age, size, and activity level (see Appendix A for a more specific breakdown). Second, the professional literature indicated that it is necessary to ensure the appropriate balance of carbohydrates, protein, and fat for said caloric levels. For ideal fitness, 45 – 65% of one’s calories should come from carbohydrates, 10 – 35% should come from protein, and 20 – 35 % should be in the form of fat (Bryant, Green, & Ekeroth, 2007). The
third and most often overlooked component of healthy eating is fluid intake (Bryant, Green & Ekeroth). The literature stated that consuming the appropriate amount of fluid, 2.1 liters – 3.7 liters per day depending on the student’s gender, age, size, and activity level (see Appendix B for a more specific breakdown) ensures that the body stays in appropriate homeostasis, allowing nutrients to be transported most efficiently to the cells and waste to be removed from the body (Institute of Medicine, 2010).

**Conclusion**

A review of the professional literature indicated that there are many components to healthy eating (Snelling & Kennard, 2009; Robinson-O'Brien, Burgess-Champoux, Haines, Hannan, & Neumark-Sztainer, 2010; United States Department of Agriculture, 2010). One component was eating appropriate portions of fruits and vegetables, lean protein, whole grains, and oils (United States Department of Agriculture, 2010). A second component was eating adequate calories to live an active full life (Williams, 2010 & Bryant, Green, & Ekeroth, 2007). The third was to consume adequate fluids to maintain appropriate internal homeostasis (Institute of Medicine, 2010). After determining the components of healthy eating, the researcher then explored the strategies of implementing healthy eating approaches with adolescent students.

**Research Question #2: According to the professional literature, what strategies have been utilized in helping adolescent students make healthier food choices and what strategies have proven ineffective?**

**Effective Strategies**

According to the professional literature there are several strategies that have been effectively used to help adolescent students make healthier food choices. Some of the most
effective approaches include nutritional education, limiting food choices to more healthy options, and the promotion of healthier foods, especially fruits and vegetables (Brener, 2006, Keirle & Thomas, 2000, Norton, Falciglia, & Wagner, 1997, & Snelling & Kennard, 2009). Programs such as the Cornell University Food and Brand Lab and the Rudd Center for Food Policy & Obesity at Yale University have explored these strategies and have ongoing programs that are working to find cost effective approaches to encourage students to make the healthiest food choices possible (Cornell University Food and Brand Lab, 2010 & Yale Rudd Center for Food Policy and Obesity, 2010). According to the professional literature, school programs that incorporate one or more of these strategies have the greatest potential of their students making more healthy food choices (Brener, 2006, Keirle, & Thomas, 2000, Norton, Falciglia, & Wagner, 1997, Snelling, & Kennard, 2009, Cornell University Food and Brand Lab, 2010, & the Rudd Center for Food Policy & Obesity at Yale University, 2010).

**Nutrition Education**

Nutritional education has long been an effective approach to creating a healthier population (Nihiser, Lee, Wechsler, McKenna, Odom, Reinold, Thompson, & Grummer-Strawn, 2007). The problem is; although this is an effective way of encouraging students to live a healthier lifestyle and make good choices, obesity has more than tripled among adolescents in the United States in the last three decades (Center for Disease Control and Prevention, 2010). During this time, Health Education (of which nutrition education is a portion) was standard in grades kindergarten through 12th grade, using guidelines established by the National Health Educations Standards developed by the Joint Committee on National Health Education Standards (National Center for Chronic Disease Prevention and Health Promotion, 2008). Many studies have shown that nutrition education is an effective means of positively influencing healthy food

**Limiting Food Choices**

Many schools have provided extensive food choices to students available outside the National School Lunch Program but within the school buildings (French, Story, Fulkerson, & Hannan, 2004). These items are referred to as competitive foods or a la carte items and can be found in school cafeterias, concessions, extra sales, fund raisers, vending machines, and school stores run by students in business classes (French, Story, Fulkerson, & Hannan, 2004 & United States Department of Agriculture, 2010). The USDA has regulated that foods of minimal nutritional value (FMNV), to include candy, gum, water ices, and soda, may not be sold in the food service areas at meal time (United States Department of Agriculture, 2010). In addition, each state may enact additional regulations for their schools to follow and nearly half of the states have done this (see Appendix C for a state by state breakdown of competitive food policies). Each school must meet the minimum state and federal regulations for school meals but may have additional guidelines and regulations to ensure the health of its students (French, Story, Fulkerson, & Hannan, 2004).

There are a few concerns with limiting food to only healthy options. One concern is that students who are forced to eat particular items and are not given any freedom will then search out unhealthy items at home or on the way home to assert their own independence and control (Just & Wansick, 2009). Another concern is that when a child is forced to take a particular food
in the cafeteria line, the amount of waste is directly affected (Just & Wansick, 2009). When foods are forced upon children, there is often great variance between foods taken and foods consumed (Just & Wansick, 2009).

**Healthy Food Promotion**

According to the USDA, the average person should consume 5-9 servings of fruits and vegetables per day (United States Department of Agriculture, 2010). In contrast to these statistics, the average adolescent consumes 1.2 – 1.5 servings of vegetables per day with the majority of these servings coming from French fried potatoes and potato or corn chips (Williams, 2010). This is a concern because increased consumption of fruits and vegetables provides protection against adiposity (i.e., obesity) in adolescents (Williams, 2010).

One solution that has seen great success is the promotion of fruits and vegetables within the cafeteria (Perry, Bishop, Taylor, Davis, Story, Gray, ... Harnack, 2010 & Just & Wansick, 2009). Simple things like product placement, having a variety of fruits (apples, oranges, bananas, plums, and peaches) at the impulse purchase area by the checkout counter instead of chips, desserts, and granola bars have shown to increase fruit sales and decrease snack food sales without having a significant impact on total revenue (Just & Wansick, 2009).

Similarly, promoting healthy foods while still leaving students with options has proven effective (Just & Wansick, 2009). In Just and Wansick’s 2009 study, only 35% of students who were required to take a vegetable at the cafeteria actually consumed the vegetable. In contrast, students were 22% more likely to actually eat the vegetable they were given if they were provided the opportunity to choose between two vegetables. It is clear that food promotion through better food placement, offering choices, and making less healthy food less available
through inconvenient placement are effective ways of encouraging our children to eat better (Just
& Wansick, 2009).

**Ineffective Strategies**

According to the professional literature, there are many strategies that are used to
encourage young people to eat healthy that are completely ineffective. Some of these include
forcing children to eat particular foods, demeaning comments about weight or eating habits, and
publicly weighing the young person or unnecessary sharing of this information (Just & Wansick,
2009, Story, Hayes, & Kalina, 1996, & Nihiser, Lee, Wechsler, McKenna, Odom, Reinold,
Thompson, & Grummer-Strawn, 2007). Education is the key to ensuring that these ineffective
strategies cease to be used.

**Conclusion**

A review of professional literature was conducted to answer the research questions. The
concept of healthy eating was explored and many studies investigated the most effective ways to
promote healthy eating in schools (Just & Wansick, 2009, Nihiser, Lee, Wechsler, McKenna,
Odom, Reinold, Thompson, & Grummer-Strawn, 2007, Perry, Bishop, Taylor, Davis, Story,
Gray, … Harnack, 2010, & French, Story, Fulkerson, & Hannan, 2004). It was determined that
the food types necessary for healthy eating are fruits and vegetables, lean proteins, whole grains
(carbohydrates), and oils (polyunsaturated and monounsaturated fats) (Robinson-O'Brien,
Burgess-Champoux, Haines, Hannan, & Neumark-Sztainer, 2010; United States Department of
Agriculture, 2010). Furthermore it was determined that nutritional education, creatively limiting
food choices to healthier options by making unhealthy food more difficult to acquire, and the
promotion of healthier foods, especially fruits and vegetables or some hybrid of these three
concepts is the most effective way to encourage students to eat healthy (Brener, 2006, Keirle & Thomas, 2000, Norton, Falciglia, & Wagner, 1997, & Snelling & Kennard, T., (2009).
Chapter III: Methodology

I. Introduction

The researcher was a civilian health and wellness specialist for the United States Navy and saw great success (i.e. weight loss and improved blood pressure) among sailors who were aware of what the healthiest options were at a particular meal. The researcher then wondered if these results might be replicable with adolescent students, therefore a potential for addressing the obesity epidemic facing young people today.

The purpose of this project was to determine if 9th grade students in a rural comprehensive high school were provided information about healthy food choices if it would influence or change their food selection.

The research questions were as follows:

1. How did the professional literature define healthy eating for adolescent students?
2. According to the professional literature, what strategies have been utilized in helping adolescent students make healthier food choices and what strategies have proven ineffective?
3. Was providing information about healthy food choices effective in influencing or changing students' food choices in a rural comprehensive secondary school?

It was apparent through the review of literature that there have been many approaches that have proven beneficial in encouraging students to make healthier food choices including identifying which foods were healthy and presenting healthier foods in a more appealing manner. The literature review clearly demonstrated the glaring issue of the obesity epidemic among
adolescent students. Finally, various studies have clearly demonstrated that simple approaches such as food presentation, labeling of foods, and limiting unhealthy choices lead to better eating habits.

For the purpose of this project, all consumable items within the cafeteria were labeled with a green, yellow, or red sticker according to the nutritional value of the food. Green labels indicated items that are healthy and whose use should be optimized. Foods in this category include fruits and vegetables that are low in fat, lean proteins, whole grains without added sugar, and fat free or low fat dairy products. Foods with yellow labels may be high in calories, sodium, or fat in relation to the nutrition they provided and should be eaten in moderation. Red labels are items that should be consumed infrequently. These foods include foods that are deep fried, foods that are high in fat or calories with minimal nutritional value, and foods that would have originally been yellow foods with excess fat or sugar added (for example: strawberry flavored whole milk).

Twenty-eight ninth grade health students participated in this study. The researcher received permission from the school principal, class instructor, and food service director to conduct this study. A consent form was sent home to each of the participants’ families before the study began (See Appendix D for a copy of the consent form). The program was explained to the students and weekly results were monitored through the cafeteria’s Pearson Education School Dining System software and a questionnaire filled-out by the students after each meal (See Appendix E for a copy of the survey).
II. Participants

Twenty-eight ninth grade students from a small, rural school in a Midwest state participated in this study. Twelve of the students were female; sixteen of the students were male. The racial make-up of the class included Caucasian and Hispanic students and students who described themselves as multi-racial. Over seventy five percent of these students receive free or reduced price lunches. On any given day of the study, between three and five students chose to pack their lunch instead of eating at the school cafeteria.

III. Intervention

The Stoplight Healthy Eating Program was fully explained to the students. Examples of the labels with red, yellow, and green dots were shown to the students (See Appendix F for examples). The students were then instructed on the meaning of each dot. Foods with green dots were very healthy and should be eaten and enjoyed. Foods with yellow dots were healthy but should be eaten in moderation because they were high in calories, fat, or sodium in relation to their nutritional value. Foods with red dots should be eaten infrequently and in moderation because they have minimal nutritional value and are high in calories, fat, or sodium.

Students were told that their food choices would be monitored through the school cafeteria’s Pearson Education School Dining System software which stores each individual’s food choices each day throughout the year. Additionally, each student was asked to respond yes or no to a survey about whether the food labels affected the student’s food choices.

The students’ food choices were monitored once a week for six weeks, the first week occurring before any explanation was made about the healthiness of the food within the cafeteria. Once a week, the Stoplight Healthy Eating Program was reviewed with the students immediately
before lunch. A brief explanation was given as to what the labels meant and why the foods were given that particular label. The students were also reminded to fill out the questionnaire before they left the cafeteria.

IV. Data Collection Instruments

The effectiveness of the Stoplight Healthy Eating Program was determined by monitoring the students' food choices through the cafeteria’s Pearson Education School Dining System software and the students’ self-assessing questionnaire. The questionnaire asked: Were you more likely to choose a healthier food based on the color code? The students’ questionnaires were picked up that day and reviewed in conjunction with the computer information about the students’ food choices. A graph was used to compare the students’ food choices pre-intervention and post intervention.

V. Procedures

The researcher had an initial conversation with the food service director explaining the purpose of this project, requesting help with its execution, and finding out more information about the cafeteria’s Pearson Education School Dining System software. The food service director informed the researcher of the software’s capabilities including recording each student’s food choices for each day and storing that information indefinitely.

Next, the researcher approached the school principal about conducting the six-week Stoplight Healthy Eating Program; she enthusiastically supported the idea of the project. From there, the researcher spoke with the teacher of the class and confirmed that time would be available once a week to explain the project and review the information with the students.
Then the researcher met with the students and handed out permission slips, with information about the project to be taken home to the students' families. All of the students and families agreed to participate in the program. The next week, the researcher met with the students again and explained the premise of the Stoplight Healthy Eating Program. The researcher explained that every food, drink, and condiment in the cafeteria would have a label with the name of the food and a colored dot above it. The colored dots were green, yellow, and red with each color corresponding to the healthiness of the food. The researcher also elaborated a bit about why the foods were designated their given color. The researcher told the students that she would be monitoring their food choices once a week for the next five weeks and would also go back-into the computer system one week for a baseline comparison. The students were also instructed to fill-out the questionnaire once a week before they left the cafeteria. The researcher explained to the students that the goal of the project was to determine if knowledge of the healthiness of the food choices within the cafeteria would positively affect their decisions.

VI. Timeline

The researcher intensively delved into the concepts of healthy eating practices, adolescent obesity, and food behavioral research from August 2009 to August 2010. With the information gained in this research, the concept of this study was outlined from August 2010 to December 2010. All participating parties within the school system were approached in October 2010 and agreed to be a part of this endeavor. Execution of the project began in January of 2011 through obtaining nutritional labels and ingredient information for several hundred food, beverage, and condiment items served in the school cafeteria. Data on food item purchases and questionnaire results were obtained from a six-week period from February to April 2011.
VII. Data Analysis

The data was analyzed; answering research question number 3 (i.e., Did providing information about healthy food choices effective in influencing or changing students’ food choices in a rural comprehensive secondary school?). The weekly computer log of each student’s food choice was the primary mode for data collection. The post meal questionnaire provided supporting data to the weekly computer log. This information from the computer log was transposed to a bar graph for each student comparing the first week (choices made without the Stoplight Healthy Eating Program stickers) to the subsequent five weeks, breaking down each week into the appropriate numbers of green, yellow, and red items consumed. Each student was given a random number and their results were compared on the graph, week by week. A second set of bar graphs were used to show how the students as a whole responded to the questionnaire each week for the five weeks that food items were labeled with stickers.
Chapter IV: Results

Introduction

The purpose of this project was to determine if 9th grade students in a rural comprehensive high school were provided information about healthy food choices if it would influence or change their food selection. Research questions were:

1. How did the professional literature define healthy eating for adolescent students?

2. According to the professional literature, what strategies have been utilized in helping adolescent students make healthier food choices and what strategies have proven ineffective?

3. Was providing information about healthy food choices effective in influencing or changing students' food choices in a rural comprehensive secondary school?

The researcher attempted to answer the following question: Was providing information about healthy food choices effective in influencing or changing students' food choices in a rural comprehensive secondary school? In an effort to answer this question, all food, drinks, and condiments within the school cafeteria were labeled with the items name and a green, yellow, or red sticker. This concept is called the Stoplight Healthy Eating Program and was derived from the Stoplight Diet (Epstein & Squires, 1988). Items with green dots are considered very healthy and can be eaten with assurance that consumption of the item contributes to a daily healthy diet. Items with yellow dots are reasonably healthy but should be eaten in moderation because they are high in calories, fat, or sodium in relation to their nutritional value. Items with red dots are to be eaten infrequently and in moderation because they have minimal nutritional value and are high in calories, fat, or sodium. The first week of results were obtained before any food, drink,
or condiment was labeled to establish a baseline of what the students typically ate on a weekly basis. Each subsequent week, for the next 5 weeks before lunch, the colored sticker system was explained to the students. Students were told that each food, drink, and condiment was labeled by name and with the appropriate color to designate the healthiness of the item. Each student’s food choices were recorded through the Pearson Education School Dining System.

**Food Choice Data Results**

The students’ food choices were recorded individually by the Pearson Education School Dining System and then compiled by the researcher on a weekly basis to determine the percentage of green, yellow, and red items purchased. The first week (before the cafeteria items were labeled with appropriate color coded stickers), the students purchased 22% green items, 67% yellow items, and 11% red items. During the second week, the students purchased 21% green items, 69% yellow items, and 10% red items. The third week the student purchased 22% green items, 69% yellow items, and 10% red items. During the fourth week, students purchased 22% green items, 67% yellow items, and 11% red items. The fifth week students purchased 24% green items, 63% yellow items, and 13% red items. In the final week, students purchased 23% green items, 67% yellow items, and 10% red items.
The graph below summarized the students' cafeteria purchases. It should be noted that all of the statistics across the weeks, by individual colors are within 6% of each other from beginning to end. Green dots specifically varied 3% over the course of the six week period. Red dots varied 5% over the six week period. Yellow dots showed the most variance at 6% over the six week period. These numbers fluctuated throughout the six weeks with no discernable consistency.

Figure 1. Comparison of Student Food Choices (in percents) of Green, Yellow, and Red Labeled Cafeteria Items by Week over the Six Week Period.

The data in graph 1 confirmed that there was minimal variation for the class as a whole between pre intervention (week 1) and post intervention (weeks 2-6).

Questionnaire Results

Each week, after the food labels were posted, the students filled-out a questionnaire. The question was: Were you more likely to choose a healthier food based on the color code? The
first week 10 students said yes, 12 said no, and 0 chose not to fill-out the questionnaire. During the second week 6 students said yes, 5 students said no, and 12 students did not fill out the questionnaire. On the third week 4 students said yes, 3 students said no, and 14 students did not fill-out the survey. The fourth week 9 students said yes, 9 students said no, and 4 students did not fill-out the survey. During the fifth week 6 students said yes, 6 students said no, and 11 students did not fill-out the survey.

The following graph displays the responses to this question each week over the five week period.

![Graph](image)

Figure 2. Comparison of Student Responses (by number of students) to the Questionnaire over the Five Week Period after the Cafeteria Items were Labeled.

On every day except the first week, at least half of the students who responded said that they were more likely to choose a healthier food based on the color code.

**Summary**

Students food choices over the six week period were tallied and this analysis demonstrated that there was little difference in the healthiness of the students food choices pre
and post intervention. The greatest distinction was 6% variance in the yellow items. When this occurred, more red and green items were purchased.

The results of the questionnaire indicated that approximately half of the students who responded chose healthier food items as a result of the color coded labels on the food. During the course of the questionnaires, as many as 14 of the students did not respond.
Chapter V: Discussion

Introduction

The purpose of this project was to determine if 9th grade students in a rural comprehensive high school were provided information about healthy food choices if it would influence or change their food selection. Research questions were:

1. How did the professional literature define healthy eating for adolescent students?
2. According to the professional literature, what strategies have been utilized in helping adolescent students make healthier food choices and what strategies have proven ineffective?
3. Was providing information about healthy food choices effective in influencing or changing students’ food choices in a rural comprehensive secondary school?

The researcher attempted to answer the following question: Was providing information about healthy food choices effective in influencing or changing students’ food choices in a rural comprehensive secondary school? In an effort to answer this question, the Stoplight Healthy Eating Program was established. The Stoplight Healthy Eating Program was modeled after the Stoplight Diet (Epstein & Squires, 1988) in which all food, drinks, and condiments are designated with a green, yellow, or red sticker. Green dots indicated that the items should be eaten and enjoyed because they are healthy. Items with yellow dots should be eaten in moderation because they were considered high in calories, fat, or sodium in relation to their nutritional value. Red dots indicate the item should be consumed infrequently and in moderation because they have minimal nutritional value and are high in calories, fat, or sodium. All items in the cafeteria received a green, yellow, or red sticker. The Stoplight Healthy Eating
Program was explained to the students before they ate lunch each day. The cafeteria staff recorded the items each student chose to eat in the cafeteria through the Pearson Education School Dining System software.

The first week’s percentages of green, yellow, and red items taken from the cafeteria were tabulated before any food, drink, or condiment labeling occurred in order to establish a baseline of what the students purchased on a weekly basis. Each subsequent week, for the next 5 weeks before lunch, the colored sticker system was explained to the students. Students were told that each food, drink, and condiment was labeled by name and with the appropriate color to designate the healthiness of the item.

**Meaning of Findings**

**Pearson Education School Dining System software**

The researcher used the Pearson Education School Dining System software to gather the data for this project. Each week pre and post intervention, the students’ cafeteria choices were registered in the Pearson Education School Dining System software. As a class, the percentages of green, yellow, and red items taken from the cafeteria stayed consistent pre and post intervention. Perhaps some of the reasons that there were minimal variations in the percentages of items taken from week to week were that there were few green options available and one of the most popular ala carte items was chocolate chip cookies which were red items. As a result, if students chose one of the few green items available their choice was often counterbalanced by a student’s cookie option. Also the majority of the items in the cafeteria were yellow items which provided little opportunity for variation. An additional reason might be that by the time students are in the ninth grade their eating habits are ingrained; therefore the instruction would have little
impact on them. Similarly, they may have had little interest in the study and therefore would continue eating whatever was typically consumed in the past.

**Questionnaire results**

The students responded to the questionnaires each week after lunch. An average of half of the students each week said that they were more inclined to choose a healthier option based upon the color code. There were several possible reasons for these results. One reason was that with the growing obesity epidemic (Peterson, 2010) and societal pressure, especially for females, to maintain a lean body type (Levine & Smolak, 2006), some students chose to pursue the healthier food options once they became aware of what those options were. Another possible explanation for these results was that the students had a desire to help the researcher by answering in the way they thought would be most helpful: answering to reflect good eating choices.

**Summary**

The purpose of the study was to determine if students would be more inclined to make healthier choices in the cafeteria if they knew which items were healthier. The participants of this study included twenty-eight, 9th grade students in a rural, comprehensive, public high school in the Midwest. There was little difference between the students’ food choices pre and post intervention. Approximately half of the students who responded to the questionnaire said that they were more likely to choose a healthy food based on its color code.
Recommendations

Label criteria

The researcher determined that the categorization of the food items was inadequate. Too many foods fell into the yellow category because the red category was so limited. In the past decade, many of the most popular red items have been removed from the cafeteria. According to the food service director, the school removed its deep fryer food preparation machine from the cafeteria in 2008 to provide healthier meals to its students (personal communication, March 9, 2011). The Child Nutrition and WIC Reauthorization Act of 2004 also limited the items available to students. Candy bars, soda-pop, and candy were no longer allowed to be sold in the cafeteria because the cafeteria was now receiving additional funds under the Child Nutrition and WIC Reauthorization Act of 2004 (Congressional Budget Office, 2011).

On the opposite end of the spectrum, there were very limited amounts of green items as well. Often, items that would have originally had a green label (fruits and vegetables) had red label items added to them (sugar, butter, or bacon): this made them yellow items. According to United States Department of Agriculture standards, this was considered an acceptable practice as long as the portion size of the base food item was correct. There were not regulations concerning what foods may or may not be added to the cafeteria item (United States Department of Agriculture, 2011).

In order to facilitate future studies, the researcher would suggest changing the parameters of the color code designated to each item in the cafeteria. The majority of the items available in the cafeteria were yellow items and this primarily contributed to the minimal variance in the
study. By changing the guidelines of how cafeteria items were labeled, there would be more opportunity to see variation in students’ choices.

**Length and days of study**

This study was six weeks in length, one week pre intervention and five weeks post intervention. The researcher would suggest that any future study replicating this work should be extended to nine weeks, three weeks pre intervention and six weeks post intervention. With three weeks of pre intervention, a better baseline could be established in order to document the students buying habits in the cafeteria.

For this study, the researcher would also suggest documenting results based upon different weekday evaluations. The researcher gathered data on the same day each week. It became evident that the same menu item would be served every other week or every third week because the cafeteria’s menu is cyclical. In order to get a true representation of students’ cafeteria choices, there would need to be an inclusion of various days of the week in the pre and post intervention data.

**Questionnaire suggestions**

The researcher would suggest forgoing the use of a questionnaire in future projects. The researcher did not find the questionnaire useful in determining if the information provided to the students was effective in influencing or changing their food choices.
School-wide recommendation

Without prompting from the researcher, the school principal had taken-on the responsibility of sending an e-mail to the entire school's personnel: students, staff, and teachers; explaining the program and the meaning of each label. It appeared to the researcher that the teachers and staff embraced the idea of the program. A substantial number of teachers commented on the labeling system and expressed gratitude for the information provided. Teachers commented about incorporating small changes (putting one scoop of bacon on their salad instead of two) and large changes (eating only green items at the cafeteria). The researcher believed that many of the teachers embraced the idea of the program because the effects of healthy or unhealthy eating become more apparent as one gets older. The researcher would also suggest that a future study might examine the school-wide percentages rather than examining one class.

Recommendation of future research questions

Upon completion of this project, the researcher realized that based upon the data and methodology, the researcher might suggest future questions. They are:

1. How can we most effectively and efficiently let students know what the healthiest options are at a particular meal?

2. How can we improve the presentation, taste, and health of our cafeteria foods to ensure that our students are not just receiving, but also eating the healthiest items possible?
Conclusion

The purpose of this project was to determine if providing information about healthy food choices would be effective in influencing or changing students’ food choices. All food, drinks, and condiments within the school cafeteria were labeled with the name of the item and a green, yellow, or red sticker to indicate their nutritional value. Students were advised on the meaning of these labels and that their food choices would be logged in the school’s Pearson Education School Dining System. After each meal, the students also filled-out a questionnaire regarding whether they were more inclined to choose a healthier food based upon the color code. The pre and post intervention data indicated that there was little difference in the foods the class consumed as a whole. In contrast, the results of the questionnaire indicated that approximately half of the students who responded to the questionnaire each week were more inclined to choose more healthy options as a result of the color coded labels. Based upon the results of this project, it might be suggested that the two areas that have the greatest potential to impact students’ health are improving the foods we give our students and improving our students’ knowledge regarding which foods are best for them.
References

Baranowski, T. (2006). Advances in basic behavioral research will make the most important contributions to effective dietary change programs at this time. *Journal of the American Dietetic Association, 106*(6), 808-811.


Appendix A

Average Adolescent Caloric Requirement Breakdown

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age (years)</th>
<th>Sedentary&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Moderately Active&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Active&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>4-8</td>
<td>1,200</td>
<td>1,400-1,600</td>
<td>1,400-1,800</td>
</tr>
<tr>
<td></td>
<td>9-13</td>
<td>1,600</td>
<td>1,600-2,000</td>
<td>1,800-2,200</td>
</tr>
<tr>
<td></td>
<td>14-18</td>
<td>1,800</td>
<td>2,000</td>
<td>2,400</td>
</tr>
<tr>
<td></td>
<td>19-30</td>
<td>2,000</td>
<td>2,000-2,200</td>
<td>2,400</td>
</tr>
<tr>
<td>Male</td>
<td>4-8</td>
<td>1,400</td>
<td>1,400-1,600</td>
<td>1,600-2,000</td>
</tr>
<tr>
<td></td>
<td>9-13</td>
<td>1,800</td>
<td>1,800-2,200</td>
<td>2,000-2,600</td>
</tr>
<tr>
<td></td>
<td>14-18</td>
<td>2,200</td>
<td>2,400-2,800</td>
<td>2,800-3,200</td>
</tr>
<tr>
<td></td>
<td>19-30</td>
<td>2,400</td>
<td>2,600-2,800</td>
<td>3,000</td>
</tr>
</tbody>
</table>

<sup>a</sup> These levels are calculated by gender, age, and activity level for reference-sized individuals. Reference size is based on median height and weight for ages up to age 18 years of age.

<sup>b</sup> Sedentary means a lifestyle that includes only the light physical activity associated with typical day-to-day life.

<sup>c</sup> Moderately active means a lifestyle that includes physical activity equivalent to walking about 1.5 to 3 miles per day at 3 to 4 miles per hour, in addition to the light physical activity associated with typical day-to-day life.

<sup>d</sup> Active means a lifestyle that includes physical activity equivalent to walking more than 3 miles per day at 3 to 4 miles per hour, in addition to the light physical activity associated with typical day-to-day life.

http://www.webmd.com/diet/features/estimated-calorie-requirement
## Appendix B

### Dietary Reference Intakes: Water

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Life Stage Group</th>
<th>Amount Ingested (Liters/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Males</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9-13y</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>14-18y</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>19-30</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9-13</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>14-18</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>19-30</td>
<td>2.7</td>
</tr>
</tbody>
</table>

http://www.iom.edu/Global/News%20Announcements/~/media/442A08B899F44DF9AAD083D86164C75B.ashx
Appendix C

<table>
<thead>
<tr>
<th>STATE</th>
<th>POLICY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>The sale of foods of minimal nutritional value during meal service times will continue to be prohibited. Schools are required to restrict student access to concession, extra sales, vending and fundraisers that are in direct competition with the Child Nutrition Program during meal services anywhere on campus. If income from such sales occurs, the revenue is required to be deposited into the Child Nutrition account.</td>
</tr>
<tr>
<td>Alaska</td>
<td>USDA Regulations</td>
</tr>
<tr>
<td>Arizona</td>
<td>USDA Regulations</td>
</tr>
<tr>
<td>Arkansas</td>
<td>USDA Regulations</td>
</tr>
<tr>
<td>California</td>
<td>The law currently in effect, requires that 50% of the items, other than foods reimbursed under federal law, offered for sale each school day at any schoolsite by any entity or organization during regular school hours be selected from a prescribed list of foods.</td>
</tr>
</tbody>
</table>

In 2002, a new law (SB 19) was passed. The law will become operative Jan. 2004 if funds are appropriated in Budget Act of 2003 for the purpose of increasing State meal reimbursements by ten cents for all meals served, including paid, free, and reduced price meals. Establishes nutrition standards at elementary schools:

1) The only food that may be sold to pupils during breakfast and lunch periods is food that is sold as a full meal. Fruit, non-fried vegetables, legumes, beverages, dairy products, or grain products may be sold as individual food items if they meet the following nutrition standards:
   - Not more than 35% total calories from fat (excluding nuts and seeds)
   - Not more than 10% total calories from saturated fat
   - Not more than 35% total weight from sugar (excluding fruits and vegetables)

2) The only beverages that can be sold are water, milk, and juice that is at least 50% fruit juice with no added sweeteners.

3) Foods sold as part of fundraising are exempted from the above standards if sold off campus or one-half hour after the end of the school day.

In Middle Schools:
   1) No carbonated beverage allowed from ½ hour before school to end of the last lunch period.

In HighSchools:
   1) The above standards will only be implemented in 10 or more school sites that are awarded a two-year grant.

Colorado | No competitive foods offered on campus from ½ hour prior to until ½ hour after
Connecticut

No extra food items anywhere on campus from ½ hour before and after any state or federally subsidized milk or food service program. Extra foods means tea (including iced tea), coffee, soft drinks, and candy. Income from sales of any foods served on campus during this time must accrue to the food service account.

Delaware

USDA Regulations. (Has recommended policies.)

District of Columbia

USDA Regulations

Florida

No competitive foods in elementary schools. No competitive foods sold until one hour after last lunch period in secondary schools. However, in high schools, the sale of carbonated beverages is allowed at all times if a 100% fruit juice is sold at each location where the carbonated beverages are sold. The location cannot be where breakfast or lunch are served or eaten. 100% juice may be sold all times during the day at any location.

Georgia

No foods of minimal nutritional value in elementary school until last lunch group is scheduled to return to class. In other schools, no foods of minimum nutritional value in dining, serving or kitchen areas during mealtime.

Guam

The sale of food in all elementary and secondary schools shall be limited to the School Breakfast Program, School Lunch Program and approved cafeteria supplementary food items. Schools shall not permit anywhere on campus the sale of the other foods from the beginning of the school day to the ending of the school day except certain beverages through vending machines. These beverages may not be sold during meal serving periods. (At least one machine shall vend bottled water. Coffee and coffee-based beverages are not allowed.) Vending machines on elementary campuses should not be accessible to students.

Idaho

USDA Regulations

Illinois

No competitive foods in elementary schools during regular breakfast and lunch periods. Competitive foods include all confections, candy, potato chips, carbonated beverages, fruit drinks containing less than 50% pure fruit juice, tea, coffee, and any other foods or beverages designated as such by the State Board of Education. Income from sale of all food and beverages provided in any dining or serving area during the designated breakfast and lunch periods shall accrue to the food service account.

Indiana

USDA Regulations

Iowa

USDA Regulations

Kansas

USDA Regulations

Kentucky

No competitive foods on campus until ½ hour after last lunch period.

Louisiana

Competitive foods are allowed in Grade K-6 before the end of the last lunch period and in Grades 7-12 before the last 10 minutes of each lunch period only if income accrued to the school foodservice account and expended only for Child Nutrition Program purposes. A la carte meal service is prohibited. However, extra
items may be sold only to those who have received a complete meal and the items must meet component requirements as defined by Enhanced Food-based Menu regulations. The only exceptions are milkshakes, yogurt, frozen yogurt, ice cream, and ice milk. Full-strength juice, milk, and bottled water (unflavored with no additives) may be sold at any time during the day to anyone, whether or not they have purchased a meal.

<table>
<thead>
<tr>
<th>State</th>
<th>Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine</td>
<td>Only the School Foodservice Program can sell food/beverages (that exceed the 5% minimal nutritional value per 100 calories rule) on campus during the school day and profits must accrue to the foodservice program. However, local school boards may establish, by policy, a process whereby a school or approved student organization is allowed to benefit from the sale of such foods and beverages.</td>
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<tr>
<td>Maryland</td>
<td>No foods of minimal nutritional value until the end of the last lunch period.</td>
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<tr>
<td>Massachusetts</td>
<td>USDA Regulations</td>
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<tr>
<td>Michigan</td>
<td>USDA Regulations</td>
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<tr>
<td>Minnesota</td>
<td>USDA Regulations</td>
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<tr>
<td>Mississippi</td>
<td>No food is to be sold on campus for one hour before breakfast or lunch and until the end of either serving period. School Foodservice shall sell only those foods that are components of the approved Federal meal patterns being served (or milk products). With the exception of milk products, a student may purchase the individual components of the meal only if the full meal also is being purchased.</td>
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<tr>
<td>Missouri</td>
<td>USDA Regulations</td>
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<tr>
<td>Montana</td>
<td>USDA Regulations</td>
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<tr>
<td>Nebraska</td>
<td>No competitive foods anywhere on campus from ½ hour before until ½ hour after breakfast or lunch.</td>
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<td>Nevada</td>
<td>USDA Regulations</td>
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<td>New Hampshire</td>
<td>USDA Regulations</td>
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<tr>
<td>New Jersey</td>
<td>No food of minimal nutritional value on campus until the end of the last lunch period. Funds from sale of foods and beverages during the hours of operation of the school lunch and breakfast programs must accrue to the foodservice account.</td>
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<tr>
<td>New Mexico</td>
<td>USDA Regulations</td>
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<tr>
<td>New York</td>
<td>From the beginning of the school day until the end of the last scheduled meal period, no sweetened soda water, no chewing gum, no candy including hard candy, jellies, gums, marshmallow candies, fondant, licorice, spun candy and candy coated popcorn, and no water ices except those which contain fruit or fruit juices, shall be sold in any public school within the State.</td>
</tr>
<tr>
<td>North Carolina</td>
<td>Competitive food sales are allowed in the lunchroom or its general environs if the profits accrue to school foodservice and used solely for the school meal programs. Schools may sell extra food items after the established lunch hour is over, only with the approval of the local board of education. Local board approval is also needed to sell soft drinks to students so long as soft drinks are not sold during the lunch period, at elementary schools, or contrary to the requirements of the...</td>
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</table>
National School Lunch Program. A la carte foods may not include food of minimum nutritional value.

<table>
<thead>
<tr>
<th>State</th>
<th>Regulations</th>
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<tbody>
<tr>
<td>North Dakota</td>
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<td>West Virginia</td>
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<td></td>
<td>Virginia</td>
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<td></td>
<td>Any food or beverage sold (including a la carte) in Virginia schools from 6:00 a.m. until the end of breakfast period, and during the lunch period, must meet the following nutrition standard. The foods and beverages sold must either be a recognized component of the food based meal pattern or must contain 5% of the Daily Value, per serving or per 100 calories, of at least one of these eight essential nutrients: iron, calcium, protein, vitamin A, vitamin C, niacin, thiamine, or riboflavin. The money from the sale of food or drink during the protected time periods must accrue to the school nutrition program account. Iced or hot coffee or tea may not be sold to students; non-carbonated water may be sold.</td>
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<td></td>
<td>Virgin Islands</td>
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<td></td>
<td>USDA Regulations</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>West Virginia</td>
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<td></td>
<td>No foods of minimal nutritional value may be served or sold to students during the instructional day, except that county boards may permit the sale of soft drinks in county high schools except during breakfast and lunch periods. Revenues accrue to the principal for purchase of school supplies and to the faculty senate for allocation. The state has nutritional standards for foods served in schools during the day including:</td>
</tr>
<tr>
<td></td>
<td>1) no foods containing 40% or more sugar by weight,</td>
</tr>
<tr>
<td></td>
<td>2) any juice or juice product must contain a minimum of 20% real juice, and</td>
</tr>
<tr>
<td></td>
<td>3) all “other” foods shall reflect the Dietary Guidelines for fat by limiting the number of fat grams to not more than 8 per one ounce serving, or meet the USDA standard for a lunch component. Only meal components may be sold as a la carte for breakfast, and only fluid milk, milkshakes and bottled water (100% natural spring water containing no additives) may be served as a la carte items for lunch.</td>
</tr>
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</tbody>
</table>
Federal Regulations Definitions:

Competitive Foods: Means any foods sold in competition with the Program to children in food service areas during the lunch periods.

Food of Minimal Nutritional Value (FMNV) means:

(i) In the case of artificially sweetened foods, a food which provides less than five percent of the Reference Daily intakes (RDI) for each of eight specified nutrients per serving; and

(ii) In the case of all other foods, a food which provides less than five percent of the RDI of each of eight specified nutrients per serving.

The eight nutrients to be assessed for this purpose are - protein, vitamin A, vitamin C, niacin, riboflavin, thiamine, calcium, and iron. The categories of FMNV include: soda water, water ices, chewing gum, certain candies, hard candy, jellies and gums, marshmallow candies, fondant, licorice, spun candy, and candy coated popcorn.

Appendix D

Consent Form

2/16/11

Dear Families,

My name is Paula Adams Campbell and I am a graduate student in education at Defiance College. As part of my degree requirement, I must engage in an action research project. My project pertains to the issue of healthy eating habits of adolescent students.

I will be providing information to your student about healthy eating habits. In conjunction with this instruction, I will be monitoring the student’s food choices at the cafeteria for 6 weeks. Your child will not be identified in the results of this anonymous study. The results will be shared with the graduate faculty within the Education Department of Defiance College. The results will be used solely for educational purposes.

I am looking forward to this exploration of healthy eating and thank you in advance for your help in this endeavor. This study poses no risk to your student. As state before, the results will be confidential. Please contact me at paula.adams.campbell@gmail.com by February 23, 2011 if you have questions or DO NOT wish for your student to participate in this project. If I do not receive contrary information, your student will be an integral part of this study.

Thank you for your consideration and I am excited to embark on this adventure with your student,

Paula Adams Campbell
Appendix E

1. Were you more likely to choose a healthier food based on the color code?

YES  NO
Appendix F

Examples of Green, Yellow, and Red Labels

- celery
- cheese slice
- chocolate chip cookie