IMPACT OF A LABELING INITIATIVE ON THE FOOD CHOICES OF HIGH SCHOOL STUDENTS AGED 18 YEARS AND OLDER

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ABSTRACT

RESEARCH PAPER: Impact of a Labeling Initiative on the Food Choices of High School Students Aged 18 Years and Older

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Many strategies have been attempted to influence adolescents to make positive food choices in the high school cafeteria. However, no simple, familiar, or easy-to-use strategies were identified in the literature. The purpose of this quantitative study was to determine if the implementation of a symbol-based nutrition labeling system was associated with an increase in the number of healthy foods purchased by students 18 years of age and older in a high school cafeteria in central Indiana. The researcher hypothesized that students, especially females, would choose a higher number of healthy foods after the implementation of a symbol-based labeling system. Baseline data (e.g., the type of food/drink each student purchased) was collected from 20 volunteers prior to the intervention. During the next four weeks, posters were hung in the cafeteria to explain the new labeling system as it related to nutrition and food choice. During the fifth week of the study, coded foods were sold in the cafeteria and the students’ food purchases were recorded. Only 13 of the original 20 students completed the post-assessment (4=female, 9=male). Results indicated there were no statistically significant changes in the type of foods purchased after the intervention, either overall or by gender.
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CHAPTER 1

INTRODUCTION

The current adolescent obesity rate of 17 percent (Centers for Disease Control and Prevention [CDC], 2012a) has resulted in many researchers attempting to identify factors associated with the increased rate and ways in which the rising rate may be ameliorated (Long, Henderson, & Schwartz, 2010). Eating habits and food choices begin in childhood and are relatively established by adolescence (Anderson & Anderson, 2010). Because adolescents in the United States spend a great deal of time within the walls of a school, the high school cafeteria may be either a contributor to obesity or a guide in healthful eating (Fleischhacker, 2007).

The National School Lunch Program has been an effort in school cafeterias that has encouraged healthy eating and positive food choices (United States Department of Agriculture [USDA], 2011). Unfortunately, with nearly all schools in the United States offering competitive foods, students now also have the option to purchase foods that contribute to unhealthy eating patterns and obesity (Snelling, Korba, & Burkey, 2007). Competitive food offerings, along with other factors that influence adolescent food choices, can further complicate the process of choosing healthy foods in the high school cafeteria.
Fortunately, many intervention methods have been shown to be effective in influencing adolescents to make healthy food choices. School nutrition action groups (Passmore & Harris, 2005), food checklists (Dwyer, Garceau, Hoelscher, Smith, Nicklas, Lytle, and Clesi, 2001), point-of-selection nutrition information (Elbel, Gyamfi, and Kersh, 2011), and stop-light labeling systems (Snelling, Korba, & Burkey, 2007; Snelling & Kennard, 2009) have all been shown to help adolescents make healthier choices in the high school cafeteria. This researcher hypothesizes that combining and simplifying these methods into one system that adolescents can easily decipher might be more effective than each of these methods independently.

Although high school students can typically identify basic foods such as candy as being “unhealthy” and raw vegetables as being “healthy,” they often cannot explain how they reached this conclusion (Marion, 2005). Some health conscientious students may know enough about nutrition to check the nutrition label (if available) for information such as the caloric content, fat grams, and sugars. However, as Misra (2002) points out, most students do not know enough about nutrition labels and the information that is included to make the required mathematical calculations. When faced with a choice between two unlabeled items, most high school students cannot identify foods that best meet their nutritional needs and are also healthier choices. Instead, they will choose a food based on taste or appearance (Bissonnette & Contento, 2001). Perhaps if a simple, easy-to-use direct labeling system is put into place, students will be able to make healthier food choices.
Problem Statement

The rising prevalence of obesity among adolescents (CDC, 2012a) demands the development and implementation of effective techniques to help reduce the unhealthy behaviors associated with this condition. While the National School Lunch Program encourages healthy eating and positive food choices (USDA, 2011), nearly all schools offer competitive foods for purchase that can contribute to unhealthy eating patterns that can lead to obesity (Snelling, Korba, & Burkey, 2007). When nutrition labeling is available, most students do not know enough about how to use the information on the labels to make healthy choices (Misra, 2002). As a result, many students choose food based on taste or appearance rather than its nutritional contribution to the diet (Bissonnette & Contento, 2001). Perhaps the application of a simple, easy-to-use nutrition labeling system in school cafeterias will help students compare food items and make healthier choices.

Purpose Statement

The purpose of this quantitative study is to determine if the implementation of a symbol-based nutrition labeling system is associated with an increase in the number of healthy foods purchased by students in a high school cafeteria in central Indiana.

Research Questions

The following research questions will be addressed:

1. Will a symbol-based food labeling system in a high school cafeteria lead to students aged 18 years and older making healthier food choices?
2. Is gender associated with the use of a symbol-based food labeling system to make healthier food choices?

**Research Hypotheses**

The researcher’s hypotheses for the research questions are as follows:

H1: Students will choose a statistically significant higher number of healthy foods after the implementation of a symbol-based labeling system than they did prior to the implementation of a food labeling initiative.

H2: Females will be more likely than males to choose healthy foods after the implementation of a symbol-based labeling system.

The corresponding null hypotheses for the research questions are as follows:

H0: There will be no difference in the number or percent of students who choose healthy foods after the implementation of the symbol-based labeling system than prior to the implementation of a food labeling initiative.

H0: There will be no difference by gender in the number or percent of students who choose healthy foods after the implementation of a symbol-based labeling system.

**Rationale**

Many different food-labeling initiatives have been attempted in high school cafeterias. Some of these methods have been shown to be successful, but others are too complicated for adolescents and young adults to understand and quickly process while in the cafeteria lunch line. If teens don’t understand nutrition information quickly and
easily, then they will likely disregard it and make food choices based upon other factors such as taste, appearance, preference, or peer influence (Campbell, 2009). Limited information is available on the use of familiar and easy-to-use symbols to label food as “healthy,” “acceptable,” or “unhealthy.” Although high school students are often viewed as “young adults,” many do not have the nutritional knowledge to quickly make healthful decisions between given items. What may be a clear choice to a knowledgeable adult may not be so obvious to a teen. As a result, nutrition labeling initiatives must be fool proof when identifying foods that adolescents should choose as part of an overall healthy diet.

**Assumptions**

The following assumptions were made in the development and implementation of the study and in the interpretation of the data:

1. Students make food choices based on their own free will.
2. Most students purchase at least one food item or meal from the school cafeteria each school day.
3. The food choices made by the students during the study period are representative of their typical food purchases throughout the academic year.
4. Prices of items were unchanged from the baseline to the conclusion of the study.
5. Students of both genders would be willing to complete both the pre-assessment and the post-assessment.
Definitions

For the purpose of this study, the following definitions will be used:

1. **Adolescent**- in the process of developing from a child into an adult; roughly from 11 to 19 years of age.

2. **Calorie**- unit of heat used to express the energy value of food; one calorie is needed to raise the temperature of one gram of water one degree Celsius.

3. **Choose My Plate Program**- United States Department of Agriculture initiative used to illustrate the five food groups in order to encourage healthy food choices.

4. **Competitive food**- food or beverage sold in a school other than one served as part of the United States Department of Agriculture’s school meal program.

5. **Dietary Guidelines for Americans**- dietary recommendations for healthy Americans age two years and older about food choices that promote health, specifically with respect to prevention or delay of chronic diseases.

6. **Food label**- information found on foods and beverages that are required by the United States’ government and must include common name of the product, name and address of the manufacturer, net contents in terms of weight, measure, or count, ingredient list, serving size, nutrition facts, and government regulated nutrition claims.

7. **Healthy food**- low in fat, saturated fat, cholesterol and sodium, and contains at least 10 percent of the Daily Values for vitamin A, vitamin C, iron, calcium, protein or fiber.

8. **High fat**- contains more than 35 percent of calories from fat.

9. **Nutrition**- the study of substances found in food that is essential to life.
10. **Nutrition label**- a graphic square placed on the packaging of prepared foods that shows the nutritional value of a consumable product.

11. **Obesity**- a range of weight that has been shown to increase the likelihood of certain diseases and other health problems; an adult with a body mass index that is 30 or higher.

12. **Recommended Dietary Allowance**- average daily level of intake sufficient to meet the nutrient requirements of nearly all (97-98 percent) healthy people.

13. **Unhealthy food**- food that don’t meet the requirements for being labeled as healthy food.

**Summary**

There is a lack of current research related to implementing easy-to-use symbol-based food labeling methods that will aid adolescents in making healthy food choices. In this study, simple to understand symbols were used to indicate the healthfulness of foods in one high school cafeteria in central Indiana. In addition, students were provided with easy to understand dietary information via posters in the high school cafeteria. Results of this study can be used to encourage healthy food choices in all settings where food items are sold and dietary choices are made.
CHAPTER 2

REVIEW OF LITERATURE

The purpose of this quantitative study is to determine if the implementation of a symbol-based nutrition labeling system is associated with an increase in the number of healthy foods purchased by students in a high school cafeteria in central Indiana. This chapter will present a review of the literature that describes the dietary intake of adolescents, the National School Lunch Program, competitive food offerings, factors associated with adolescent food choices, and effective strategies to influence adolescent food choices.

Dietary Intake of Adolescents

The Youth Risk Behavior Surveillance System (YRBSS), conducted by the Centers for Disease Control and Prevention (CDC), monitors six types of health-risk behaviors that contribute to the leading causes of death amongst youth and adults (CDC, 2012a). One of these six areas is “unhealthy dietary behavior.” YRBSS surveys are conducted locally, and analyzed both nationally and state by state, as part of a cooperative agreement between each state and the CDC (Sussman, Jones, Wilson, & Kann, 2002). The 2011 national Youth Risk Behavior Survey pointed to less than desirable results for high school-aged students. The 2011 YRBSS results indicated that,
nationwide, 13 percent of adolescents were classified as obese based on their BMI, five percent did not eat fruits during the seven days before the survey, six percent did not eat vegetables during the seven days before the survey, and 11 percent drank a can, bottle, or glass of soda three or more times per day during the seven days before the survey was conducted (CDC, 2012a).

The National Health and Nutrition Examination Survey (NHANES), conducted by the CDC as part of the nation’s nutrition monitor program, is designed to assess the health and nutritional status of children and adults in the United States. NHANES was first conducted in the 1960’s, but it has grown and been adapted to meet current needs. Beginning in 1999, NHANES became a continuous program that has a changing focus on a variety of health and nutrition measurements to meet emerging needs. The survey examines a nationally representative sample of about 5,000 persons each year from 15 counties across the United States (NHANES, 2007).

In the 2007-08 NHANES survey, 19.3 percent of males and 16.8 percent of females, 12-19 years of age, were found to be obese. On average, males ages 12-19 years old consumed 2707 calories per day, while females in the same age group consumed 1906 total calories per day. The mean daily intake in grams of total fat was, 100.9 for males ages 12-19 and 72.3 grams for females of the same age range (CDC, 2012b), exceeding the recommendation of the United States Department of Agriculture’s (USDA) Dietary Guidelines for Americans, 2010 (USDA, 2010a). Teens are also eating far less fruits and vegetables than the 1.5 cups of fruit and two to three cups of vegetables that are recommended by the USDA’s Choose My Plate program (USDA, 2012). Lastly, teens are consuming far too much sugar. According to the USDA’s Dietary Guidelines for
Americans, added sugars contribute 16 percent of the total calories in the American diet. However, the USDA’s recommendation is that no more than five to 15 percent of calories should come from fat and added sugars (USDA, 2010b). The lack of adequate fruit and vegetable consumption, combined with the excessive intake of fat and sugar, results in diets that lack important vitamins and minerals (USDA, 2010a).

**National School Lunch versus Competitive Food Selection**

The National School Lunch Program (NSLP), operated by the United States Department of Agriculture (USDA), was begun in 1946 (USDA, 2011). The federally funded program ensures that participating students obtain daily meals that provide a weekly average of one-third or more of the Recommended Dietary Allowances for protein, iron, calcium, and vitamins A and C. In 2010, the National School Lunch Program operated in over 101,000 schools nationwide and served 31 million students each day (USDA, 2011), which far exceeds the number of people served daily by the nation’s largest fast-food chain (Marion, 2005).

Fleischhacker (2007) found that NSLP participants consumed less sugar, soft drinks, and sweetened fruit drinks, consumed more milk and vegetables, and had a higher intake of many key vitamins and nutrients than those not participating in NSLP. Unfortunately, research indicates that as students get older, fewer participate in NSLP. A national survey during the 2006-2007 school year found that 84 percent of eligible elementary school students participated in free NSLP meals. By middle school, this amount dropped to 81 percent and by high school only 64 percent of eligible students participated (Long, Henderson, & Schwartz, 2010). While the lunch program had been
successful in meeting its original goals, it seems that it has been losing traction in the past
decade as competitive food offerings have drastically changed the dietary choices in
school cafeterias (Harris, 2002).

“Competitive foods” are defined as any foods that are sold outside of the NSLP.
Competitive foods are offered in 97 percent of our nation’s schools. Although these foods
are shown to displace student’s consumption of more nutritious foods, many schools
allow, and even encourage their sale, due to the revenue potential. In 1994, the USDA
adopted legislation that prevented the sale of foods of minimal nutritional value (FMNV)
in cafeterias during lunchtime (Flesichhacker, 2007). In 2010, the United States
Congress updated this legislation by passing the Healthy, Hunger-Free Kids Act (Food
and Nutrition Service [FNS], 2012). In addition to updating student meal standards, the
act aims to improve the nutrition content of competitive foods to meet many of the same
guidelines of NSLP lunches (Food Research and Action Center, 2010). It is important to
note that the Healthy, Hunger-Free Kids Act is a dynamic piece of legislation that is not
scheduled to be fully finalized or implemented until 2013 or later.

In 2006, Connecticut implemented its Healthy Food Certification (HFC) program,
which created a strict set of guidelines to rate foods’ nutritional value and to determine
whether or not certain foods would be permitted to be sold in school cafeterias. With
these new guidelines, Connecticut became one of the most effective states at removing
unhealthy foods from school environments. Results of a study conducted by Long and
associates (2010) found that Connecticut schools that voluntarily participated in HFC
before its official implementation saw more students participating in NSLP and did not
see a significant loss in revenue.
Other states have also taken up the challenge of serving healthier foods in their school cafeterias. Beginning in 2008, Oregon schools stopped offering high-fat, high-calorie entrees and drinks. Massachusetts has also taken a stand against competitive food offerings. Schools in Massachusetts offer fresh fruits and vegetables every day, no foods are fried, and only olive and canola oils are used (Caine-Bish & Scheule, 2009).

Factors Associated with Adolescent Food Choices

Campbell (2009) notes that food choices of adolescents are influenced by multiple factors, including health status, age, family and friends, and culture and tradition. Other researchers have indicated that gender, cost, taste, nutritional knowledge, and previous experience may also strongly influence food choices. Campbell (2009) concluded that adolescents are at a life stage where they are still forming their own independent ideas and opinions on many aspects of their lives, including food choices.

Many teens rely on the advice and direction of their peers to guide their choices. Salazar (2007), in his recollection of his personal experiences as a Mexican-American immigrant in an American school, points out how experiences in the school cafeteria made him realize how his food and culture were different from that of the typical American teenager. In an effort to fit in with his peers, Salazar changed his food choices to conform to those that he felt American adolescents were choosing. In this way, one realizes how the influence of peer pressure can impact the lives of adolescents.

Nutrition knowledge is an important factor when adolescents make food choices (Campbell, 2009). Pirouznia (2001) compared the nutrition knowledge of 532 male and female high school students. Results indicated that high school females had a higher
nutrition knowledge score than high school boys (ANOVA $F_{1,339}=17.88$, $P<0.0010$), which appeared to have a positive impact on the selection of healthier foods.

Shannon and colleagues (2002) surveyed 289 high school students in grades ten through twelve in a metropolitan area to determine factors in the school cafeteria that influenced their food choices. Descriptive statistics, chi-squares, and general linear models were used for data analysis. Results indicated that females, and those students who worried about their weight and health when making food choices, were more likely to report greater interest in the availability of low-fat foods in the school cafeteria. These same students were more likely than males, or those unconcerned with weight or health (67.5% and 34.7%, respectively), to report that it was “cool” to eat low-fat foods. In addition, 32.9 percent of high school females who were surveyed reported that they thought low-fat foods tasted good, compared to only 15.6 percent of boys.

Bissonnette and Contento (2001) conducted a study to identify what factors are most important to adolescents when making food choices. The study used a cross-sectional survey design and consisted of a sample of 669 senior high school students in the New York City metropolitan area. The sample provided a wide range of socioeconomic levels and ethnic groups. Results indicated that 93 percent of teens rated taste as very important, 78.7 percent rated cost of food as important and 75.3 percent rated appearance as important.

Based on the results of Bissonnette and Contento’s (2001) study, Caine-Bish and Scheule (2009) suggested that current offerings and policies should be driven by the question, “What will kids eat?” Research has demonstrated that children’s food preferences will predict the food children choose. If students prefer cookies, cakes, and
pastries, then these are the foods they will choose. However, there are many healthier food options that students also prefer such as grapes, strawberries, and milk (Cain-Bish & Scheule, 2009). If school cafeterias will simply consider the preferences of children, then they can predict what students will choose, and therefore influence the healthfulness of these students’ diets.

**Effective Strategies to Influence Adolescents’ Food Choices**

Previous research has suggested many strategies that may effectively assist high school students in making healthy and knowledgeable food choices in the school cafeteria (Campbell, 2009). Some of these interventions can be incorporated in the classrooms that are directly down the hallway from the school cafeteria.

Misra (2002) pointed out the importance of students being able to understand and decipher food and nutrition labels. She found that adolescents are only able to effectively understand food and nutrition labels when no math is involved. Besides helping them to make healthier choices, understanding dietary information also empowers adolescents to avoid the absurd claims of fad diets.

In addition to teaching students to understand the information on food and nutrition labels and to be able to perform necessary calculations, Passmore and Harris (2005) suggested that giving students more control over food offerings in their schools increased healthy eating and positive dietary choices. These authors conducted a study to compare food selections between 12 schools implementing school nutrition action groups and 12 control schools. School nutrition action groups were formed in experimental schools. Results indicated a significant increase \( t=4.60, P<0.001 \) in the sales of main
meals offered through the NSLP in schools where school nutrition action groups were
formed, trained, and utilized. Furthermore, there was a decrease in NSLP participation
and an increase in competitive food sales in schools where no school action groups
existed.

Dwyer, Garceau, Hoelscher, Smith, Nicklas, Lytle, and Clesi (2001) conducted a
study to determine the viability of using a food checklist to help adolescents choose foods
that were lower in calories, fat, and sodium. Dwyer and colleagues developed a 24-hour
food checklist that was administered to 71 students in the eighth grade. Regression
analysis was used to evaluate the data. Results indicted that that after learning basic
nutritional information, the students were able to develop their own basic checklist of
foods that were considered healthy and unhealthy based upon the caloric value, fat grams,
and sodium in the foods. When in the school cafeteria, students used the checklist to keep
track of the foods that they were choosing and eating. Upon review of their checklists,
students identified their unhealthy behaviors and were able to correct their choices to
reflect their knowledge of healthy eating. At baseline, 44 percent (n=71) of the subjects
chose at least one food from the high school cafeteria that was identified as “unhealthy.”
By the end of the study, only 32 percent of students (n=71) were choosing an unhealthy
option.

Point-of-selection nutrition information is another method of challenging the
decision-making of adolescents in the high school cafeteria, although results have been
mixed (Thorndike, Sonnenberg, Riis, Barraclough, & Levy, 2012). Elbel, Gyamfi, and
Kersh (2011) conducted a natural experiment to assess whether a two-phase labeling and
choice architecture intervention would increase sales of healthy food and beverages in a
cafeteria. The researchers compared relative changes in three-month sales from baseline to phase one and from phase one to phase two. Results indicated there was no significant difference in the calories purchased before and after point-of-selection labeling. Although 57 percent of students involved in the natural experiment reported that they noticed the presence of the calorie labels when they were introduced, only 9 percent reported that they considered the information when making food choices.

Chu, Frongillo, Jones, and Kaye (2009) examined changes in meal selection in a cafeteria setting when nutrition labels were provided at the point-of-selection. These authors used a quasi-experimental, single-group, interrupted time-series design to examine daily sales before, during, and after the provision of the point-of-sale nutrition labels. Results indicated the average calorie content of food choices purchased by adolescents dropped significantly, from an average of 839 calories per meal to an average of 667 calories per meal when nutrition labels were made available at the point-of-purchase (slope=-0.766; P=.007). The authors noted that high calorie foods were gradually purchased at a higher rate once the nutrition information was removed.

The most effective labeling initiative in the high school cafeteria related to adolescent food choice appears to be a stoplight-like system (Snelling, Korba, & Burkey, 2007; Snelling & Kennard, 2009). In using this type of labeling, foods that are considered to be nutritious and low calorie are labeled “green.” Students are encouraged to eat these foods, which tend to be rich in vitamins and minerals, high in fiber, and low in fat, at every meal. “Green” foods include whole grains, fruits, and vegetables. “Yellow” foods are moderate in calories and include mostly meats, some grains, and some dairy products. Students should eat “yellow” foods in moderation because over consumption may lead to
excess caloric intake. “Red” foods are high calorie and have minimal nutrient value. Examples would be fried foods, high fat foods, and foods such as candy, soda, and pastries (Snelling & Kennard 2009).

Snelling, Korba, and Burkey (2007) sought to determine the type of foods being offered during lunch in the cafeteria in three public high schools in one county. They labeled the foods based on nutrient density using a stoplight approach that was very similar to that used in the Snelling and Kennard (2009) study. Results indicated that students would typically purchase foods in proportion to what was available in the cafeteria. For example, green and yellow foods made up 77 percent of all foods offered, and students purchased these offerings in 73 percent of their overall purchases. The authors concluded that offering more green foods will result in the purchase of more green, or nutritious foods, and less purchases of red foods, or minimally nutritious foods.

Snelling and Kennard (2009) used a stoplight labeling system to examine the effects of nutrient standards as part of a wellness policy that was implemented in three public high schools in a single county. Results indicated that “red” foods made up 83 percent of purchases prior to the implementation of the intervention; after the new labeling system was implemented, “red” food purchases declined to 47 percent of all purchases.

Thorndike, Sonnenberg, Riis, Barraclough, and Levy (2012) called their stoplight labeling system a “labeling and choice architecture intervention.” The study’s structure was similar to most traditional stoplight labeling systems. However, in this particular study, phase one began the color-coding system and in phase two, more “green” foods were added and their visibility was improved. In the beginning of the experiment, 42.2
percent of sales were “green” and 24.9 percent were “red.” Sales of “red” items decreased in both phases, and “green” items increased in phase one. The largest changes occurred among beverages. “Red” beverages decreased 16.5 percent during phase one and further decreased 11.4 percent in phase two. “Green” beverages increased 9.6 percent in phase one and further increased 4 percent in phase two (P<.001).

Summary

There is no doubt that adolescent obesity rates continue to rise in the United States. With the number of hours that students of this age group spend in a school environment, it is crucial that cafeteria offerings encourage teens to make healthy choices. The National School Lunch Program’s initiative to provide students with healthy meals is effective only when students choose these meals. Unfortunately, more students are choosing competitive food offerings in the cafeteria, which are mostly foods that are high calorie and offer little nutritional value.

Because adolescents’ choices are influenced by many factors including health status, age, family and friends, culture and tradition, gender, cost, taste, nutritional knowledge, previous experience, and peer pressure, schools and cafeterias must experiment with many different labeling systems in order to reach students and help them make healthy choices. Previously used food labeling systems include nutrition labels, checklists, point-of-purchase information, and a stoplight-like initiative. Of these systems, the stoplight method tends to produce the most positive results because it is a clear structure that adolescents readily understand.
The current approach of offering NSLP lunches and competitive foods in high school cafeterias, while expecting adolescents to make their own choices that will best meet their individual needs, is failing. Teens are not equipped with the skills to deduce nutrition facts, when they are made available. More effective means of reaching adolescents with nutrition information is needed. It is important that when systems are put in place, they are simple and relate easily to what students in their teen years know about dietary information. If initiatives are confusing or require effort from students, they will be unsuccessful. Instead, students will revert to choosing foods that they know are tasty, which tend to be unhealthy and minimally nutritious.
CHAPTER THREE

METHODOLOGY

The purpose of this quantitative study was to determine if the implementation of a symbol-based nutrition labeling system was associated with an increase in the number of healthy foods purchased by students aged 18 years or older in a high school cafeteria in central Indiana. This chapter describes the methods used to conduct the study.

Institutional Review Board

The Institutional Review Board at Ball State University determined the procedures proposed for this study were appropriate for exemption under the federal regulations on February 14, 2013 (Appendix A-1). The researcher conducting this analysis completed the Collaborative Institutional Training Initiative training (Appendix A-2).

Subjects

Subjects for this study were volunteers from a population of approximately 732 students who attended a central Indiana high school, who ate lunch in the school cafeteria, and who were at least 18 years old. Volunteers were recruited via the school’s
televised school announcements (E-2), the school’s email database (E-1), and
announcements made in classrooms (E-2).

**Instruments**

To conduct this study, all foods and drinks offered in the cafeteria, both packaged
and unpackaged, were coded using one of the following three sets of star symbols: one-
star (★), two-star (★★), or three-star (★★★). Foods and drinks labeled as “★★★”
(i.e., three star food items) were foods that had 120 calories or less, 30% or less of
calories from fat, and less than or equal to 140 mg of sodium per serving (United States
Food and Drug and Drug Administration, 2011). For a food to be labeled★★★, it had to
meet two of these three criteria. Students are encouraged to eat these foods, which tend to
be rich in vitamins and minerals, high in fiber, and low in fat, at every meal. These foods
include whole grains, fruits, vegetables, skim milk, and water.

Foods and drinks labeled as “★★” (i.e., two star food items) were food items that
contained 121 to 300 calories, 31% to 40% of calories from fat, and 141 to 200 mg of
sodium, per serving. All foods labeled as ★★ had to meet two of these three criteria.
These foods include mostly meats, some grains, and some dairy products, including 2
percent milk. Students should eat these foods in moderation because over consumption
may lead to excess caloric intake.

Foods and drinks labeled as “★” (i.e., one star food items) were foods that
contained 301 or more calories, 41% or more of calories from fat, and 201 mg or more of
sodium, per serving. If a food did not meet the listed criteria to be labeled as ★★★ or
★★★, it was labeled as ★. These foods tend to have minimal nutrient value and should be
eaten in moderation. Examples of one-star foods include fried foods and foods such as candy, soda, and pastries.

Packaged food and drink were labeled with a sticker placed directly on each item that represented its nutrition value via the appropriate symbol. Foods and drinks sold unpackaged, including foods on the buffet line and foods served as part of the National School Lunch Program, were labeled by placing the appropriate sticker on a picture of the item being served. Pictures were located directly on the glass that is placed in front of the food.

Table 1 includes a list of foods served during the baseline period and the implementation period, along with the corresponding nutrition information and number of stars assigned.

A simple form with columns for gender, “★★★” food choices, “★★” food choices, and “★” food choices was used to record data from the baseline period and after the implementation period (Appendix B). The instrument collected both students’ food choices and gender.
Table 1. List of One-Star, Two-Star, and Three-Star Foods and the Total Calories, Percent of Calories from Fat, and Milligrams of Sodium per Serving.

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Calories</th>
<th>% Calories Fat</th>
<th>Sodium, mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>★★★ Foods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>95.0</td>
<td>0.0%</td>
<td>2.0</td>
</tr>
<tr>
<td>Apple Mandarin Salad</td>
<td>75.0</td>
<td>34.8%</td>
<td>111.8</td>
</tr>
<tr>
<td>Banana</td>
<td>105.0</td>
<td>2.9%</td>
<td>1.0</td>
</tr>
<tr>
<td>Canned Pears</td>
<td>81.6</td>
<td>1.1%</td>
<td>6.5</td>
</tr>
<tr>
<td>Crudite Cup Fresh Vegetables</td>
<td>20.7</td>
<td>4.3%</td>
<td>42.9</td>
</tr>
<tr>
<td>Dasani Water/Vitamin Water Zero</td>
<td>0.0</td>
<td>0.0%</td>
<td>0.0</td>
</tr>
<tr>
<td>Lowfat Strawberry Milk</td>
<td>160.0</td>
<td>14.4%</td>
<td>120.0</td>
</tr>
<tr>
<td>Lowfat Milk</td>
<td>100.0</td>
<td>22%</td>
<td>120.0</td>
</tr>
<tr>
<td>Powerade Zero (grape)</td>
<td>0.0</td>
<td>0.0%</td>
<td>150.0</td>
</tr>
<tr>
<td>Roasted Butternut Squash</td>
<td>116.1</td>
<td>34.9%</td>
<td>7.2</td>
</tr>
<tr>
<td>Seasoned Corn</td>
<td>86.0</td>
<td>28.3%</td>
<td>0.8</td>
</tr>
<tr>
<td>Side Salad</td>
<td>14.6</td>
<td>12.3%</td>
<td>5.1</td>
</tr>
<tr>
<td>★★ Foods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot and Spicy Chex Mix</td>
<td>130.0</td>
<td>27.7%</td>
<td>420.0</td>
</tr>
<tr>
<td>Lowfat Chocolate Milk</td>
<td>170.0</td>
<td>13.2%</td>
<td>240.0</td>
</tr>
<tr>
<td>Pulled Pork Sandwich</td>
<td>258.4</td>
<td>24.7%</td>
<td>362.2</td>
</tr>
<tr>
<td>★ Foods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antipasto Salad</td>
<td>409.9</td>
<td>27.2%</td>
<td>691.0</td>
</tr>
<tr>
<td>Breaded Chicken Wrap</td>
<td>436.8</td>
<td>48.2%</td>
<td>967.3</td>
</tr>
<tr>
<td>Cheese Pizza</td>
<td>338.8</td>
<td>39.3%</td>
<td>720.6</td>
</tr>
<tr>
<td>Chicken Bruschetta Flatbread</td>
<td>340.2</td>
<td>37.3%</td>
<td>440.9</td>
</tr>
<tr>
<td>Coleslaw</td>
<td>46.9</td>
<td>59.5%</td>
<td>282.2</td>
</tr>
<tr>
<td>Philly Cheese Steak Pizza</td>
<td>353.8</td>
<td>37.9%</td>
<td>707.8</td>
</tr>
<tr>
<td>Spicy Chicken Sandwich</td>
<td>369.2</td>
<td>31.4%</td>
<td>663.9</td>
</tr>
<tr>
<td>Three Cheese Sandwich Wrap</td>
<td>395.4</td>
<td>46.9%</td>
<td>903.4</td>
</tr>
<tr>
<td>Yogurt Parfait</td>
<td>446.2</td>
<td>11.9%</td>
<td>288.0</td>
</tr>
</tbody>
</table>
Letters of Permission and Information

Permission to conduct this study were obtained from the high school principal (Appendix C-1) and the school corporation’s food service director (Appendix C-2). Participants also signed a consent form (Appendix C-3).

Methods

This pre-/post experiment was conducted over a five-week period, due to the five-week cycle of the school cafeteria’s menu. After consent was obtained, the researcher took digital photographs of each participating student in order to match each subject’s pre-item food selections with their post-item food selections, and also to identify gender. Each student was assigned a code number (e.g., pre1, pre2, pre3) for data collection purposes based on the "order" in which they purchased their food; no other identifying information was included. Students’ baseline data was tallied on one sheet, while their implementation data was recorded on a second sheet. The number of ★, ★★, and ★★★ foods were counted and tallied on each student’s corresponding line of the recording instrument.

In weeks three and four, posters (Appendix D) that explained the labeling methods were placed in the cafeteria. A poster identical to one located in the cafeteria, was sent via the school’s email database to all students who were participating in the study.

During the follow up period (fifth week of the study), the researcher once again took a digital photograph of each student, followed by a digital picture of his or her food purchases. The digital picture of the student was used to identify and record the subject’s
gender and to match the student’s pre-data to his/her post-data. The post-data was collected on the same day in the cycle menu as the pre-data collection day to ensure there was no variation of foods that could have influenced the results.

Finally, individual students’ pre-data and post-data was compared, along with the total number of items purchased in weeks one (baseline) and five (treatment) to determine if the labels impacted the type and number of foods purchased by the students, both overall and by gender.

**Data Entry and Analysis**

Data was entered into a spreadsheet by label (★ ★ ★, ★ ★, ★) category. Data was analyzed using Microsoft Excel for Mac, 2008, version 12.3.5 and SPSS v.19. Descriptive statistics and frequency counts were run on all variables. Frequency counts (number and percent) were used to determine the overall prevalence of specific occurrences of each symbol choice amongst both baseline and implementation periods, both overall and by gender. The paired t-test was used to compare baseline and implementation periods. Statistical significance was set at p ≤ 0.05.

**Summary**

Baseline food purchasing data was collected from 20 students aged 18 years and older. All food items were coded as ★, ★★, or ★★★, based on the foods nutritional content. Posters describing the star coding system were hung throughout the school and in the cafeteria during weeks three and four. Five weeks later (due to a 5-week cycle menu), food purchasing data was collected once again to see if the intervention impacted the type of foods purchased in the cafeteria.
CHAPTER 4

RESULTS

The purpose of this quantitative study was to determine if the implementation of a symbol-based nutrition labeling system was associated with an increase in the number of healthy foods purchased by students aged 18 years or older in a high school cafeteria in central Indiana. This chapter describes the results obtained in the study.

Subjects

Twenty students participated in the baseline research. Of these students, nine were female and eleven were male. Thirteen of the twenty students who participated in the baseline research also participated in the implementation portion of the experiment (65% return rate). Of these 13, four (44% return rate) were female and nine (82% return rate) were male.

Research Hypothesis $H_1$

The first research hypothesis proposed that students would choose a statistically significant higher number of healthy foods after the implementation of a symbol-based labeling system than they did prior to the implementation of a food labeling initiative.
At baseline, the students consumed, on average, 1.54 ± 0.78 one-star foods (least nutritious). After the two week poster-intervention, the students consumed, on average, 1.31 ± 0.48 one-star foods (least nutritious). Although the mean number of one-star foods decreased, on average, by 0.23 servings per person, a paired t-test indicated the results were not statistically different (t=1.00, df=12, p=0.337) (Table 2).

Similarly, at baseline, the students consumed, on average, 0.62 ± 0.65 two-star foods. After the two week poster-intervention, the students consumed, on average, 0.54 ± 0.52 two-star foods. Similarly, while the number of two star foods decreased slightly after the intervention (mean difference -0.08 servings), a paired t-test indicated the results were not statistically different (t=0.32, df=12, p=0.753) (Table 2).

Lastly, at baseline, the students consumed, on average, 1.00 ± 0.71 three-star foods (most nutritious). After the two week poster-intervention, the students consumed, on average, 1.31 ± 0.63 three-star foods. Although the results indicated that the mean number of three-star foods increased by 0.31 servings per person, a paired t-test indicated the results were not significantly different (t=1.18, df=12, p=0.165) (Table 2). As a result, the first directional hypothesis is not supported in this study. It should be noted, however, that the mean number of three-star foods increased (0.31 servings) by the same magnitude as the decrease in the number of one and two-star foods combined (0.08+0.23 = 0.31 servings). This indicates that, despite the lack of statistical significance due to the small sample size, the students did appear to be substituting healthier foods for less healthy options after the intervention.
Table 2. Impact of a Nutrition Education Intervention on the Number of One, Two, and Three Star Foods Purchased in a High School Cafeteria (n=13).

<table>
<thead>
<tr>
<th>Food Type</th>
<th>N pairs</th>
<th>Baseline Assessment</th>
<th>Post Assessment</th>
<th>Mean Difference</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Star</td>
<td>13</td>
<td>1.00 ± 0.71</td>
<td>1.31 ± 0.63</td>
<td>0.31</td>
<td>1.18</td>
<td>12</td>
<td>0.165</td>
</tr>
<tr>
<td>Two Star</td>
<td>13</td>
<td>0.62 ± 0.65</td>
<td>0.54 ± 0.52</td>
<td>-0.08</td>
<td>0.32</td>
<td>12</td>
<td>0.753</td>
</tr>
<tr>
<td>One Star</td>
<td>13</td>
<td>1.54 ± 0.78</td>
<td>1.31 ± 0.48</td>
<td>-0.23</td>
<td>1.00</td>
<td>12</td>
<td>0.337</td>
</tr>
</tbody>
</table>

Research Hypothesis H2

The second research hypothesis proposed that there would be a difference in the number of healthier foods chosen after the symbol-based labeling intervention, with females more likely than males to choose more three-star foods.

When the total number of one-, two-, and three-star foods purchased prior to the intervention were added together and compared by gender, results of the independent samples test indicated that the males (n=11) purchased 3.45 ± 1.03 items while the females (n=9) purchased an average of 2.56 ± 0.53 items (t=2.358, df=18, p=0.03).

When analyzed by food type, ANOVA indicated the males (n=11) ate significantly more one-star foods (1.73 ± 0.65) than the females (n=9) at baseline (1.11 ± 0.60) (F=4.78, df=18,1, p=0.042) (Table 2). Although males consistently purchased more total food items, no difference was detected by gender in the number of two (F=0.66, df=1,18, p=0.800) or three star (F=0.37, df=1,18, p=0.550) foods consumed prior to the intervention (Table 3).
Table 3. Number of One, Two, and Three-Star Foods Consumed by Gender before the Intervention.

<table>
<thead>
<tr>
<th>Food Type</th>
<th>Males (n=11)</th>
<th>Females (n=9)</th>
<th>F</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Assessment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three Star</td>
<td>1.11 ± 0.83</td>
<td>0.89 ± 0.60</td>
<td>0.371</td>
<td>1.18</td>
<td>0.550</td>
</tr>
<tr>
<td>Two Star</td>
<td>0.64 ± 0.67</td>
<td>0.56 ± 0.73</td>
<td>0.066</td>
<td></td>
<td>0.800</td>
</tr>
<tr>
<td>One Star</td>
<td>1.73 ± 0.65</td>
<td>1.11 ± 0.60</td>
<td>4.784</td>
<td></td>
<td><strong>0.042</strong></td>
</tr>
</tbody>
</table>

When the total number of one-, two-, and three-star foods purchased after the intervention were summed and compared by gender, the independent samples test indicated no difference by gender. Males (n=9) purchased an average of 3.22 ± 0.44 items while the females (n=4) purchased an average of 3.00 ± 1.15 items (t=0.520, df=11, p=0.613). When analyzed by food type, ANOVA indicated no difference by gender in the number of one-star (F=0.920, df=1,11, p=0.358), two-star (F=0.029, df=1,11, p=0.867) or three-star (F=1.425, df=1,11, p=0.258) food items purchased (Table 4).

Table 4. Number of One, Two, and Three-Star Foods Consumed by Gender after the Intervention.

<table>
<thead>
<tr>
<th>Food Type</th>
<th>Males (n=9)</th>
<th>Females (n=4)</th>
<th>F</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-Assessment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three Star</td>
<td>1.44 ± 0.53</td>
<td>1.00 ± 0.82</td>
<td>1.425</td>
<td>1.11</td>
<td>0.258</td>
</tr>
<tr>
<td>Two Star</td>
<td>0.56 ± 0.53</td>
<td>0.50 ± 0.58</td>
<td>0.029</td>
<td></td>
<td>0.867</td>
</tr>
<tr>
<td>One Star</td>
<td>1.22 ± 0.44</td>
<td>1.50 ± 0.58</td>
<td>0.920</td>
<td></td>
<td>0.358</td>
</tr>
</tbody>
</table>
When only paired pre- and post-assessment data were analyzed (Table 5), results indicated there was a significant reduction in the number of one-star (less nutritious) foods purchased by the males after the intervention (1.78 ± 0.67 vs. 1.22 ± 0.44; t=2.291, df=8, p=0.05). Although the females purchased a higher mean number of three-star foods after the intervention (0.75 ± 0.50 vs. 1.00 ± 0.82), the results of the paired t-test indicated the results were not significantly different (t=0.52, df=3, p=0.64). As a consequence, the second directional research hypothesis is not supported by the results of this study.

Table 5. Number of One, Two, and Three-Star Foods Consumed by Gender Prior to and After a Nutrition Education Intervention.

<table>
<thead>
<tr>
<th>Food Type</th>
<th>N</th>
<th>Pre-Assessment</th>
<th>Post-Assessment</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three Star</td>
<td>9</td>
<td>1.11 ± 0.78</td>
<td>1.44 ± 0.53</td>
<td>1.41</td>
<td>8</td>
<td>0.20</td>
</tr>
<tr>
<td>Two Star</td>
<td>9</td>
<td>0.56 ± 0.53</td>
<td>0.56 ± 0.53</td>
<td>0.00</td>
<td>8</td>
<td>1.00</td>
</tr>
<tr>
<td>One Star</td>
<td>9</td>
<td>1.78 ± 0.67</td>
<td>1.22 ± 0.44</td>
<td>2.29</td>
<td>8</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three Star</td>
<td>4</td>
<td>0.75 ± 0.50</td>
<td>1.00 ± 0.82</td>
<td>0.52</td>
<td>3</td>
<td>0.64</td>
</tr>
<tr>
<td>Two Star</td>
<td>4</td>
<td>0.75 ± 0.96</td>
<td>0.50 ± 0.58</td>
<td>1.00</td>
<td>3</td>
<td>0.39</td>
</tr>
<tr>
<td>One Star</td>
<td>4</td>
<td>1.00 ± 0.82</td>
<td>1.50 ± 0.58</td>
<td>1.73</td>
<td>3</td>
<td>0.18</td>
</tr>
</tbody>
</table>
Summary

Results of this pilot study do not support the research hypotheses that provided the framework for this study. The small sample size and concomitant reduced power most likely contributed significantly to these results.
CHAPTER 5

DISCUSSION

The purpose of this quantitative study was to determine if the implementation of a symbol-based nutrition labeling system was associated with an increase in the number of healthy foods purchased by students aged 18 years or older in a high school cafeteria in central Indiana. This chapter discusses the results obtained in this study in context with the literature.

Research Hypothesis H₁

The first research hypothesis proposed that students would choose a statistically significant higher number of healthy foods after the implementation of a symbol-based labeling system than they did prior to the implementation of a food labeling initiative. The results obtained from the 13 individuals who completed both the pre-assessment and the post-assessment indicated no difference in the number of one-, two- or three-star foods purchased after implementation of the nutrition intervention. Thus, the directional hypothesis must be refuted and the null hypothesis must be accepted for research question one.
Research Hypothesis H₂

The second research hypothesis proposed that there would be a difference in the number of healthier foods chosen after the symbol-based labeling intervention, with females more likely than males to choose more three-star foods. The results obtained from the 13 individuals who completed both the pre-assessment and the post-assessment indicated no difference by gender in the number of one-, two- or three-star foods purchased after implementation of the nutrition intervention. Thus, the second directional hypothesis must be refuted and the null hypothesis must be accepted for research question two.

Interpretation

The null findings of this research study have several potential implications and explanations. As indicated by the number of stars assigned to the involved foods in this experiment, many of the foods labeled as “★” contained more than 300 calories, more than twenty-percent of calories from fat, and more than 250 milligrams of sodium. This information correlates with the USDA’s (USDA, 2010b) information concerning teenage obesity and lack of adequate vitamins and minerals in the diet. The fact that student’s continued to choose high calorie and high fat foods, even after they had relevant information, is reason for concern.

High school is a crucial time for the development of food choices. As Fleischhacker’s (2007) research indicates, 17% of students cease participation in the National School Lunch Program between middle school and high school. With only 64% of eligible students participating in the NSLP, students gradually begin gravitating away
from NSLP foods and instead make their own choices, which as this experiment indicates, are foods that are often high calorie and high sodium. Campbell (2009) suggests that some of these choices may be related to health status, age, family, friends, culture, tradition, gender, cost, taste, past nutritional knowledge, and previous experience. Salazar (2007) proposes that peers are the dominant guiding factor in food choices.

Regardless of the reasons behind the food and beverage choices of high school students, schools should continue to investigate ways to improve and advocate healthy selections. The Healthy, Hunger-Free Kids Act could be one piece of legislation that will eventually aid schools in offering competitive foods that are also nutritious (Food Research and Action Center, 2010). While this act will not be the solution to the adolescent obesity problem, it could serve as a win-win for students and schools. Students can eat foods that are both more nutritious than current competitive food offerings, but also still enjoyable, while schools can continue to benefit from the revenue of competitive food offerings.

Perhaps the most intriguing result of this research experiment was that males ate fewer one-star foods after the implementation. Gender and food selection seems to differ in different research experiments. While this experiment found no statistically significant difference in the selection of healthier foods by females, when compared to males, Pirouznia (2001) found that high school females did have a higher nutrition knowledge score than males, and therefore selected healthier foods. Shannon and colleagues found similar results in their 2002 survey, when they found that females who were concerned about their weight and health appeared to have more interest in making healthier food choices. Although this research experiment doesn’t necessarily argue the results of these
past studies, the results of this research experiment encourage more research directed
towards males and food selection.

Even though no statistically significant evidence was found during this research study, the results do support past research that indicates that stop-light labeling systems may be one of the most effective food labeling systems in school settings (Snelling, Korba, & Burkey, 2007, Snelling, & Kennard, 2009). It is possible that some students confused the meaning of the number of stars in the labeling system used in this experiment. Although the students noticed and verbally questioned the use of the stars during the implementation phase, they may have misunderstood the meaning. Because high school students are exposed to traffic lights each day, they tend to associate the colors “green,” “yellow,” and “red” with conclusive, or almost automatic, meanings, whereas they may have to stop and more carefully consider “★★★,” “★☆,” and “★” symbols.

Finally, past research suggests that if healthier options were offered in the cafeteria, students would purchase healthier options. Elbel, Gyamfi, and Kersh (2011) found that students purchased foods in proportion to what was available in the cafeteria. Although Elbel, Gyamfi, and Kersh (2011) based their study on a stoplight system, the same results may be possible with a symbol-based system. For example, if more “★★★,” foods were proportionally offered, more “★★★,” foods may be purchased.

Although the null hypothesis was supported for both research questions in this study, it is possible that this study may support past research studies, as well as suggest topics for future research. Unfortunately, the low statistical power that resulted from the small sample size did not allow this research study to provide the needed support.
CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

With teenage obesity continuing to rise, the purpose of this quantitative research study was to determine whether a simple, easy-to-use nutrition labeling system in school cafeterias will help students compare food items and make healthier choices. The results of this study were not able to support the two research hypotheses that formed the framework for this study. This means that there was no difference in the number or percent of students who chose healthy foods after the implementation of the symbol-based labeling system than prior to the implementation of a food labeling initiative. Additionally, there was no difference by gender in the number or percent of students who chose healthy foods after the implementation of a symbol-based labeling system.

Limitations of this study include a small sample size and only the use of participants who were at least eighteen years of age or older. Recommendations for future research include the use of a larger sample size, use of participants of all ages of high school students, and use of a wider variety of demographics, including race and nationality. Different results may also be obtained if a similar experiment were tried with middle school students. Finally, the use of a longer teaching phase, including information being reinforced in classroom settings may produce helpful results.
REFERENCES


APPENDIX A

INSTITUTIONAL REVIEW BOARD MATERIALS

A-1 IRB Letter of Approval

A-2 CITI Certificate of Completion
A-1 IRB Letter of Approval

Institutional Review Board

DATE: February 14, 2013

TO: Alicia Criswell

FROM: Ball State University IRB

RE: IRB protocol # 404661-1

TITLE: Impact of a Labeling Initiative on the Food Choices of High School Students

SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS

DECISION DATE: February 14, 2013

The Institutional Review Board reviewed your protocol on February 14, 2013 and has determined the procedures you have proposed are appropriate for exemption under the federal regulations. As such, there will be no further review of your protocol, and you are cleared to proceed with the procedures outlined in your protocol. As an exempt study, there is no requirement for continuing review. Your protocol will remain on file with the IRB as a matter of record.

Editorial notes:

1. Approved- Exempt
2. Informed Consent Required

While your project does not require continuing review, it is the responsibility of the P.I. (and, if applicable, faculty supervisor) to inform the IRB if the procedures presented in this protocol are to be modified or if problems related to human research participants arise in connection with this project. Any procedural modifications must be evaluated by the IRB before being implemented, as some modifications may change the review status of this project. Please contact please contact John Mulcahy at (765) 285-5106 or jmulcahy@bsu.edu if you are unsure whether your proposed modification requires review or have any questions. Proposed modifications should be addressed in writing and submitted electronically to the IRB (http://www.bsu.edu/irb/) for review. Please reference the above IRB protocol number in any communication to the IRB regarding this project.

Reminder: Even though your study is exempt from the relevant federal regulations of the Common Rule (45 CFR 46, subpart A), you and your research team are not exempt from ethical research practices and should therefore employ all protections for your participants and their data which are appropriate to your project.
Appendix A-2 CITI Certificate of Completion

<table>
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<th>Ref #</th>
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<th>Required Modules</th>
<th>Elective Modules</th>
<th>Score</th>
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**RCR FOR SOCIAL, BEHAVIORAL & EDUCATIONAL RESEARCHERS Curriculum**

**RCR FOR SOCIAL, BEHAVIORAL & EDUCATIONAL RESEARCHERS**

- This course is for investigators, staff and students with an interest or focus in Social and Behavioral research. This course contains text, embedded case studies AND quizzes.

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<th>Stage</th>
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<th>Required Modules</th>
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See archived completion reports you earned when affiliated with Ball State University (covers May 2004 through December 2006)
APPENDIX B

RECORDING INSTRUMENTS

B-1 Baseline Data Recording Instrument

B-2 Implementation Data Recording Instrument
Appendix B-1 Baseline Data Recording Instrument

**RECORDING INSTRUMENT**

IMPACT OF A LABELING INITIATIVE ON THE FOOD CHOICES OF HIGH SCHOOL STUDENTS 18 YEARS OF AGE AND OLDER

**Baseline Data Collection Sheet**

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APPENDIX C

LETTERS OF PERMISSION AND INFORMATION

C-1  Letter of Permission from Principal

C-2  Letter of Permission from Food Service Director

C-3  Consent Form
Appendix C-1, Letter of Permission from Principal

December 4, 2012

To Whom It May Concern,

I, Mr. Steve Cox, principal at Beech Grove High School, grant permission for Alicia Criswell to conduct a research study in which she will be labeling cafeteria food items and assessing the purchasing patterns among high school students. The study will involve all high school students at Beech Grove High School who purchase items in the school cafeteria.

If you were to have any questions or concerns, please contact me at (317) 786-1447 or at Beech Grove High School, 5330 Hornet Avenue, Beech Grove, Indiana 46107.

Sincerely,

Steve Cox
Beech Grove High School Principal
Appendix C-2, Letter of Permission from Food Service Director

December 4, 2012

To Whom It May Concern,

I, Ms. Kelley Deahl, food service director of Beech Grove City Schools, grant permission for Alicia Criswell to conduct a research study in which she will be labeling cafeteria food items and assessing the purchasing patterns among high school students. The study will involve all high school students at Beech Grove High School who purchase items in the school cafeteria.

If you were to have any questions or concerns, please contact me at kdeahl@bgcs.k12.in.us.

Sincerely,

Kelley Deahl
Food Service Director, Beech Grove City Schools
Appendix C-3, Consent Form

CONSENT FORM

Study Title: Impact of a Labeling Initiative on the Food Choices of High School Students Aged 18 Years and Older

Study Purpose and Rationale
- The purpose of this study is to determine if a symbol-based nutrition labeling system will increase the number of healthy foods purchased by students in a high school cafeteria in central Indiana.
- Many different food-labeling initiatives have been attempted in high school cafeterias. Some of these methods have been shown to be successful, but others are too complicated for adolescents to understand and quickly process while in the cafeteria lunch line. If teens don’t understand nutrition information quickly and easily, then they will likely disregard it and make food choices based on other factors such as taste, appearance, preference, or peer influence. Limited information is available on the use of familiar and easy-to-use symbols to label foods as “healthy,” “acceptable,” or “unhealthy.” Although high school students are often viewed as “young adults,” many do not have the nutritional knowledge to quickly make healthful decisions between given items. What may be a clear choice to a knowledgeable adult may not be so obvious to a teen. As a result, nutrition labeling initiatives must be fool proof when identifying foods that adolescents should choose as part of an overall healthy diet.

Inclusion/Exclusion Criteria
- Participants must be at least 18 years old and purchase at least one lunch item daily in the school cafeteria.

Participation Procedures and Duration
- The study will last approximately five weeks; data will be collected twice.
- During the first week of the study, the researcher will take a digital picture of you and the tray of food you selected in the cafeteria for lunch; five weeks later, when the same menu that was offered when the first picture of you and your food was taken, the researcher will once again take a digital picture of you and of the tray of food you purchase.

Audio or Video Tapes (if applicable)
- For the purpose of accuracy, a picture of you and the food you choose will be photographed so the researcher can easily obtain a record of you and the food you selected for lunch without interfering with the flow of the food line.

Confidential Data
- All data collected will be confidential. Your name will not be recorded. The data collected during the first data collection period will be coded based on the order in which you purchase your food (e.g., 1st, 2nd, 3rd). During the post-assessment, the researcher will use your picture to identify the code you were assigned during the first data collection period so the data from the second time period can be matched to the first time period.
- Only the researcher and Dr. Carol Freisen (Ball State University) will have access to your picture and the picture of the food you selected. Once your first and second data collection pictures are matched, the two pictures of you will be deleted electronically. The raw data will be stored in coded form only (e.g., 1st, 2nd, 3rd and post1, post2, post3). Your raw data will not be shared with anyone else.

Storage of Data
- Data will be recorded confidentially: your gender—but not your name—will be recorded.
- The data will be stored in on a flash drive in a locked office at Beech Grove High School.
- Data will be destroyed as soon as it is analyzed, which will be approximately twelve weeks after the beginning of the study.

Risks or Discomforts
- There are no anticipated risks for participating in this study.

Benefits
- Participants may be better equipped to make healthier food choices when purchasing food items in the cafeteria.

Voluntary Participation
- Your participation in this study is completely voluntary and you are free to withdraw your permission at anytime for any reason without penalty or prejudice from the researcher. Please feel free to ask any questions of the researcher before signing this form and at any time during the study.

IRB Contact Information
- For questions about your rights as a research subject, please contact Director, Office of Research Integrity, Ball State University, Muncie, IN 47306, (765) 265-5270, irb@bsu.edu.

Date Last Updated: 5/26/2013

Page 1 of 2
Impact of a Labeling Initiative on the Food Choices of High School Students 18 Years of Age or Older

Consent

I, ____________________________________________, agree to participate in this research project entitled, “Impact of a Labeling Initiative on the Food Choices of High School Students 18 Years of Age and Older.” I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my consent to participate. I understand that I will receive a copy of this informed consent form to keep for future reference.

To the best of my knowledge, I meet the inclusion/exclusion criteria for participation (described on the previous page) in this study.

______________________________          __________________________
Participant’s Signature                     Date

Researcher Contact Information

Principal Researcher:                      Faculty Supervisor:

Alicia Creswell                         Dr. Carol Friesen
Graduate Student                        Graduate Program Director/Associate Professor
Ball State University                    Ball State University
Muncie, IN 47306                         Muncie, IN 47306
Telephone: (317) 755-1447               Telephone: (755) 285-5925
Email: acreswell@bpcs.k12.in.us          Email: cfriesen@bsu.edu

Date Last Updated: 5/28/2013

Page 2 of 2
Appendix D, Educational Poster

Be a STAR

In the Cafeteria! The more stars it has, the better it is for you...

These are the foods that you should eat the MOST of!
- Whole grains
- Fruits
- Vegetables
- Skim milk
- Water

These are the foods that you should eat in MODERATION!
- Red meats
- Refined (white) grains
- Dairy products that are not non-fat

These are foods that you should eat RARELY or never!
- Fried foods
- Candy
- Soda
- Pastries
APPENDIX E

RECRUITMENT ANNOUNCEMENTS

E-1 Recruitment Flyer

E-2 Recruitment Announcement
Mrs. Criswell Needs YOU!!!

Are you 18 years of age or older?

Do you eat lunch in the cafeteria?

If you answered YES, Mrs. Criswell would like to talk to YOU!

Mrs. Criswell is conducting a study in the cafeteria in which she will be observing the food selections of students 18 years of age or older. During the study, Mrs. Criswell will take a digital picture of the food selections of participating students on two different occasions.

If interested, contact Mrs. Criswell in room 105 or 107 TODAY!
INTERCOM RECRUITMENT ANNOUNCEMENT

"Mrs. Criswell is conducting a study in the cafeteria in which she will be observing the food selections of students 18 years of age or older. During the study, Mrs. Criswell will take a digital picture of the food selections of participating students on two different occasions. All interested BGHS students 18 years of age or older should contact Mrs. Criswell in room 105 or 107 this week where she will answer your questions and provide more details about this her study."