

Nutrition Information in a High School Cafeteria:
The Effect of Point of Purchase Nutrition Information During Lunch in Grades 9-12

By

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ABSTRACT

Providing nutrition information at point of sale at restaurants has gained in popularity in recent years and will soon become a legal requirement. Consumers are using this opportunity to become more informed on the nutritional quality of the foods they consume in an effort to maintain healthfulness. Prior research has confirmed the utility of this information in adult populations. However, research on adolescents in school environments has resulted in mixed findings. This study investigated the effect of exposure to calorie and fat information on student purchases at lunchtime in a high school cafeteria. Additionally, it explored other factors that may contribute to students' food selections during school lunches. The research methods included analysis of changes in cafeteria food sales in one school, surveys, and focus groups. Analysis of cafeteria food sales during lunch did not show any significant change in the average number of calories and fat purchased per student between pre and post intervention. However, information gathered from focus group questioning demonstrated how students used the nutrition information to change their behavior after they have purchased their food.

DEDICATION

This dissertation is dedicated to Dr. Constance Smith, my mentor while I completed my undergraduate and graduate degrees at Northern Arizona University. Dr. Smith, your personal story and passion for education has been a constant inspiration for me as I have continued in my professional and academic careers. Thank you for your guidance and advocacy.

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While attempting to learn Spanish during our program's trip to Costa Rica, the motto they tried to instill in our head was little by little, or poco a poco. In reflecting back on the last three years, I realized this has been how I have tackled the challenges of this program, little by little. Poco a poco, the assignment, presentations, and papers were completed. Little by little, I received help from my DELTA classmates, employer, co-workers, friends, spouse, family, committee, and colleagues. Poco a poco, the contents of this dissertation have come together. I would like to take this opportunity to thank those who have provided me assistance throughout this process.

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Chapter 1: Introduction

Personal Significance

As part of my doctoral program at Arizona State University, I travelled to Spain to learn more about Spanish language, culture, and educational systems and how these differ from those in the United States (U.S.). During my time in Granada I observed how Spanish food culture varied greatly from the U.S. This was not only apparent in the social and structural elements of eating and food choices, but also present within their schools.

The built environment in Granada is such that supermarkets are not giant mega stores, but small by many U.S. standards. Moreover, some Americans may even argue that there is not a great variety of brands or flavors. Bread makers, butchers, and fruit stands are still present in communities. Meals are eaten in a more relaxed environment where businesses close for a couple of hours in the afternoon and employees have the opportunity to go home and eat rather than hurriedly have lunch at their desk. At restaurants you find more entrees created from base product foods rather than foods that were processed, frozen, or packed with preservatives.

One particularly striking difference between Granada and what I have experienced in the United States was how food culture was displayed and modeled in the primary school I visited. At the Granada school, eating was an intentional act where exposure to new foods was encouraged, and meals and snack times were important parts of the day. Rather than serving students canned fruit in syrup or a lunch consisting of breaded chicken nuggets that were previously frozen, students were given fruit in its natural form, which, particularly for small children, require aides to prepare before it could be eaten. School lunches were comprised of fresh food that was prepared on site

by the same people who were responsible for educating the students in the classroom. The educators at this school expressed that it was through observation and exposure that children learn how to prioritize and appreciate food as an integral part of their daily lives, a lesson that will likely carry over and guide their food choices into adulthood.

This experience reminded me of how disappointed I have become with the food culture of our communities and our educational institutions. I have spent the last six years working in a secondary school in the Phoenix metropolitan area, and it seems as if Flaming Hot Cheetos[®] are a staple in a teenage American diet. Walk into any classroom or down any hallway, and you will likely see students with red-stained fingers reaching for their sodas to aid in reducing the hot aftertaste. The frequency and prevalence of junk food consumption may be one of the factors driving the increase in obesity rates among children in recent years.

The Problem

The concern with the high prevalence of junk food consumption I observe in schools is related to the question of whether or not schools have a role in teaching students to be responsible and intentional with their food choices. While students only spend a fraction of their time at school (the secondary school minimum for Arizona is four hours a day), the influence that school has on the student is much greater (Colasanti, 2007). This influence is not strictly academic. Within a school environment, students are learning many other lessons that they will carry with them through adulthood which are not necessarily explicit in the curriculum. Students learn how to interact socially, they are introduced to an academic culture that may be vastly different from the cultures experienced at home, they interact with adults outside of their families who model new

sets of behaviors and values, and they learn how to navigate the educational system. Between school breakfast, lunch, and meals served during after school programs, many students may eat multiple meals at school. Most students in the U.S., 31.6 million every day, will consume at least one meal at school that is part of the National School Lunch Program , and over the course of 12 years of public schooling, for a high school graduate, the influence of that meal and the food culture of the school can be long-lasting (FNS, 2013).

Between 1960 and 1970 the incidence of obesity for adolescents between the ages of 12 to 19 was 4.6%. Since that time obesity rates of adolescents have almost quadrupled to 18.1% between 2007 and 2008 (Ogden & Carroll, 2010a). Between 1999 and 2002 approximately 30% of adolescents aged 12 to 19 were either overweight or at-risk for becoming overweight (Hedley, Ogden, Johnson, Carroll, Curtin, & Flegal, 2004). These numbers are even more severe for members of ethnic minority and low-income communities (Haas, Lee, Kaplan, Sonneborn, Phillips, & Liang, 2003; Shrewsbury and Wardle, 2008). Between 1999 and 2002 the prevalence of being at-risk for overweight and being overweight for non-Hispanic, White adolescents between the ages of 12 and 19 was 27.9%, for non-Hispanic Black adolescents, it was 36.8%, and for Mexican Americans it was 40.7% (Hedley et. al., 2004). In an adult population the percentage is much higher with 68% of all adults falling into either the overweight (BMI between 25 and 30) or obese (BMI > 30) category (Ogden & Carroll, 2010b) and as much as a 12.7% point difference between non-Hispanic White and Mexican American adults.

The overweight and obesity epidemic in the U.S. has driven new health interventions, marketing campaigns, and legislation. In March 2010, the Patient

Protection and Affordable Care Act made it a national requirement for retail establishments that have 20 or more locations doing business under the same name and offering the same menu items to disclose nutritional content on their menu boards. The law requires that calorie information must be “adjacent to the name of the standard menu item, so as to be clearly associated with the standard menu item, on the menu listing the item for sale, the number of calories contained” (p. 124 stat. 573-574). In addition, the suggested daily caloric intake must be posted on the menu board. This menu board is “designed to enable the public to understand, in the context of a total daily diet, the significance of the caloric information that is provided on the menu” (p. 124 stat. 574). However, the law does not require public schools to post nutrition information for a very large population of adolescents consuming food away from home: students in the public school system, which amount to 49.8 million (NCES, 2012). Schools that participate in the National School Lunch Program have to follow dietary guidelines. However, in the past, these guidelines have been very strict for elementary schools, but not rigorously enforced in secondary schools. New lunch regulations are going into effect for the 2012-2013 school year. This will hopefully improve the nutritional intake of school children, but there are still no provisions in the law that require posting nutritional information at point of purchase so that consumers (students) may have the opportunity to make more informed and intentional food consumption choices while at school. Exposure to this type of information may allow children and adolescents to develop more responsible eating practices at an earlier age. Schools also provide a great environment to teach them how to utilize this information at other retail food establishments. This study is guided by two research questions, the first of which includes five sub-questions.

Research Questions

1. Does exposure to calorie and fat information in a high school cafeteria affect adolescents' food purchases?
 - a. What are the changes in sales over two, four, six, and eight weeks of exposure to calorie and fat information?
 - b. What are the changes in sales for all Sardella's Pizza meal offerings between pre and post exposure to calorie and fat information?
 - c. What are the changes in sales for the Super Nacho meal between pre and post exposure to calorie and fat information?
 - d. What are the changes in sales for the Chick Fil-A[®] meal between pre and post exposure to calorie and fat information?
 - e. What are the changes in sales for all of the meal offerings at the Grab N Go (GNG) meal station between pre and post exposure to calorie and fat information?
2. What are the reported changes in behavior between pre and post exposure to calorie and fat information?

Purpose

Researching the effect of point of purchase nutrition on an adult population has gained in popularity over the past few years. This has increased our understanding of the best practices for educating adults about nutrition and about the decisions they make as a result. However, there is still a void in the research when it comes to adolescent populations and how their food choices might be affected when they are presented with nutrition information on a consistent basis. The purpose of this study is to gain a better

understanding of the impact of point of purchase nutrition information on adolescent food selection while at school by making this information available and visible next to each menu item in the school cafeteria. This may provide an opportunity for students to become more intentional in their food choices and provide a retail food environment at school that is consistent with how they might experience this information at other restaurants outside of a school environment.

Definition of Terms

Primary Prevention – Intervention strategies designed to prevent the occurrence of disease by reducing risk factors and promoting health.

Overweight – Maintaining a Body Mass Index between 25 and 29.9 (CDC, 2010).

Obese – Maintaining a Body Mass Index of 30 or higher (CDC, 2010).

Body Mass Index (BMI) – A number calculated from an individual’s height and weight that provides a reliable indicator of body fatness and is used as a tool to screen for weight-related health problems (CDC, 2011b).

Point of Purchase Nutrition Information – Nutrition information, such as calories and fat, posted next to a menu item.

Base Product Foods – Food items that have not been altered from their original form.

Foods of Minimal Nutritional Value – Food items in this category include soda waters, water ices, chewing gum, and certain candies (FNS, 2012).

Competitive Foods – All foods offered for sale at school that are not included in the federal school meal. This includes a la carte foods available in the school cafeteria,

food and beverages from vending machines, school stores, and fund-raisers (Food Research and Action Center, 2010).

À la Carte – Food items sold separately or in addition to what would be considered a reimbursable meal in the National School Lunch Program.

Significance

The statistics for adults and adolescents on the incidence of overweight and obesity are alarming. If we are going to make a dent in reducing the impact that this problem has on current and future generations, changes need to be made and maintained now. While I do not believe that simply making nutrition information available at point of purchase will be enough to make a dramatic impact on the health of our nation, I hope that it could make positive contribution to improving the healthfulness within our communities. This could be one step in the promotion of food responsibility for adolescents where the decisions and habits made now will have a dramatic impact on the rest of their lives. This study assessed the utility of providing this information to an adolescent population and whether or not students will react favorably to the information and if they find it useful and use it as it is intended. Eventually nutrition information will be required to be posted for all locations where food is purchased away from home; some day this will hopefully include all school cafeterias. If this information makes a difference in consumption habits and consumers continue to respond favorably to such information, retail food establishments will be forced to become more competitive in their healthy menu options, allowing people to make more informed consumption decisions.

Chapter 2: Literature Review

Adolescent Health

A person gains excess weight when the amount of energy he/she takes in, through food and drink, exceeds the amount of energy a person expends through maintenance of basic life functions and exercise over a prolonged period of time. Additional contributing factors include an individual's genetic susceptibility to excess weight and the physical environment in which they live (CDC, 2011a). The last half-century has witnessed dramatic changes in the structure of our environment. People lead lifestyles that are more sedentary and food is more convenient and abundant than ever. Advances in food technology have made food bigger, more readily available, easily accessible, and more marketable to both adults and children. Some believe that this rapid change in food culture has contributed greatly to the weight epidemic that has plagued so many of our adults and children. With the number of overweight Americans more than doubling between 1960 and 2008 (Ogden & Carroll, 2010b) and the number of overweight adolescents almost quadrupling during this period (Ogden & Carroll, 2010a), the media, educators, and policymakers have started to pay attention to this epidemic.

It has been estimated that by 2020, 75% of Americans will be overweight (Keller, 2010). The societal implications of having three-fourths of a population more at risk for diseases associated with excess weight are great and still not fully realized. If the United States continues on this trajectory, it is estimated that the life expectancy of today's adolescents will be reduced by two to five years, and there will be a dramatic increase in obesity-induced health conditions that were previously rarely seen in young people (Olshansky et al., 2005). These conditions include hypertension, which is a risk factor for

other diseases related to cardiovascular health, and development of type-two diabetes, and symptoms associated with obstructive sleep apnea (Mallory, Fiser, & Jackson, 1989; Pinhas-Hamiel, Dolan, Daniels, Standiford, Khoury, & Zeitler, 1996; Rhodes et al., 1995; Sorof & Daniels, 2002; Steinberger, Moran, Hong, Jacobs, & Sinaiko, 2001).

In addition, obese adolescents are six times more likely to experience a severely decreased quality of life and likely to miss three more days of school than healthy weight adolescents (Schwimmer, Burwinkle & Varni, 2003). Obese adults are more likely to experience financial ramifications related to their weight condition. When taking into account the overall tangible cost of being obese such as direct medical costs, work absenteeism, short-term disability, etc. Dor, Ferguson, Langwith, and Tan (2010) estimated that on average an obese individual would spend between six and nine times more on medical costs than a healthy weight individual.

Adolescent Food Consumption

It is a common stereotype that adolescents lack the motivation to be conscious of healthful eating behaviors. After all, many of them are plagued by an invincibility fallacy that they will be young and carefree forever. A study by Lewis-Moss, Paschall, Redmond, Green, and Carmack (2008) assessed attitudes from 448 African American adolescents ages 12 to 17 in Wichita, Kansas regarding healthful eating choices, and only 29% of respondents felt it was a good idea to eat a balanced diet every day. Only 13% stated that they were extremely likely to eat a balanced diet within the next week. In another study, an adolescent focus group indicated that they preferred foods that were more appealing in presentation and taste. If given the choice between a high fat, high

sugar option or something more healthful, members of the focus group stated that they would more likely choose the former (Neumark-Sztainer, Story, Perry, & Casey, 1999).

Other studies suggest that adolescents may not be as unaware about food and health. A little more than half of the adolescents in a study by Dennison and Shepherd (1995) saw themselves as someone who was concerned about what they eat and how it affected their health and slightly fewer than half of those surveyed viewed themselves as health-conscious. Those students who described themselves as more health-conscious were more likely to participate in healthful eating behaviors. An adolescent's social network also shaped their food choices. Students whose friends ate more healthfully were more likely to do the same, which is a testament to the influence of not only peer pressure and vicarious learning, but also the importance of increasing exposure to healthful eating practices. O'Dea (2003) conducted focus groups with Australian students in Grades 5 through 11 and found that many of them were able to articulate both positive and negative effects that certain types of food have on the body. These students described healthy food's "refreshing" effect, particularly fruits and vegetables, and described junk foods as "clogging the system" or reported that they had a slowing effect on their mind and body. Participants in this study stated that what they eat had a lot to do with the foods available in their home, school, or friend's houses and they looked to the adults in their lives (parents and teachers) to encourage them to be involved in more healthful behaviors.

Environmental factors play a big role in adoption of healthful behaviors especially by children and adolescents. This is because unlike adults they are less able to change their environments when they are unsupportive. Previous research has showed that there

is a positive relationship between availability of competitive foods and grade level, with students in high school having access to the largest availability (Briefel, Crepinsek, Cabili, Wilson, & Gleason, 2009; Templeton, Marlette, & Panemangalore, 2005). Additionally, as the availability of competitive foods increases, so does the energy consumed by students. Templeton et al. (2005) estimated that when competitive foods are made available, students increase their energy intake by about 20%. This and other studies also documented that students consumed fewer higher-nutrient foods such as solid fruits, 100% fruit juices, and vegetables, and more sugar-sweetened beverages (Templeton et al., 2005; Briefel et al., 2009). Briefel et al. (2009) estimated the increase in excess energy from competitive foods to be around 241 calories a day among high school students, most of which is consumed during lunch time. Over the course of a year, 241 calories can translate to 12 pounds of excess energy a year (3,500 calories equals one pound of excess energy, 180 days minimum in an academic year). The foods available in a school setting shape student behaviors related to healthful eating, which suggests that federal, state, school, and district school food policies have an important role in influencing the development of healthful eating practices.

School Food Culture

Not all schools are created equal when it comes to the availability and accessibility of healthful food items. Additionally, although schools are required to follow federal school lunch guidelines, there is much variability in the quality of lunches across schools. The nutritional environment is especially important for Title 1 schools, which have a higher proportion of students qualifying for free or reduced lunches and where students may not be able to afford alternatives to the meals they are provided.

Students who participate in the school breakfast and lunch programs may be getting as much as two-thirds of their consumed energy from school meals. One study that assessed the dietary intake of a group of minority students in Newark, New Jersey, found that 75% of participants failed to meet the minimum recommended servings for grains, vegetables, dairy, and fruit. It also found that 93% of 9 to 13-year olds in this study did not meet the recommended daily intake for calcium. In addition, between one quarter and one half of students were not meeting the recommended daily intakes for iron and folate (Langevin et al., 2007). Calcium, iron, and folate are all essential to adolescents' growth, development, and sustainability of bones and cells. A deficiency in these nutrients can also lead to increased fatigue, reduced immunity, and poor work performance (Langevin et. al., 2007). In settings where a large portion of students are consuming between one and two-thirds of their daily intake of energy at school, it is important to look at how the school environment may be contributing to nutrient deficiency and increased prevalence of adolescents who are overweight or obese. More importantly, it is essential to investigate how a school environment can have an impact on improving the healthfulness of adolescents and future adults.

When it comes to the process of decision making, there are three factors that stand out for what influences our food choices: availability, accessibility, and priority. There are an abundance of food items low in nutritional value in most secondary schools. In one study of 55 high schools in Minneapolis and St. Paul, Minnesota, 87% of surveyed schools had vending machines, one-third had a school store, and 96% had the option for students to buy items *à la carte* during lunchtime (Story, Hayes, & Kalina, 1996). In another study that surveyed 1,088 high school students in 20 schools also in Minneapolis

and St. Paul, Minnesota, student snack food purchases were positively associated with the number of machines on campus (Neumark-Sztainer, French, Hannan, Story, & Fulkerson, 2005). Kubik, Lytle, Hannan, Perry, and Story (2003) conducted an additional study that assessed the nutritional quality of food items available in vending machines or in school stores and found that 80% of the snacks offered in the vending machines and school stores were from a category labeled “limit,” defined as foods that should be limited in quantity because of their poor nutritional quality. They also found that 84% of beverages from vending machines should be included in this group. Between vending machines, school stores, and á la carte menu items the most popular choices amongst students were cookies, fruit juices or juice drinks, pizza, snack cakes, chips, French fries, malts, nachos, and sandwiches (Story et al., 1996).

There appears to be an inverse relationship between the availability of food items lower in nutritional quality at schools and the consumption of foods higher in nutritional quality by students. Kubik et al. (2003) found that students’ mean percentage of daily calories from fat were positively associated with the availability of á la carte food items. They noted that vending machines, school stores, and á la carte items are “displacing” fruits and vegetables from the diets of students. Moreover, they estimated that for every vending machine present on campus there was an average decline of 11% in fruit consumption by students. From these findings, it is not a surprise that students who attended schools without an á la carte program were more likely to meet or come close to meeting dietary recommendations when compared with students from schools who had the á la carte options (Kubik et al., 2003). In this context, the restriction of vending machine use is another attempt by schools to boost consumption of more healthful foods.

At the school where I work, a school lunch for students who do not qualify for free or reduced lunch costs \$2.40. A more nutritious sandwich at the alternative cafeteria is approximately \$4 depending on the sandwich.



Chicken patty sandwich, pasta, canned peaches, animal cookies, & chocolate milk.

Hamburger, sliced oranges, goldfish crackers, canned baked beans, & chocolate milk.

Tortilla chips, liquid nacho cheese, canned shredded chicken, sliced oranges & chocolate milk.

Figure 1. Photos taken of actual school lunches.

The healthier option for our students costs nearly twice that of the school lunch and does not include any additional items that could supplement daily nutritional recommendations that a student may choose from. A student that adds a drink, side of fruit or vegetables, or a salad to the sandwich would spend between \$4 and \$9 for lunch. Buying lunch daily in the cafeteria costs a student \$12 weekly, but healthier options would cost as much as four times that amount. Students who participate in the Free and Reduced Lunch Program are not likely to be able to purchase healthier options if they find the school sponsored lunch unappealing. What I have observed at my school is consistent with reports in the research literature (Story et al., 1996). Likewise, the fruits or vegetables made available at some schools were bruised and “nasty” looking, and the lines were significantly longer for students to be able to purchase them (Neumark-Sztainer et al.,

1999). I have cringed at the sight of “fresh” carrots served to my students that appear dry or old and a sandwich line that takes three times as long as the line for fried foods. As Neumark-Sztainer et al. (1999) noted, why would a student pay more for a more healthful lunch when fast food or cafeteria á la carte items are cheap and they can fill up on a few dollars?

When students in a focus group were asked what it would take for them to make more healthful food choices, they responded that you have to make it “cool” or the “thing to do” (Neumark-Sztainer et al., 1999). What some studies have found is that accessibility is simply not enough to promote healthful eating behaviors in students. One study in Germany that promoted the consumption of drinking water compared intervention schools (water fountains were installed, four 45-minute classroom lessons were taught, and water bottles were given away to students) to baseline schools and found that while the risk of overweight at the follow up assessment was significantly reduced in the intervention group, the results could have been greater had all of the teachers maintained the integrity of the educational lessons that were supposed to accompany the intervention (Muckelbauer, Libuda, Clausen, Toschke, Reinehr, & Kersting, 2009). Another intervention aimed at increasing fresh fruit and vegetable consumption in the Chicago Public School District (85% of students qualify for free or reduced lunch) was creating a salad bar for students. Some schools that received the salad bars also had accompanying food and nutrition education to aid in the promotion of healthful eating choices. The comparison schools received the salad bars, but not the educational component. What Suarez-Balcazar et al. (2007) found was that there was a significant increase in the number of students choosing the salad bar option after

receiving nutrition education classes, whereas in the comparison schools no change occurred. These studies suggest that simply making healthier foods available is not enough. To ensure lasting significant changes, there needs to be a shift in the food culture of the schools, which encompasses attitudes, curricula, and policy changes.

School Food Policy

Policies in schools regarding food and nutrition work behind the scenes to create the food culture of the school that students experience. Among them are awarding contracts to food vendors, policies about the accessibility of vending machines and the foods they offer, using a centralized kitchen for preparing meals, and supplementing school income¹ to name a few. As Martin (2008) pointed out, laws or policies around food culture have the ability to “impose enforceable duties on bodies which are in a position to improve the health environment, provide powers which give some leverage in ensuring that stakeholders recognize their responsibilities, and set norms to influence public opinion on what is and what is not acceptable health behavior” (p. 6).

While many school leaders report that schools should promote healthy eating, in some states few schools had policies related to food and nutrition. For instance, in a survey of Minnesota school principals, those with more positive attitudes regarding healthful eating reported a greater number of school food policies (French, Story, & Fulkerson, 2002). Of those surveyed, 64% reported that only healthful food choices should be provided to students in a secondary school; however, only 32% of principals reported that their school had a policy regarding food and nutrition. Additionally, only

¹ Some vendors in exchange for pouring rights or vending machine sales will supplement school income by contributing to school events, sports activities, etc.

17.8% had policies concerning the types of food sold in vending machines and 10.2% for what types of food can be served at various school functions, such as class parties or sporting events. While many school administrators want to have a policy regarding the types of foods made available to students, there appears to be a disconnect between the desires of administrators and their actions. According to French et al. (2002), those actions are teaching students that healthful nutrition is not a priority.

Policies regarding vending machine accessibility and the types of foods sold have shown an inverse relationship with the frequency of student vending machine purchases for both snacks and beverages (Neumark-Sztainer et al., 2005; Vereecken, Bobelijn, & Maes, 2005). Some school districts have taken additional steps in changing the vending machine policies in schools by putting restrictions on the types of food made available. In 2004, the Chicago Public School District required vending companies to meet minimum nutritional standards for their vending items. These included no more than 30% of energy from fat, no candy bars or soda, only water, sports drinks or 100% fruit juice, and to provide snacks like pretzels, low fat foods, and granola bars (Suarez-Balcazar et al., 2007). However, this change in vending items was not met without resistance from school staff. As Suarez-Balcazar et al. (2007) stated, “resistance usually comes from those who oppose changing the status quo because they have a vested interest in keeping the situation as it is” (p. 342). One reason for this resistance was because many principals and teachers felt that the school would not continue to make the same amount of money from vending sales with healthier options in the machines. Additionally, secondary school students are encouraged to be more autonomous in their decision-making. Many felt that if the selection of items that are most appealing to

teenagers was not available then the students would take their purchases elsewhere, taking revenue away from the school (Hendel-Patterson, French, and Story, 2004). As Vereecken et al. (2005) stated, “it often can be a challenge for school principals to find a balance between creating this extra income, satisfying their student customers, and providing adolescents with healthy food choices, often neglecting the latter” (p. 276).

The last few years have been incredibly tough on the finances of schools due to the economic downturn. As a result, many schools have been looking for alternative ways to salvage some lost revenue due to budget cuts. Anderson and Butcher (2004) found that schools experiencing financial pressures were more likely to make junk food available to their students, have contracts with food vendors, and allow food and beverage advertising to students. In 2001, Wechsler, Brener, Kuester, and Miller found that 79.2% of school districts in the United States received a specified percentage of vending machine sales, 62.5% received cash incentives or donations of supplies and other equipment once sales have reached a specified amount, 43% allowed companies to advertise on school grounds, and 35.3% allowed companies to advertise inside school buildings. How much additional revenue gained was not assessed by this survey; however, with the majority of districts receiving some sort of financial incentive, it appears to be in the district’s best financial interest to maintain a relationship with food vendors.

In a review of literature related to poverty, energy consumption, and food costs, Drewnowski and Specter (2004) found that there was an inverse relationship between energy density and energy costs of food. Individuals, who were faced with a reduction in income, in an effort to stretch their food budget, would consume less expensive foods to

maintain energy intakes at a lower cost. What if this same logic was applied to schools and the foods that they offer to students, especially since they have been faced with diminished budgets every year for the last few years? Many districts have opted to reduce costs by transitioning to meals prepared by a centralized kitchen, allowing them to reduce staffing and equipment expenditures. Additionally, because centralized kitchens produce a much higher volume of food, they are able to offer comparable meals at a reduced cost. Has this change affected the nutritional quality of the lunches provided to students? Foods prepared from a centralized kitchen are often easy to prepare and contain high levels of sodium, preservatives, and additives. At my school I have observed few meals comprised of base product foods or foods that are served in their natural state. Many of the items served are made from processed foods: canned chicken instead of fresh, canned fruit instead of fresh fruit, liquid nacho cheese, and mashed potatoes made from powder. Few items contain whole grains (see Figure 1).

Many people believe that healthier school lunch options cost more and will be less appealing to students. Many schools/districts cite these two reasons for not making dramatic changes in the availability of more nutritious foods. While these are valid concerns, research by Wagner, Senauer, and Runge (2007) suggest that these concerns may be misperceptions. In an assessment of 330 Minnesota school districts, Wagner et al. (2007) found that the inverse relationship between healthfulness of meals and student meal consumption was not significant. They also found non-significant relationships between the healthfulness of school meals and increased food production costs. Wagner et al. (2007) argued that healthier meals require “greater managerial skill, better equipped kitchens, and more skilled labor for on-site food preparation,” but that the actual cost of

food was much less, leading to an overall reduced cost of production (Wagner et al., 2007, p. 676). In sum, it is important that the appeal of the school lunch program remains intact so that it can continue to function within schools and not become a financial burden.

Food Responsibility

Our educational systems are well situated to teach food responsibility to students in hopes that they develop and maintain healthy relationships with food. Food responsibility is defined as making food decisions that contribute to the maintenance and promotion of health. Food management practices consist of being informed of health sustaining and promoting dietary recommendations, advocating for higher quality food choices, and being educated about the foods that you consume.

I am a big advocate of what I call informed eating, which is an awareness of the nutritional content of the foods you choose to consume. This is not another diet proposition to aid in weight loss, but a strategy that can help an individual with making informed food choices. I would like to suggest an analogy, if we are given \$1,000 to spend chances are we are going to research not only what we are going to spend it on, but will have also accounted for all of the \$1,000 of the purchase. It is our financial responsibility to know where our money is going. Yet, people, teenagers especially, may spend 1,000 plus calories on a single meal and not know it. They may be aware that the food is high in calories/fat, but they may not be informed of exactly what the nutritional content is within their meal. Beyond that, teenagers and the rest of the population are not too familiar with how using this type of information could benefit them. Once an individual starts to notice and use this information on a regular basis they can then begin to use this information to guide their food selection. Prolonged exposure to this

information will allow individuals to develop habits around it, habits that hopefully promote greater food responsibility.

A few years ago New York advocated for point of purchase nutrition information by requiring posting of calorie and other nutritional information on menus next to each food item. Since then, studies have been conducted to determine if posting nutritional information is an effective strategy in improving the diets of individuals who choose to eat away from home. For example, when Subway[®] customers saw and took nutrition information into account when purchasing food, they ordered 99 less calories than those who did not see the information posted (Bassett et al., 2008). While Subway[®] customers may not be entirely representative of food purchasing behaviors of customers at other fast food establishments, these findings suggest that there is utility in making nutrition information easily available. This leads me to ask the question that guides this research, how useful would this information be if it were provided to an adolescent population during school meals?

The majority of studies on point of purchase nutrition information have been conducted within an adult or college-aged population. I was able to find one study that looked at adolescent food choices when presented with nutrition information (Yamamoto, Yamamoto, Yamamoto, & Yamamoto, 2005). While the findings suggest that students presented with a menu that contained nutrition information would modify their food choices, it presented students with a hypothetical situation and thus the findings may not reflect how adolescents would make food choices in a real setting where they would see the information and order and consume actual food (Yamamoto et al., 2005). Other studies have presented conflicting results. Rainville, Choi, Ragg, King, and Carr's

(2010) study with high school students suggested that nutrition information posted at point of sale did not affect students' purchases, but instead the researchers felt as though offering healthy menu options would be a stronger influence, and stated "If schools provide healthy options, students will eat better.... Providing passive nutrition information is insufficient for changing lunch purchases in high schools," (p. 7) even though students demonstrated an interest in the labels. It is important to note that the nutrition information provided in this study may have been more effectively utilized by adolescents had it been presented in a simpler form. In another study, Cranage, Conklin, and Lambert (2006) did not directly measure the utility of point of purchase nutrition information in the healthfulness of students' purchases, but assessed if nutrition information would affect student satisfaction with the school lunch program. The results of their study suggest that supplying nutrition information "empowered" students and allowed them to make food decisions easier and faster, leading to greater satisfaction with their food choice. Lastly, a study by Conklin, Cranage, and Lambert (2005) did find that point of purchase nutrition information lead to students making more healthful food choices. Using this information led to an increase in purchases of foods lower in fat and calories (example being switching from pepperoni pizza to cheese) and a decrease in foods higher in fat and calories.

Since New York instituted point of purchase nutrition information, other states, such as California, are aiming to implement similar laws for chain restaurants, which will hopefully create some healthful competition and increase access to healthful food choices across all populations of people. However, secondary schools are not required to provide this information to students or parents. Students who eat food items purchased at a

school should have the opportunity to utilize nutritional information in their food choices; while this may not be the case now, there are new laws that will go into effect during the 2012-2013 school year that bring a little more accountability on types of food served and the maximum calories present in a single meal.

Theoretical and Conceptual Frameworks

There are two main theoretical and conceptual frameworks used to better understand how and why individuals make decisions. One of those is the theory of planned behavior, which has been used in many studies to determine how individuals make health-related decisions, including participation in healthful eating behaviors (Bagozzi, Wong, Abe, and Bergami, 2000; Conner, Norman, and Bell, 2002; Povey, Conner, Sparks, James, and Shepherd, 2000). According to Azjen (2005), the theory of planned behavior “is based on the assumption that human beings usually behave in a sensible manner; that they take account of available information and implicitly or explicitly consider the implications of their actions” (p. 117). There are three factors that influence a person’s intentions to perform a certain behavior: a) attitude toward the behavior, an individual’s positive or negative evaluation of the behavior; b) the subjective norm, an individual’s perception of social pressure to participate in the behavior; and c) perceived behavioral control, one’s self efficacy or ability to perform the behavior. Behaviors are then determined by ones intentions (See Figure 2).

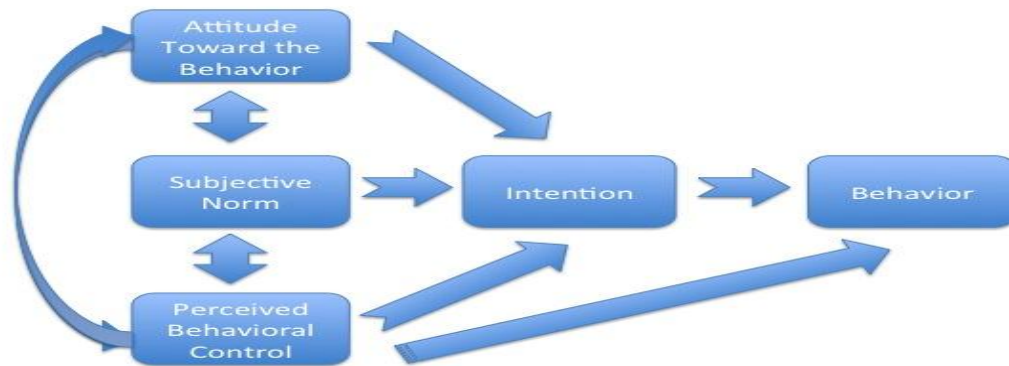


Figure 2. Theory of Planned Behavior.

Providing point of purchase nutrition information to a high school population could serve to influence all three elements of the theory of planned behavior. Hypothetically, providing nutrition information could aid in changing or modifying a person’s attitude toward the food they eat by allowing them to see the nutritional quality of the food they are consuming. The subjective norm could be influenced in that high school students tend to be highly social, eating lunch with a friend or multiple friends. The Rainville et al. (2010) study made nutrition information available and while the authors suggest it did not influence food purchases, they do state that students did demonstrate an interest in the labels. This could lead to students creating new norms regarding food choices made in a cafeteria. Lastly, nutrition information might allow people to feel better equipped and more capable of making more healthful choices because they see the information is clearly visible next to the menu items, as suggested in the study by Conklin et al. (2005)

cited above. All of these factors allow a student to strengthen their intentions and ultimately their behaviors in eating more healthfully.

The other conceptual framework is the hierarchy of effects model developed by Grunert and Wills (2007) to address the decision-making process as it relates to nutrition information and healthful eating. In a study where they utilized this model, Grunert, Wills, and Fernandez-Celemin (2010) state that exposure to labels will aid in consumer understanding of nutrition knowledge which will lead an individual to evaluate the quality of the product and whether they would like to purchase the item.

According to this model, if students have access to nutrition information in a form that is easy for them to understand and it is easily accessible, they will use this information. Additionally, continued exposure could improve how students use this information to guide their food selection during school meals. The chart below is a representation of how prolonged exposure to healthful behaviors may lead to students choosing to participate in those behaviors. Each day that a student presents to the school cafeteria is a new opportunity for them to utilize nutrition information in making their food choices. The great thing about a school environment is that there are 180 days minimum in a school calendar year and four years to complete a high school education, creating a cycle of daily, prolonged exposure. This translates to a minimum of 720 opportunities for a high school graduate to be exposed to point of purchase nutrition information in a secondary education setting alone, so that even if they don't see it or use it the first time they are exposed to it, there will be another opportunity within an educational environment. As point of purchase nutrition information catches wave across the United States, there will be additional exposure opportunities available at eating

establishments away from home, further expanding the exposure loop outside of the educational environment.

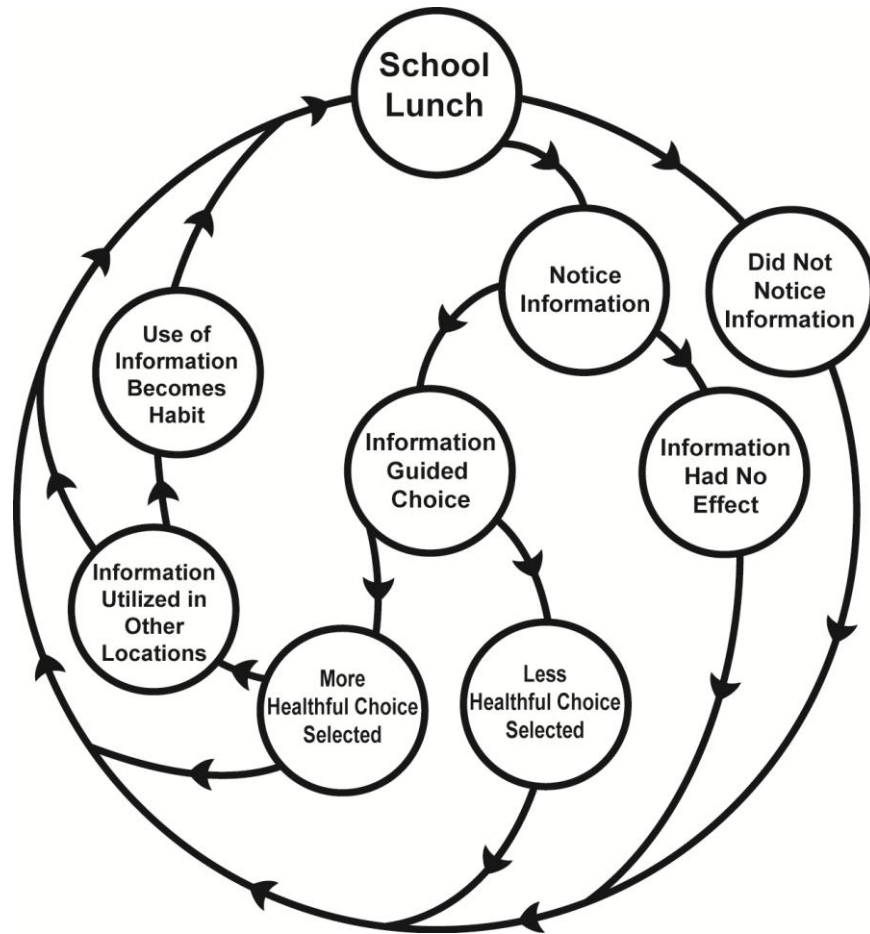


Figure 3. Exposure loop demonstrating the possible effects that information can have on lunch choice.

Summary

Many factors contribute to food choices and eating behaviors for adolescents: attitude toward certain foods, social networks, availability of food at home and at school, and the culture that surrounds food in those environments. While research on the effectiveness of intervention strategies with adolescents has been inconclusive, one thing

researchers have all agreed on is that there is a need to increase the healthfulness of children and adolescents. Elementary schools already have strict guidelines in place that limit the types of food that can be sold in vending machines or served at lunch, and many secondary schools have enacted their own similar policies in an effort to get students to make healthier food choices. However, very few schools make nutrition information available to students either at point of sale or on the school's website. Research in prior studies with adults has demonstrated a utility for this information at restaurants; however, the body of available research with adolescents is limited and varied. This study seeks to expand prior research by making calorie and fat information available in a simple format in a high school cafeteria during lunch. This study also expanded the time frame for the intervention used in prior studies in an effort to provide an environment of prolonged consistent daily exposure.

Chapter 3: Research Methodology and Sample

Research Questions

1. Does exposure to calorie and fat information in a high school cafeteria affect adolescents' food purchases?
 - a. What are the changes in sales over two, four, six, and eight weeks of exposure to calorie and fat information?
 - b. What are the changes in sales for all Sardella's Pizza meal offerings between pre and post exposure to calorie and fat information?
 - c. What are the changes in sales for the Super Nacho meal between pre and post exposure to calorie and fat information?
 - d. What are the changes in sales for the Chick Fil-A[®] meal between pre and post exposure to calorie and fat information?
 - e. What are the changes in sales for all of the meal offerings at the Grab N Go (GNG) meal station between pre and post exposure to calorie and fat information?
2. What are the reported changes in behavior between pre and post exposure to calorie and fat information?

Restatement of the Problem

New health care legislation has made it a requirement for food retail establishments with 20 or more locations, serving the same or similar menu, to post nutrition information on menu boards in an effort to not only educate consumers about the nutritional quality of the food they are consuming but to allow them to make more informed choices about their dietary health. While this element within the Patient

Protection and Affordable Care Act (2010) is excellent news for consumers electing to eat food away from home who have a desire to gain more control of their dietary health, there are no provisions in this law requiring the same or similar standards for food items purchased in an educational setting. It is estimated that students will consume and purchase between 26 and 47% of their daily energy in a school environment. For the 49.4 million children in grades K-12 this presents a perfect setting for teaching and applying nutrition literacy strategies in hopes of reducing the prevalence of dietary related preventative diseases (Briefel et al., 2009; NCES, 2012).

The research available on point of purchase nutrition information has been able to demonstrate its utility and effectiveness in adult populations. However, there have been very few studies conducted to determine the impact it could have on an adolescent population in a particular setting. The goal of this study was precisely to determine the impact that point of purchase nutrition information may have on the food choices of adolescents, specifically during school lunch.

This study explored the food selection decisions of 9th through 12th graders at LSF² High School in the LSF Unified School District in Glendale, Arizona. There are three main components to this study. The first is the modification of menu boards to reflect calorie and fat information, as it would be seen if an individual were to encounter this information at any other restaurant that is in accordance with the Patient Protection and Affordable Care Act. The second component is the tracking of food sales, and the third consists of student surveys and a student focus group.

² Names of the high school and school district have been changed.

Data Sources and Collection Procedures

Data collection for this study consisted of three parts. The first was the modification of menu boards and the tracking of food sales in the cafeteria. Food sales data were collected for four weeks prior to the posting of nutrition information on the menu boards. Tracking of food sales began the third week of school after the start of the Fall 2012 semester and ended after four weeks of data collection, August 27, 2012 to September 21, 2012. After the baseline period, cafeteria staff posted laminated cards on their menu boards that displayed calorie and fat information for each menu item. Prior to the intervention, the cafeteria manager only displayed each of the daily cafeteria offerings on a dry erase board in front of each food counter. Tracking of food sales continued for eight weeks after the posting of calorie and fat information on the menu boards of the school cafeteria, from September 24, 2012 to November 16, 2012. Prior studies have included tracking at the end of one menu cycle (typically four or six weeks) and have suggested that additional research be conducting to assess for a “wear-out” effect on students after a prolonged period of time (Rainville, Choi, Ragg, King, & Carr, 2010; Conkin et al., 2005). This also served to answer the second question of this study: how does prolonged daily exposure affect student food choices? Tracking of food sales required the participation of the district’s food service director and the school’s cafeteria manager. LSF High School utilized paper and pencil production sheets for recording daily food sales.

To ensure proper intervention implementation, I conducted weekly cafeteria visits and maintained regular communication with the cafeteria manager on an almost daily basis. The visits to the cafeteria occurred on random days and the cafeteria manager was

notified prior to each visit. This time was utilized to problem solve any issues that may have arisen during the week with regards to missing labels, changes to the menu or meal offerings, and placement of the labels at each meal station. Additionally, cafeteria staff were trained on proper placement for labels and the use of production sheets to maintain records of daily food sales. Data collection from part one was used to answer question one: Does exposure to calorie and fat information in a high school cafeteria affect adolescents' food purchases? This information was also used to answer question 1a) What are the changes in sales over two, four, six, and eight weeks of exposure to calorie and fat information; 1b) What are the changes in sales for all Sardella's Pizza meal offerings between pre and post exposure to calorie and fat information; 1c) What are the changes in sales for the Super Nacho meal between pre and post exposure to calorie and fat information; 1d) What are the changes in sales for the Chick Fil-A[®] meal between pre and post exposure to calorie and fat information; and 1e) What are the changes in sales for all of the meal offerings at the Grab N Go (GNG) meal station between pre and post exposure to calorie and fat information?

Part two examined for student self reported use of calorie and fat information at school through the distribution of a confidential student survey at two points in time. Consent forms were distributed to 260 students prior to the collection of any survey data. The first survey was distributed prior to the modification of menu boards in the high school cafeteria. This survey collected student demographics: age, grade level, gender, race, and participation in the National School Lunch Program's Free or Reduced Lunch. Other questions included an inventory of food items that a student would purchase on a typical day during the lunch period, typical location of food purchased (cafeteria, snack

bar, or home), and if they would be likely to use calorie and fat information to guide their food choices if it were made available. The survey was distributed prior to the start of the intervention, and consisted of nine questions that combined closed and short answers (see Appendix B). Two English classes were targeted per grade level (25-35 students in each classroom) with the goal of retrieving 50 completed surveys per grade, for a total of 200 completed surveys.

The second survey was distributed at the end of the eight weeks of exposure to calorie and fat information in the cafeteria. Consistent with the first survey, the second survey collected similar demographic data: age, grade level, gender, race, and participation in the National School Lunch Program's Free or Reduced Lunch. It also included an inventory of food items purchased during a typical lunch period, the typical location of the food purchased, if they noticed the calorie and fat information posted, the frequency that calorie and fat information affected their lunch purchases, how the calorie and fat information affected their lunch purchases, and if their use of calorie and fat information changed over time. The second student survey consisted of 10 questions and combined closed and short answer responses (see Appendix C). The same English classes that were targeted for survey 1 were targeted to complete survey 2 with the same goal of retrieving 50 surveys per grade level, for a total of 200 completed surveys. English classes were targeted because every student must complete an English class that corresponds with their grade level. Pre and post survey responses were utilized to answer question one: Does exposure to calorie and fat information in a high school cafeteria affect adolescents' food purchases? In addition, the surveys aided in answering question

two: What are the reported changes in behavior between pre and post exposure to calorie and fat information?

Part three consisted of a semi-structured focus group conducted with 14 students and served to look into additional variables that may influence a student's decision to utilize point of purchase nutrition information. Consent forms that were distributed at the start of the study, targeting the two English classes per grade level, provided each student with the option to volunteer to participate in the focus group. Invitations to participate in the focus group were extended to approximately 33 students. Due to the limited number of consent forms returned, all students who provided consent to be video-taped and participate in a focus group were extended an invitation to participate in the focus group. The focus group occurred after the completion of the second survey and on the last day of the nutrition information intervention. Focus group questions were semi-structured and video-recorded. Both the video and any identifying student information were destroyed immediately upon completion of the study. Focus group questions explored student opinions of school lunches and nutrition information, their initial reaction to the posting of calorie and fat information, and the effect of calorie and fat information on their food purchases during lunch. The focus group also invited students to discuss if having the calorie and fat information changed their opinion of the food served at school, and to provide recommendations for the best place to provide this type of information (see Appendix D). In total, the focus group lasted about 50 minutes.

Materials and Equipment for Intervention

This study required the modification of menu boards that are posted in cafeteria to reflect the total calories and fat of each menu item as it is served. This was done using

printed card stock. Cards were laminated and backed with Velcro so they could be easily removed and stored for future use. Meals served through the National School Lunch Program had meal calorie and fat totals posted. Calorie and fat information was clearly visible and located next to the item up for consideration (see Appendix E for photos of cafeteria set up). Calorie and fat information was obtained from the school district's food service director, the school's cafeteria manager, from nutrition labels, and from the utilization of the website CalorieKing.com. Menu offerings, service style, meal preparation, and pricing were not modified during the intervention period.

Participants

Situated in the southwestern part of the United States, Arizona maintains a very diverse population. The U.S. Census Bureau estimated the population of Arizona at 6.4 million for 2011 with 57.4% of the population being White, 30.1% Hispanic, 4.5% Black, 5.2% American Indian, and 3.3% Asian/Pacific Islander. Within the state of Arizona the average household income is \$50,752 and 16.2% of the population is below the poverty level (U.S. Census Bureau, 2012). LSF High School is located in Maricopa County, population 3.8 million, in the city of Glendale. Glendale's population for 2011 was estimated at 230,482 with 51.5% White, 35.5% Hispanic, 6% Black, 1.7% American Indian, and 4.1% Asian/Pacific Islander. The median household income for the city of Glendale rests slightly above the state average at \$51, 570, and they are slightly above the state average of those below the poverty level with 17.7% (U.S. Census Bureau, 2012).

LSF High School, with 1,832 students, is one of seven high schools in the LSF Unified School District, which has a student population of 36,873. LSF High School's student population is 42% White, 43% Hispanic, 7% Black, 4% Asian/Pacific Islander,

and 1% American Indian. Forty-five percent of students are eligible for free or reduced lunch. To be eligible for free lunch a student's family income must fall below 130% of the federal poverty level, which for a family of four is an annual income below \$29,965. To qualify for reduced lunch a student's family income must fall between 130 and 185% of the federal poverty level, which for a family of four is an annual income between \$29,966 and \$42,643 (Child Nutrition Programs, 2012). LSF High School was selected because their student population is fairly representative of Arizona demographics and of the proportion of students on free and reduced lunch, which is estimated at 47%.

Part one of the intervention, posting of calorie and fat information for each menu offering, affected all students who purchased lunch at one of the five service stations within the main cafeteria. Over the course of the intervention, the cafeteria served an average of 960 students between two lunch periods. Food sales data were recorded for all students who purchased lunch within one of the five service stations in the main cafeteria.

A total of 260 students in Grades 9 through 12 were invited to participate in both surveys. Eight classrooms, two per grade level, were targeted for recruitment of student survey participants. I went to each of those classrooms to recruit for student participants. Students who showed interest in the survey participation were provided a consent form, which needed to be signed by both the student and their parent/guardian. Students were given two weeks to return the consent forms. Those that returned a consent form, regardless of level of participation, had their name entered into a drawing to win an iPod Nano. Of the 260 consent forms, distributed 43 were returned and 42 had provided consent to participate in both surveys.

A total of 41 students participated in the first survey. They ranged in age from 14 to 18 years old. Of the 41 survey respondents, 25 were 9th graders, five were 10th graders, seven were 11th graders, and four were 12th graders. There were 16 male and 24 female participants, and one who did not report their gender. Six students identified themselves as White, 24 were Hispanic, six were Asian, one was identified as American Indian, three were identified as other, and one participant did not respond. Twenty-one students reported that they participated in the free or reduced lunch program, 18 reported that they did not participate, and two were unsure (see Table 1).

Table 1

Survey 1 Participant Distribution by Age, Grade, Gender, Race, and Free/Reduced Lunch Participation

		N	Percent
Age	14	12	51%
	15	10	24%
	16	6	15%
	17	3	7%
	18	1	2%
Grade	9th	25	61%
	10th	5	12%
	11th	7	17%
	12th	4	10%
Gender	Male	16	39%
	Female	24	59%
	No response	1	2%
Race	White	6	15%
	Black	0	0%
	Hispanic	24	59%
	Asian	6	15%
	American Indian	1	2%
	Other	3	7%
	No response	1	2%
Free/ Reduced Lunch	Free/reduced	21	51%
	No participation	18	44%
	Not sure	2	5%

The second survey was distributed to 42 students during the final week of the intervention and 33 surveys were returned. There was a decrease of 11 students (20%) between survey one and survey two. While there was a sizeable decrease in student

participation, the distribution of respondents considering age, grade, gender, ethnicity, and participation in free or reduced lunch remained relatively similar to survey one (see Table 2).

Table 2

Survey 2 Participant Distribution by Age, Grade, Gender, Race, and Free/Reduced Lunch Participation

		N	Percent
Age	14	11	33%
	15	14	42%
	16	5	15%
	17	3	9%
	18	0	0%
Grade	9th	20	61%
	10th	5	15%
	11th	6	18%
	12th	2	6%
Gender	Male	13	39%
	Female	20	61%
Race	White	4	12%
	Black	0	0%
	Hispanic	19	58%
	Asian	5	15%
	American Indian	1	3%
	Other	3	9%
	No response	1	3%
Free/ Reduced Lunch	Free/reduced	18	55%
	No participation	13	39%
	Not sure	2	6%

Thirty-three students were invited to participate in the focus group with the goal of reaching 13 to 15 participants. A total of 14 students (seven males and seven females) showed up to participate in the focus group. Nine of these students were in the 9th grade, three in the 10th grade, and two in the 11th grade. Participants were not asked to identify their race and free/reduced lunch status.

Data Analysis Procedures

Quantitative data analysis. Quantitative data from the food sales and closed-ended survey responses were analyzed using SPSS and Excel software. Descriptive statistics are presented to identify any changes during the intervention. Additionally, a one-way analysis of variance (ANOVA) was conducted to examine differences between pre- and post-intervention results and to determine significance.

Qualitative data analysis. Qualitative data from the open-ended survey responses and focus groups were analyzed to determine any patterns or evolving themes using comparative analysis (Corbin & Strauss, 2008). Numeric identifiers were used to code concepts, which were then synthesized into larger categories that represent any similarities in the initial coding. The categories were then collapsed into larger themes. To ensure trustworthiness of the analysis, peer debriefing was conducted with another researcher who had experience working with survey and focus group data. The peer debriefing was conducted by having the additional researcher review the data collected from the surveys and focus group and compare that information to the results formulated. The qualitative analysis will discern patterns of interrelationships that describe how the intervention affected students' point of purchase decisions.

Chapter 4: Results

This chapter outlines the contributions that this study can make to further the research on adolescent reactions to nutritional information posted at point of sale. This study consisted of three parts, the modification of menu boards to post calorie and fat information, a pre and post survey of students, and a student focus group, all of which served to aid in answering the two main research questions.

The data collected to answer the first question included the tracking of food sales from the main cafeteria for four weeks prior to the start of the intervention and eight weeks during the intervention, student responses to surveys (to determine if they utilized the information provided and changed their behavior), and student responses to focus group questions to gain a more in-depth perspective on their reactions to the intervention. Data collected from the cafeteria food sales at two, four, six, and eight weeks of the intervention were utilized to answer research question *1a*, which would aid in determining if the length of the intervention had any effect on the outcome. Sales data collected from specific meal items were utilized to answer questions *1b* to *1e* to gain insight into how students may have reacted to specific meal items. Lastly, responses from both surveys and the focus group were utilized to answer research question 2 to determine if any behavioral changes were made as a result of the intervention.

This section consists of three subsections that correspond to the three components of this study: examining the data from the sales reports, examining the data from the student surveys, and examining the data from the student focus group.

Exposure to Calorie and Fat Information

Part one of this intervention modified menu boards in the cafeteria at LSF High School, which was completed by compiling the calorie and fat totals for each individual meal item served and each meal combination available. Calorie and fat information was then posted on a laminated card and adhered to the window in front of each meal option in a way that would not obstruct the view of the menu item but would still remain clearly visible. Prior to the intervention, menu items were displayed using a dry erase board and marker where menu items were updated on a daily basis by writing them on the board. Data was collected from the production sheets that cafeteria staff filled out on a daily basis which totaled the amount of food served for each menu item. This information was then transferred into an Excel spreadsheet where it was tracked by day of the intervention, day of the week, week of the intervention, and meal station where each item was served. Baseline data was collected for four weeks, August 27, 2012 to September 21, 2012, or 18 school days. During this time the cafeteria staff did not make any modifications to procedures conducted in preparation for or during lunchtime. The intervention progressed for the eight weeks immediately following the baseline data collection, September 24, 2012 to November 16, or 34 school days. During the intervention the only modification made to mealtime preparation or procedures consisted of posting the laminated cards detailing the calorie and fat information for each meal or individual item.

The cafeteria at LSF High School served an average 955 students per day during the study duration between two 35-minute lunch periods. Within the cafeteria there are five different meal service stations: four serve hot food and one serves pre-packaged cold meals out of a deli case. Each station has its own independent line. Meals in the cafeteria

ranged in calories and fat between 246 calories and 12.8g fat for the beef taco with green beans to 945 calories and 30.5g fat for the chicken marinara and fries. The average calories and fat for all meals offered were 565 calories and 22g of fat.

In response to question 1, the data between the pre and post intervention were compared utilizing a one-way analysis of variance (ANOVA). Table 3 below summarizes the results.

Table 3

Daily Means Between Baseline and Intervention Data, All Meal Stations

	Baseline	Intervention	% Change
Students Served	964	950	-1%
Calories-Daily Average	586,515	572,700	-2%
Fat-Daily Average	22,394g	21,688g	-3%
Calories-Student Daily Average	602	596	-1%
Fat-Student Daily Average	23g	23g	0%

As observed in the table, there was a decrease of 13,815 calories, from 585,515 to 572,700. This represents 2% in daily average of total calories served between baseline and the intervention periods. The ANOVA between baseline and intervention data for the daily average of total calories served was not significant, $F(1,50) = .90, p = .765$. There was also a decrease of 706 grams of fat (3%) in the daily average of total fat served. The ANOVA between baseline and intervention data for the daily average of total fat served was not significant, $F(1,50) = .18, p = .669$. There was a decrease of six calories or 1%

in the daily average of calories served per student. The ANOVA between baseline and intervention data for the daily average of calories purchased per student was not significant, $F(1,50) = .03, p = .857$. There were no reported changes between baseline and intervention periods for the daily average of fat served per student. The ANOVA between baseline and intervention data for the daily average of fat served per student was not significant, $F(1,50) = .057, p = .813$.

To investigate further into the effects that this intervention may have had on student food purchasing behaviors, intervention data was separated by two-week intervals. This was done to assess for any changes that may have happened as a result of prolonged exposure to the intervention (see Table 4). The ANOVA between all weeks of the intervention and total calories was not significant, $F(11,40) = .262, p = .992$. The ANOVA between all weeks of the intervention and total fat was not significant, $F(11,40) = .262, p = .989$. The ANOVA between all weeks of the intervention and calories purchased per student was not significant, $F(11,40) = .278, p = .987$. The ANOVA between all weeks of the intervention and fat purchased per student was not significant, $F(11,40) = .227, p = .994$.

Table 4

Intervention Daily Means Separated by Two-Week Intervals for All Meal Stations

	Week of Intervention			
	2	4	6	8
Students Served	999	893	926	948
Calories-Daily Average	633,369	546,078	590,580	614,181
Fat-Daily Average	23,610g	21,130g	22,040g	22,346g
Calories-Student Daily Average	626	603	630	644
Fat-Student Daily Average	23g	24g	24g	24g

Sales data between baseline and intervention were further broken down by meal served to assess for changes that may have taken place for individual meal offerings based on popularity and frequency of the meal item.

Sardella's Pizza, a meal item offered four times a week, was the most frequent hot meal served, and it paired with French fries, salad, or veggie sticks. This category was selected because during the course of the intervention it was consistently one of the more popular meal offerings that provided a variation of calorie ranges based on the side item paired with the pizza.

Table 5

Change Between Baseline and Intervention for Sardella's Pizza Options

	Calories	Fat	Baseline	Intervention	% Change
Sardella's Pizza, Fries	600	22g	464	433	-7%
Sardella's Pizza, Veggie Sticks	360	12g	443	452	+2%
Sardella's Pizza, Salad	317	12g	397	391	-2%

The change in sales for the Sardella's Pizza and fries meal, which was the highest calorie/fat pizza offering, decreased by 31 servings or 6.7% between baseline and intervention. The ANOVA between baseline and intervention data for the average number of students served was not significant, $F(1,21) = 1.149, p = .296$. The change in sales for the Sardella's Pizza and veggie sticks meal increased by nine servings or 2%. The ANOVA between baseline and intervention data for the average number of students served was not significant, $F(1,6) = .056, p = .821$. The change in sales for the Sardella's Pizza and salad meal decreased by six servings or 1.5% between baseline and intervention. The ANOVA between baseline and intervention data for the average number of students served was not significant, $F(1,7) = .026, p = .878$.

The Super Nacho was a meal offered once a week on Fridays and was selected because it is a popular specialty item that was a higher calorie/fat meal offering with 746 calories and 30 grams of fat. There was an increase in students served for the Super Nacho of 1 serving or 0.5% between the baseline and intervention periods. The ANOVA

between baseline and intervention data for the average number of students served was not significant, $F(1,8) = .001, p = .97$.

The Chick Fil-A[®] and fries meal was offered once a week on Tuesdays and was the most popular item from all meals offered. This meal was included in the analysis due to its popularity and novelty status because it was only offered once a week. It is also one of two outside restaurant meal offerings. The other is Sardella's Pizza which is offered four times a week. Additionally, the Chick Fil-A[®] and fries meal was higher in calories/fat with 740 calories and 26g fat per meal served. There was an increase in students served between baseline and intervention of 37 students or 4.5%. The ANOVA between baseline and intervention data for the average number of student served was significant, $F(1,9) = 6.742, p = .029$.

The Grab N Go (GNG) meals offered consisted of pre-packaged cold meals that students could grab from a deli case without waiting in line and ranged in calories/fat per meal, between 331 calories and 13.6g fat for the garden salad to 880 calories and 45g fat for the Uncrustable[®] meal. The GNG meal station was analyzed separately because it provided meal offerings that an individual may view as a "healthier" alternative to the hot food served. One reason a person may categorize meals from the GNG station as healthier is because there are typically a variety of salads, cold sandwiches, and fruit offered on a daily basis. However, despite a person's initial reaction, the GNG meal station offered a wide range of calorie and fat offerings on a daily basis. All GNG meals were analyzed as a whole between baseline and intervention periods and by comparing the average calories/fat purchased per student during each day of the baseline or intervention time frames completed the analysis. There was a decrease of 55 calories or

7.8% in the daily average of calories purchased per student. The ANOVA between baseline and intervention data for the average number of calories purchased per student for the GNG meal station was significant, $F(1,50) = 16.339, p = .000$. There was a decrease of 1g fat or 3% in the daily average of fat purchased per student. The ANOVA between baseline and intervention data for the average number of fat purchased per student for the GNG meal station was not significant, $F(1,50) = 2.784, p = .101$.

Table 6

Daily Means Between Baseline and Intervention Data, GNG Only

	Baseline	Intervention	% Change
Students Served	36	54	+50%
Calories-Daily Average	25,259	35,277	+40%
Fat-Daily Average	1,170g	1,708g	+46%
Calories-Student Daily Average	708	653	-8%
Fat-Student Daily Average	33g	32g	-3%

Student Surveys

Student surveys were distributed at two points in time during the study duration. The first survey was circulated in week 1, and the second in week 12. The first survey was confidential and consisted of nine questions that assessed for age, grade, race, participation in free or reduced lunch and lunch ordering behaviors that were typical to

that student. Students were asked to identify which meal station they would be likely to order food at during a typical day. The options included each of the meal stations within the main cafeteria as well as additional food outlets available on and off campus. The main cafeteria consists of South of the Border (Mexican food options), LSF Sandwiches (hamburgers, chicken sandwiches, Chick Fil-A[®], etc.), LSF Pizzeria (Pizza), This and That (variety items), Salad Bar, and Grab N Go (cold meal options served from a deli case). The Snack Bar and vending machines all serve food outside of the main cafeteria. The most popular option for students on a typical day is the LSF Sandwiches within the main cafeteria, with nine of the 41 respondents stating that they typically eat there. Following the LSF Sandwiches option in popularity was the LSF Pizzeria station with eight students stating this was their preference on a typical day. Nearly 32% of students reported that they do not purchase lunch within the main cafeteria. These students were given the option of writing in what meal alternatives they typically select and among the responses some of the most popular were Arizona Iced Tea[™], burrito, chips, candy, and Hot Cheetos[®].

Table 7

Survey 1 Participant Distribution by Meal Station

Meal Station	<i>N</i>	Percentage
Main Cafeteria (not indicated)	6	15%
South of the Border	1	2%
LSF Sandwiches	9	22%
LSF Pizzeria	8	20%
This and That	1	2%
Salad Bar	1	2%
Grab N Go	2	5%
Snack Bar	5	12%
Vending Machine	2	5%
Lunch From Home	4	10%
N/A	2	5%

Lastly, students were asked “If calorie and fat information were made available in your school cafeteria, how likely would you be to use this information to guide your food purchases?” Students were given the option of four responses: “I would not use calorie and fat information at all,” “I might use calorie and fat information some of the time,” “I would use calorie and fat information most of the time,” and “I would use calorie and fat information every day.” The majority of the students, 44%, responded by saying that they “might use the calorie and fat information some of the time.” Thirteen or 32% of students responded by saying that they would be likely to use the information either most of the time or every day.

Table 8

Survey 1 Participant Anticipated Use of Calorie/Fat Information

Use of Nutrition Info	<i>N</i>	Percent
Would not use information	10	24%
Might use information some of the time	18	44%
Would use information most of the time	8	20%
Would use information every day	5	12%

Survey two was also confidential and assessed for student demographics, such as age, grade, gender, race, and free/reduced lunch participation. It also assessed for student lunch purchasing behaviors on a typical day, if the student saw the calorie and fat information posted in their cafeteria, if the information affected their purchasing behaviors, how the information may have changed their behaviors, and the students history of use of the calorie and fat information over the eight week intervention period.

Nearly 73% of students reported that on a typical day they ate lunch in the main cafeteria. Within the main cafeteria, LSF Pizzeria continued to be one of the more popular selections, followed by LSF Sandwiches. This distribution is fairly similar to the reports made by students during survey one.

Table 9

Survey 2 Participant Distribution by Meal Station

Meal Station	N	Percentage
LSF Pizzeria	11	33%
LSF Sandwiches	7	21%
Snack Bar	5	15%
Main Cafeteria (Not Indicated)	3	9%
This and That	2	6%
N/A	2	6%
Grab N Go	1	3%
Vending Machine	1	3%
Lunch from Home	1	3%
Salad Bar	0	0%
South of the Border	0	0%

Surveys one and two differed from each other in that the second survey asked four questions specific to the intervention. The first of those asked if the student had seen the calorie and fat information posted in the cafeteria. Of those participating in the survey, 64% of respondents reported that they had seen the calorie and fat labels posted at each of the meal service stations. Thirty-three percent of students reported that they had not seen the information posted during the eight-week intervention period, and one student failed to respond.

Table 10

Survey 2 Participant Distribution of Students Who Saw Posted Calorie and Fat Information

See Posted Information	<i>N</i>	Percent
Yes	21	64%
No	11	33%
No Response	1	3%

Students who responded to question seven by stating that they had seen the posted calorie and fat information were then asked to respond to a follow up question: “How has the information affected your purchases during lunch in the cafeteria?” Twenty percent of students who saw the information posted in the cafeteria responded by saying that the calorie and fat information was used to guide their purchases either most of the time or every day. Seventy-six percent of the students who did see the calorie and fat information posted reported that the information either did not affect their purchases or that their purchases were only affected some of the time, and one person did not respond.

Table 11

Survey 2 Participant Distribution of How Lunch Choices Were Affected

Informational Effect	<i>N</i>	Percent
Information Did Not Affect Purchases	9	43%
Information Affected Purchases Some of the Time	7	33%
Information Affected Purchases Most of the Time	2	10%
Information Affected Purchases Every Day	2	10%
No Response	1	5%

Question eight of survey two asked students: “How has having calorie and fat information posted in your cafeteria typically changed your lunch purchases?” Nearly half of those students who responded stated that they did not observe any change in their lunch purchasing behaviors. Forty-five percent of students stated that they used the information to purchase fewer calories and fat, and 6% of students reported that they used the information to purchase more calories and fat.

Table 12

Survey 2 Participant Distribution of Behavior Change

Use of Information	N	Percent
No Change	15	48%
Purchased Fewer Calories/Fat	14	45%
Purchased More Calories/Fat	2	6%

The final question of the second survey was utilized to correspond to the second part to research question one, which explored if the use of information may have changed over length of time. Forty-two percent of students stated that they did not use the information at all. Of those who reported that they used the calorie and fat information, half stated that they utilized the calorie and fat information more at the beginning of the intervention, 33% stated that their use of the calorie and fat information remained the same for the duration of the intervention, and 17% reported that their use of the information increased more over the length of the intervention.

Table 13

Survey Two Participant Distribution of History of Use of Information

History of Use of Information	N	Overall Percent	Percent Students who Used Information
Did Not Use Information	13	42%	N/A
Used Information More at First	9	29%	50%
Use of Information Remained the Same	6	19%	33%
Use of Information Increased With Time	3	10%	17%

Student Focus Group

During the last week of the intervention, students were invited to participate in a short focus group that would allow for a more detailed perspective into their use and opinions of the calorie and fat information posted in their cafeteria. The focus group lasted approximately 50 minutes. A total of seven questions were asked during the focus group with topics relating to the students’ opinion of their school’s lunch, general opinions related to nutritional information, their reactions to the posted calorie and fat information, and their food choices based off of the information provided (see Appendix D). Students were seated in a circle and as each question was asked students were given an opportunity to respond by going around the room. Open discussion or follow up responses were allowed after every student had provided their response.

Question 1: What do you think about high school lunches? The general opinion of the focus group about the lunches served at their school was not a positive one. Nearly half of the students stated that the lunches served at school were “nasty” or “greasy.” Half of the students reported that they do not regularly eat the school lunch but

prefer to eat at the student store, which is run by student council and not the cafeteria. There was some preference for the Sardella's Pizza and the Chick Fil-A[®] options; however, beyond those two meal offerings there wasn't anything positive the students had to say about the lunch served in the cafeteria.

Question 2: What do you think about nutrition information? The majority of the focus group participants (12 out of the 14) did not express an opinion about nutrition information. One student who mentioned that he has stopped drinking soda because of "all of the sugar and calories" and another student thought that calorie and fat information could be a useful tool for athletes as a way to help them keep fit.

Question 2 follow-up: Did anyone notice the nutrition information posted in your school cafeteria? Nearly two-thirds of the participants stated that they did notice the calorie and fat information posted in their cafeteria. Of the five who responded by saying that they did not see the information, three stated their reason for not noticing it was because they never go into the cafeteria and two stated that they just didn't notice it. While some of the students did not see the information for themselves they did state that they heard about the information because other students in the school were talking about it.

Question 3: What was your initial reaction when you first noticed the nutrition information posed in your school's cafeteria? Among the seven students who reported going into the cafeteria regularly, five noted that their initial reaction was to change their behavior or stop eating in the cafeteria all together. Two of those five students who reported changing their behavior as a result of the posted information chose not to continue eating in the cafeteria and brought their lunch from home or switched to

purchasing food at the student store. The other three students stated that while they continued to purchase the same food as before they would throw out certain food items or only eat a portion of their total meal. One female student stated that after she saw the information she “just ate half of it or not very much. I don’t eat the whole pizza.” One student utilized the information to reflect on the choices she had been making prior to the intervention. She stated that the information made it “a lot easier to realize that what I’m eating is pretty good for me, aside from the fact that some days they are served with French fries.” Lastly, among the seven who reported regularly eating within the cafeteria, one male student shared that he “doesn’t pay attention to the information; as long as I’m getting full, I’m good.”

Question 4: Does having calorie and fat information present in your school’s cafeteria affect how you ordered or purchased your food? The responses to this question varied, but they were very similar to the responses described in the previous question. Six students reported that they did not experience any change in how they ordered or purchased their food; however, these responses were from students who do not eat in the cafeteria regularly or at all. One student stated that the information had no effect on his purchasing decisions. Lastly, half of the students reported that they did experience changes in their food ordering or purchasing behaviors that they attributed to the information. There were three types of behavior changes with these six students: a) continuing to order the same food options as before but choosing to eat less of their food, b) reducing the side items that they used to add to their meal, such as ice cream, and c) no longer continuing to eat in the cafeteria.

Question 5: Does having calorie and fat information present in your school's cafeteria change your opinion of the food served during lunch at your school? The majority of students chose to pass on this question and not provide a response because they either felt that they had already answered it or because they felt that it did not apply to them because they do not eat in the cafeteria. Of the 14 students in the focus group four provided a response. Two students expressed that they were under the impression that the food served at school was considered healthy. As one young lady stated "I thought what was being served was healthier because everyone is worried about mid-life obesity and they are talking about how schools should be healthier, and finding out it isn't as healthy was sad." Another young lady stated that she doesn't "even eat the same anymore." Lastly, one male student expressed that the information had no impact on his opinion of the food served in his high school cafeteria.

Question 6: Is there anywhere else you would like this type of information made available? Every student in the focus group expressed an interest in seeing calorie and fat information at restaurants. The majority of the students felt that this information should be posted everywhere food was served. In addition, some students took the conversation one step further and made suggestions for how this information should be displayed. A few of the students felt as though many restaurants, while they post the information, were also trying to hide it. These students stated that restaurants need to make the information clearly visible and easily accessible prior to ordering food. Another student argued that this information should be made available at a fast food drive through window because it "wasn't possible to get all the facts from the information posted on the wall inside the building." This student was specifically referencing Wendy's[®], a chain

that makes nutrition information available for all meal items; however the information is posted on a large poster inside the building and not next to each menu item. Interestingly, many of the students already knew which restaurants made this information readily available and where they could find it, citing specific restaurants and where the information is posted for each. For example, Subway™ has calorie and fat information posted on the glass right where customers would place their order and on their napkins. However, they do not post information for all of their menu items, just their lowest calorie/fat offerings.

In general, the students in the focus group were under the impression that the meals served in the cafeteria were healthy; however, once they were informed of the calorie and fat information they no longer shared that impression for some meal selections and felt that it was a “real eye opener.” Students who saw the information were fairly consistent on their reactions to the information, not only regarding their surprise about the nutritional content of the meals being offered but also in their increased awareness about the food they are eating and in their behavior changes. The most common changes that students expressed were the following: a) more thoughtful consideration of the food they purchased, b) the ordering of the same food they had previously but consuming less, c) no longer purchasing novelty items such as ice cream, and d) no longer continuing to eat food served in the cafeteria. There were a total of seven students who ate in the cafeteria regularly and saw the posted calorie and fat information. Of those seven, there was only one student who stated that the information did not have any effect on his meal purchases or eating behaviors. He was more interested in getting full off of the food he was eating than the nutritional value of that

food. Lastly, the focus group did not express any opposition to the posting of calorie and fat information and felt that this was information that should be distributed at all restaurants and places that sell food.

Chapter 5: Conclusions, Limitations, and Recommendations

Conclusions

The provision of nutrition information at point of sale for adolescent students in a school cafeteria may provide an opportunity for students to become more intentional in their food choices and provide an environment that is more consistent with that of retail food establishments that make this information readily available. As stated previously, students in most schools do not have an opportunity to make more informed and intentional food consumption choices while at school because nutrition information is not provided and easily accessible to them at the time of purchase. One question up for debate is what role should schools have in teaching students to be responsible and intentional with their food choices? School meals have the ability to guide students in developing what type of value system they will have with regards to their behavior surrounding food. The purpose of this study was to gain a better understanding of how point of purchase nutrition information may have an effect on food selection and behavior changes in an adolescent population.

Previous research in an adolescent population with exposure to nutrition information has provided mixed findings. However, models or theories on behavior, such as the Theory of Planned Behavior and the Hierarchy of Effects Model, have proposed that people will make decisions based on the availability of information and then they will implicitly or explicitly consider the implications of their actions (Ajzen, 2005; Grunert & Wills, 2007). Obviously, exposure to this information is essential for it to have any effect on behavior. There is also the possibility that the more an individual is exposed to a certain type of information the more likely they may be to use that

information to guide their decisions (see exposure loop in Figure 3). Providing nutrition information during lunch at school could aid in modifying the value system that an adolescent has toward their food choices, which can guide them throughout their lifetime.

This study sought to answer two main research questions:

1. Does exposure to calorie and fat information in a high school cafeteria affect adolescent food purchases?
2. What are the reported changes in behavior between pre and post exposure to calorie and fat information?

This study utilized multiple research methods in an attempt to answer these questions. The first component of this study included the use of nutrition labels posted at each food service station, which allowed an individual to be informed of the lunch options for the day in addition to the calorie and fat information in each menu item. To accompany this intervention cafeteria sales were tracked for each meal item both before and after the implementation of the intervention. Tracking of food sales data post intervention continued for eight weeks in an effort to expand upon prior studies that have been completed in a high school cafeteria that ended after one menu cycle, between four and six weeks. In an effort to paint a more complete picture of student reactions to this intervention, student survey and focus group data were analyzed to allow for an additional perspective into any changes in adolescent behavior as a result of the intervention.

As noted above, the overarching question that is guiding this study asks if exposure to calorie and fat information has an effect on the food purchases of adolescents in their high school cafeteria. To determine the significance that the intervention may

have had on student purchases during lunch, a comparative analysis was completed for the cafeteria as a whole as well as for specific meal items that varied by popularity, calorie/fat values, as well as meal station.

The cafeteria. Determination of changes between pre and post exposure to the intervention utilized a few different methods, the first being the tracking of food sales for four weeks prior to and eight weeks after the posting of calorie and fat information. Overall, there was not a noticeable change between pre and post intervention for a combination of all service stations in the cafeteria, only a decrease of an average of six calories per student and no change in the average amount of fat purchased per student. Due to the mixed findings with both adolescent and adult populations in prior research, it was difficult to predict the outcome for this portion of the intervention. Additionally, it is important to note that while there was no change in the number of calories and fat purchased per student the goal of the intervention was not to determine if there would be a reduction in calories/fat purchased but only use of the information provided. A change in average purchased calories/fat per student would only be one possible indication of a use of information.

Prior studies with adults have demonstrated a reduction of as much as 99 calories in a fast food environment (Bassett et al., 2008). While the high school cafeteria is a retail food environment set up in similar fashion to a fast food environment, there are at least three differences. The first is that a fast food establishment maintains the same menu on a daily basis with very little, if any, fluctuation. The high school cafeteria environment is one where the menu rotates on a daily and weekly basis, so that the same things are not offered every day. With that, there is also a variance in the nutritional

content of the meals provided on a daily basis and the excitement level of a student on a day where a popular item is being offered. A second difference is that each service station maintained its own independent lines, where each line only served one meal option. So, if students wanted to compare the nutritional content with all meal options they would then have to move from station to station in order to do so thereby requiring more effort to make that comparison. Doing this would be more time consuming for the student during a lunch period that is already brief. A third difference, particularly relevant for the purpose of this study, is that when a restaurant, fast food or otherwise, makes nutritional information available on a menu or menu board it is generally placed within view of all other meal options. In other words if customers were to decide between two options they would be able to compare both options side by side in a way that is convenient and requires little extra effort. As it was mentioned earlier, the set up of the cafeteria service stations prevented this method of comparison for all service stations except the Grab N Go, which provides multiple options in one location with all nutrition labels posted next to each other offering a different experience for the student purchasing at this station.

One of the secondary goals of this study was to extend what prior research had done by lengthening the intervention time frame to two menu cycles or eight weeks to determine if there was an increased use of calorie and fat information with time. To do this, data was taken at four points in time: two, four, six, and eight weeks post intervention. During these time frames there was not a significant change in the average calories or fat purchased per student (see Table 13). Student responses in survey two indicated that 17% of students who used the nutrition information felt that their use of the

information increased with time, 33% indicated that their use remained the same, and half of respondents stated that they used the information more in the beginning of the intervention than the end. It is important to mention again that the goal of this intervention was not to assess if there would be a decrease in calories/fat purchased over time. Survey responses indicate that there is a small portion of students who reported that with increased exposure to the information there was an increase in use of the information.

Table 14

Average Calories and Fat Purchased Per Student Post Intervention

	Week 2	Week 4	Week 6	Week 8
Average Calories Purchased Per Student	626	603	630	644
Average Fat Purchased Per Student	23g	24g	24g	24g

While there was not a significant change in calories or fat at these specific points in time, an analysis of the calorie and fat information on the alternating weeks revealed as much as a 99 calorie difference from week to week in purchased calories per student. After reviewing all of the weeks combined, there was a fluctuation in the average number of purchased calories that alternate in a pattern of every other week for post intervention data (see Figure 4).

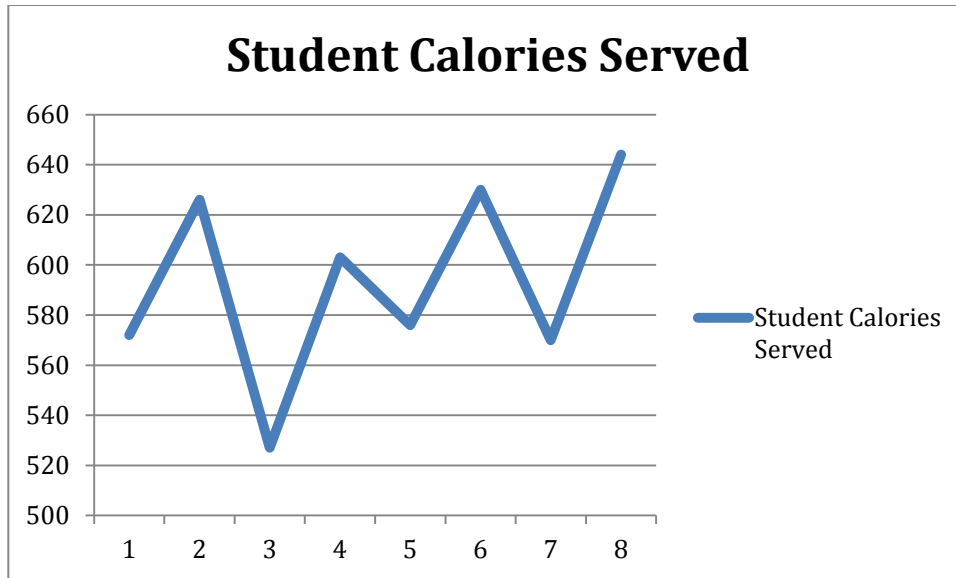


Figure 4. Graphical representation of average number of calories served per student post intervention.

Had weeks one, three, five, and seven been investigated instead, the data would have shown a much lower average number of calories purchased per student (see Table 15).

Table 15

Average Calories Purchased Per Student Post Intervention

Week 1	572
Week 3	527
Week 5	576
Week 7	570

After reviewing the average calories purchased per student in greater depth possible explanations were then investigated as to why the average number of student

calories purchased per day would vary so greatly from week to week. The data collected from the cafeteria production sheets provided a number of anticipated servings as well as the actual number of students served. After looking at the meals offered on a daily basis and the anticipated servings for each meal each day of the intervention, a similar pattern was displayed using the average number of calories offered per student per meal (see Table 16). When graphically represented the calories offered per student and the average calories purchased per student almost overlap (see Figure 5).

Table 16

Average Calories Purchased Per Student Compared With Average Calories Offered Per Student by Week Post Intervention

	Average Calories Purchased Per Student	Average Calories Offered Per Student
Week 1	572	569
Week 2	626	626
Week 3	527	520
Week 4	603	599
Week 5	576	575
Week 6	630	621
Week 7	570	563
Week 8	644	634

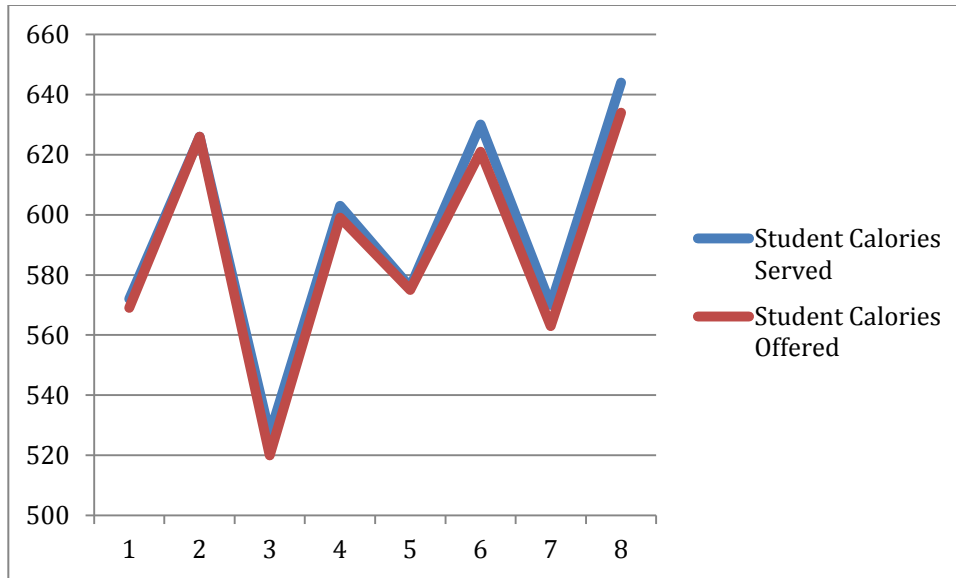


Figure 5. Average calories purchased per student compared with average calories offered per student post intervention.

With this information in mind, it appears as though the menu of available food items and the quantity of those items offers a reasonable explanation for the calorie fluctuation.

While there was no significant variation in number of calories/fat purchased per student over the course of the intervention for the whole cafeteria, the data suggest that the average number of calories purchased per student is directly related to the average number of calories per meal made available to students. The next step in this analysis is to look at data from a variety of meals offered to determine if any changes were made to specific meals or meal categories.

Sardella's Pizza was a meal offered four days per week and was a highly popular item with almost half of all students served selecting this option. This was also an option, where depending on the day, provided a variance of 240 to 283 calories and 10 grams of fat depending on the side item paired with the pizza. While none of the three options

(pizza and fries, pizza and veggie sticks, or pizza and salad) demonstrated any significant changes between pre and post intervention, the option for pizza and fries did see a 7% decline in number of students served, 464 to 433. The Sardella's Pizza and fries option contained the highest calorie and fat levels of the three pizza options, with 600 calories and 22 grams of fat. It is important to note that none of the three options were ever served on the same day, so there is no way to compare students making a selection from the three options at the same time. Additionally, due to the method of tracking food sales, pizza sales were collected as a whole category and not separated by pizza type. There is a slight variation in the calorie and fat levels of a pepperoni pizza versus a cheese pizza, around 30 calories and two grams of fat depending on the brand. A previous study by Conklin et al. (2005) suggested that this variation in calories and fat is enough to allow students to reconsider their options. In Conklin's study, there was an increase in students switching to cheese pizza as a result of the nutrition information posted in the cafeteria. Even though the decrease of 7% for the pizza and fries selection was not significant in this study, I feel it is worth mentioning as it indicates that students eventually may opt to no longer eat the pizza and fries meal and choosing to select a different option for lunch based on the nutrition information posted.

The super nacho meal was one of the highest calorie and fat options with a little over 20% of the students eating lunch in the cafeteria making this selection every Friday. The super nacho meal consists of a bowl of tortilla chips, ground beef, and liquid nacho cheese and was labeled at 746 calories and 30 grams of fat. There is also a toppings bar, which allows students to add on other items such as cheese, sour cream, tomatoes, jalapenos, and lettuce; however, due to the self serve nature of these items, servings taken

were not tracked over the course of the intervention even though nutritional labels were created for them. There was no change between pre and post intervention for the super nacho meal.

The Chick Fil-A[®] sandwich and fries meal was so popular over the course of the intervention that the cafeteria would often shut down one of the meal stations in order to serve the high volume of students. Chick Fil-A[®] was only offered on Tuesdays and on average served 858 students during the intervention time period, which was about 80% of all students eating in the cafeteria that day. The popularity of Chick Fil-A[®] was so great that the cafeteria anticipated around a 200 student increase in students served on the Tuesdays it was offered. This selection saw a significant increase of 4%, 37 students served, between pre and post intervention. One explanation for this increase could be that students became more familiar with the cafeteria offerings and students began to anticipate Chick Fil-A[®] Tuesdays. On the Tuesdays where I observed the interactions in the cafeteria during lunch, the Chick Fil-A[®] counter maintained the longest line and the most chaos as students were in a hurry to get their lunch because it is not unusual for the cafeteria to run out of the sandwich but also because the longer the line the less time they have during lunch to participate in other activities. As a hypothesis, it can be posted that the popularity of the meal and students' fear that they may not get the lunch led them to disregard or not even notice the nutrition labels posted for this meal item.

The Grab N Go (GNG) meal station offers a variety of pre-packaged cold meals every day that are served from a deli case. The meals offered from the deli case vary in total calories and fat offered with the highest offering being the Uncrustable[™] meal at 880 calories and 45 grams of fat. Some of the other offerings include the yogurt, fruit,

and cheese meal at 545 calories and 20 grams of fat, the chicken salad sandwich at 750 calories and 29 grams of fat, and the chef salad at 367 calories and 23 grams of fat. The GNG meal station is a popular choice for students who would prefer a cold meal over the hot meals served at the other meal stations, a student who would prefer a salad option as the GNG meal station generally has a variety of packaged salad options, or for those students who do not want to wait in the longer hot food lines as the GNG meal station doesn't require a cafeteria worker to serve the meal. The analysis for the GNG meal station was completed as a whole because there are multiple items being offered from the same service station on the same day. This was done in the same way the analysis was run for the entire cafeteria, by taking the number of calories and fat for each meal and multiplying that by the number of students purchasing that meal. Then taking the total calories served at this station and dividing it by the total number of students served calculating an average number of calories/fat purchased per student. As a whole, the GNG meal station experienced a significant decrease of 8% in the average number of calories served per student, going from 708 to 653 between baseline and intervention time frames.

One question arises in relation to this situation: why would there be a sizeable decrease in calories purchased per student at this meal station and not in the entire cafeteria? In response to this question there are two explanations could be taken into consideration. The first is that there is a difference in the set up of the GNG meal station and the other meal stations within the cafeteria. To paint a better picture, as a student walks into the main cafeteria they are ushered through a winding line that enters into the service station area, where once inside they then will fall into one of four different food

service lines, not including the GNG meal station. Once they have grabbed their food from one of the lines they are ushered into two separate lines to pay. So, from start to finish a student has then entered into three different lines during lunch, which spans an entire time frame of about 30 minutes. Each of the meal stations maintain a line that is independent of the other meal stations and the calorie and fat labels are located at each meal station, but only display what is being served at that specific meal station (see Appendix E for images). What is different at the GNG meal station is that there are between four and six different meal options every day at one meal station with all of the calorie/fat labels located next to each other (see Appendix E, photo 6). So, as students walk up to the GNG meal station to make their selection they can see from the different options without having to leave the line and investigate the others, allowing them to make an immediate decision on which option to select.

The second explanation relates to the new lunch regulations that were enforced during the first week of the intervention, which significantly modified how the cafeteria provided their salad and fruit options. During the four weeks of baseline data collection and for one week of intervention data collection the cafeteria offered an “all you can eat” salad bar and an “all you can eat” fruit bar. New lunch regulations went into effect October 1, 2012, which required the limitation of the amount of grains and protein offered on a daily basis. Because of the self serve aspect of the salad and fruit bars the cafeteria did not have a way to control for the amount of grains and protein purchased by the students. As a result, the cafeteria responded by increasing the number of GNG meal offerings and mostly doing away with the salad and fruit bars. This led to a 50% increase in the number of students served at this meal station. Prior to the intervention, the

average number of calories offered per student at the GNG meal station was 705 and the average number of calories offered during the eight week intervention were 643, a 62-calorie decrease or 9%. This information along with the information presented above relating to the number of calories/fat made available and purchased for the cafeteria as a whole lead me to conclude that this is again a situation where students will purchase what is made available for purchase.

The students Tracking of food sales was only one method used to determine changes as a result of the intervention. This may not have been the best method for understanding if students made changes in behavior that resulted from use of the information because this reveals little behind the thought process or behaviors of the individual after they have purchased their food. For this reason, the tracking data was complemented with student surveys and a focus.

Before the start of the intervention, students were surveyed to gauge what the interest level might be in utilizing calorie and fat information posted in their high school cafeteria. Prior research on an adolescent population has resulted in mixed findings, with some studies concluding that there is not a great interest in more healthful eating behaviors and others citing an awareness that adolescents have for what it means to eat more healthfully. The lack of conclusive research in this area with this population has made it difficult to anticipate how students will react to this type of intervention. Responses from survey one indicated that close to one third of students were interested in utilizing the calorie and fat information should it be posted in their cafeteria by indicating that they would use it most of the time or every day. There were another 44% of respondents who stated that they might use the information some of the time, which

signifies some degree of interest. This means that three quarters of the students surveyed think that they will use this type of information some of the time, most of the time, or all of the time. Only a quarter of the respondents stated that they would not use the information at all.

Survey two was utilized to determine self-reported use of calorie and fat information and to what extent they were used. The first component of this intervention is awareness. If the information is posted and no one sees it, then the intervention will not be of any use. Responses from the second survey indicated that 64% of respondents saw the information posted. About half of the entire student population purchased lunch in the high school cafeteria during the study period, so this information suggests that the intervention was effective in making students aware that it existed (at least students who entered the cafeteria). What this means is that the labels were placed in a position that was clearly visible and accessible to students eating in the cafeteria. Information obtained from the student focus group indicated that half of those participants saw the information posted. Through focus group questioning evidence supports that the main reason for students not being aware of the information was because they do not purchase food from the cafeteria or they do not go into the cafeteria. Even though a portion of students never saw the information posted, there is evidence to suggest that the posting of the labels created conversations amongst students outside of the lunch line. For instance, a respondent in the focus group stated he heard about the labels from his friends. In my own experience, from six years working in a high school environment, high school students are highly social and those social networks have the ability to strongly influence their attitudes and behaviors. The attention that the labels received outside of the

cafeteria through social networks could allow a student who has not noticed the information to seek out the information the next time they are in the cafeteria, or in the very least remind them that the information exists should they purchase food in the cafeteria.

Thirty-two percent of survey one respondents indicated that they had a moderate to strong interest in utilizing the calorie and fat labels prior to the intervention. However, only 20% of respondents from survey two who indicated that they saw the information actually used the information most of the time or every day. Another 33% of survey respondents indicated that the posting of information affected their purchases some of the time. In total, about half of respondents who saw the information utilized the information in some way over the course of the intervention. When respondents used this information, most of the time they changed their behavior by choosing meal options lower in calories/fat. A surprising finding from the focus group participants who reported utilizing the information was that many of them applied the information to change not how they purchased their food but how they ate their food. These students stated that, after being informed of its nutritional content, they continued to order the same food items but would eat a portion of the meal, for example throwing out the fries or only eating half a pizza. This behavior is an example of the participants' level of critical thinking when assessing their options.

There are three approaches a person can take when making the decision to purchase something when nutrition information is present: 1) they can disregard the information and purchase and eat the same as they always have, 2) they can use the information to modify their choice, 3) or they can continue to purchase the same meal

items but respond to the information by modifying how they consume their meal. My experience working in a weight management setting suggests that the third option (ordering the same and modifying how much we eat) is not always a choice immediately thought of. Often people are expected to either decide to disregard the information and order the same or completely modify what they have ordered, a very black and white approach.

Other participants in the focus group indicated that as a result of the nutrition information posted they decided to no longer continue eating in the cafeteria. Over the course of the intervention there was a 1% decrease in the average number of students who purchased food in the cafeteria every day. While this was not significant, it suggests the possibility that there is a small population of students who elected to no longer eat in the cafeteria as a result of the information posted. Two students in the focus group indicated that instead of continuing to purchase food from the cafeteria they decided to either bring food from home or purchase food from the student store. Although these options do not guarantee that these students ate a meal that was more nutritious than the cafeteria meals, it does demonstrate their ability to access these as alternatives. However, not all students are able to do this; forty-four percent of the student population at LSF High School are eligible for free or reduced lunch where eligibility is based on family income. A student who is eligible for free or reduced lunch may have more limited alternatives to eating in the cafeteria due to a lack of resources, financial and otherwise. Students who elect to bring lunch from home have a home life that supports food being transported to school. Similarly, students who elect to purchase lunch from sources outside the cafeteria have a home life that can financially support purchasing the

alternatives, which are not covered under the Free and Reduced Lunch Program.

The primary question that guided this study was if exposure to calorie and fat information in a high school cafeteria has an impact on adolescent food purchases. Looking specifically at food sales would indicate that the initial answer to this question is that there is no significant impact. However, a more detailed analysis reveals that the answer is not as black and white as a yes or no. Based on the data discussed above, two conclusions can be drawn. The first is that the intervention did not play a role in significantly reducing the average number of calories or fat purchased, but this was not the goal of the intervention. The goal was to determine numerically one type of reaction to the posted information. The second conclusion is that the information posted in the cafeteria played a role in the decision-making process students use to evaluate their purchases. Like every health intervention there will always be a portion of the target population that will not utilize or react to the strategies enacted. Determining compliance to a health intervention is not an exact science. While there are strategies that can be implemented to make interventions more easily accessible and understood, what an individual does after the fact is hard to predict. With this in mind there is no set standard to determine to what extent participants in an intervention need to react to the intervention in order to determine its effectiveness, especially when prior research has consistently been inconclusive not only in results but in intervention type. Prior studies with adolescent populations and nutrition information are highly varied in their approach and very few have utilized a high school cafeteria for an intervention medium.

What this intervention did effectively was disseminate information in a way that

was convenient to see and easy to understand. This intervention varied from prior studies completed in that it assessed the adolescent responses to nutrition information in a school setting. Moreover, the data collected was not from a hypothetical situation, and the study extended the intervention time frame of prior studies, provided information in a very simple and basic format, and utilized both quantitative and qualitative approaches to data collection.

Limitations of the Study

The limitations of this study are discussed in correspondence with its three components.

Part 1 – Posting of calorie and fat information and tracking of daily food sales. The LSF High School cafeteria maintains five food service stations in addition to the outside snack bar. The intervention was only conducted within the main cafeteria and not within the snack bar areas, vending machines, or the student store. Therefore, the population of students who do not eat within the main cafeteria, about half of the total student body, did not maintain exposure to the calorie/fat labels for the duration of the intervention. Additionally, because individual students were not tracked over the course of this intervention there is no way of knowing what proportion of students maintained consistent daily exposure to the nutrition labels.

The calorie and fat values for each meal were created by taking the nutrition labels from boxes and containers and combined according to the recipe for each meal. Efforts were made to make sure that the information was as accurate a representation as possible; however, some meal items did not have nutrition labels. In this case a best estimate was utilized based on food products that were most similar and the values

retrieved from the website CalorieKing.com.

At the beginning of the time frame for tracking of food sales the cafeteria at LSF High School had a few self-serve areas where students could add condiment type items (ketchup and ranch dressing), an additional toppings bar for the South of the Border meal station (sour cream, cheese, lettuce, olives, jalapenos), an all-you-can-eat fruit bar, and an all-you-can-eat salad bar. Tracking for the condiments and the additional toppings bar at the South of the Border meal station was not completed for the duration of this intervention. Nutritional labels were posted for all available condiments and additional toppings; however, there is no way of knowing the impact that those labels may have had on the students. Additionally, as of October 1, 2012, new lunch regulations were implemented into the LSF High School cafeteria that placed additional restrictions on the servings of grains and protein for each meal. The all-you-can-eat salad and fruit bars contained items in those categories, and as a result the cafeteria had to respond to these new regulations by significantly reducing the available options at these service stations. They compensated for this by also increasing the variety and availability of Grab N Go meal options. Due to these changes food sales were only tracked through the first week of the implementation of the intervention for the salad and fruit bars. After that point in time, the number of items offered was dramatically reduced and there was not a way to draw comparisons between baseline and intervention data.

Part of the intent of this intervention was to create an environment that is similar to that of a fast food or other restaurant that would post nutrition information on a menu board. However, as discussed earlier, there are some differences between this environment and that of a fast food restaurant: the primary difference being that students

at LSF High School had to enter into separate lines for each service station. There was not one line to service all meal options and not one menu board to display all meal options with the calorie and fat values posted in one location. This could have made comparisons for each meal option more time consuming and lessened a student's ability to make a quick evaluation of their meal option when placed in the context of all other available options. Additionally, the LSF High School cafeteria worked on a menu that rotated its offerings on a four-week cycle and did not maintain consistency from week to week. So items that were high in popularity were limited in availability, and therefore students may have responded to this with an above average excitement.

Data collection for this portion of the intervention was completed by manually entering in meal items made available at the beginning of lunch and meal items taken at the end of lunch on a production sheet for each service station. Cafeteria workers who were trained on how to do this accurately completed this portion; however, this method of recording is dependent on the accuracy of the count from the cafeteria worker. A more ideal situation would have been one where food sales could have been tracked electronically through the registers that students pass as they exit the cafeteria. The district food services director was in the process of making this option available prior to the start of the intervention but became delayed in the process.

Part two – Student surveys Recruitment for student participation in both surveys one and two presented as a major challenge within LSF High School. There were 260 students recruited to participate in both surveys and the focus group, with a goal of receiving 200 signed consent forms to participate. Recruitment took place in eight English classrooms, two for each grade level, under the assumption that because entire

classrooms were being recruited and survey participation would take place in the classroom setting that students would be encouraged to participate. Students agreeing to participate would need to return two consent forms, one signed by their parent/guardian and one signed by the students themselves. Students were originally given a week to return the signed consent forms prior to the distribution of survey one. At the conclusion of the first week I received correspondence from the three teachers whose classrooms were being used for recruitment that they had only received a handful of signed consent forms. At that point I made the decision to allow another week for students to return their signed consent forms and added an additional incentive of the chance to win a new iPod Nano for anyone who returned a consent form. After an additional week only 43 students had returned both consent forms despite the added incentive and the extra time.

A couple of factors played into the 16.5% return on consent forms, the first being the lack of rapport development with the students being targeted for the study. Having spent the last six years in a high school setting, I am very familiar with working with a high school population, but was unfamiliar to the student body at LSF High School. Rapport between student and teacher/counselor/administrator is important in situations where student participation in an event is needed. Rapport development signifies a level of trust that has been established between the student and the educator. Because I was new to LSF High School and was unfamiliar to the student population, this worked to my disadvantage. Secondly, it is important that when entry is gained into a school or study site that a researcher have the support of those who are responsible in those situations. I was able to gain permission from the principal and the three English teachers whose classrooms were being recruited for survey and focus group participation, but I felt that

only one of the teachers provided support in completing the study goals. Twenty-five of the 41 survey one respondents were all from the same 9th grade English teacher and were recruited from two class sections. The other 16 survey one participants were from a combination of the two other teachers who also had a larger student body to draw from, a total of six class sections. The teacher assisting with the recruitment of the 9th grade students assisted the researcher by creating reminders and generating excitement in the study, and as a result about 40% of the students in her class consented to participate, whereas the two other teachers received a response rate of about 8% combined.

The factors cited above also contributed to the high proportion of 9th grade students completing surveys one and two that could possibly have an effect on the survey and focus group results. Ninth graders being new to the school and relatively unfamiliar with the cafeteria setting may have a difference of opinion from students in the 10th through 12th grades and may be more willing to share their opinions in a focus group setting.

An important finding from the focus group data is that students, in response to the calorie/fat information posted, did not react by lowering their number of purchased calories, but reacted by changing how they consumed the food they typically ate. With this in mind it would have been a good idea to have a question in survey two that assesses this possibility of behavior change to see if other students outside of the focus group acted in a similar way.

Part three – Student focus group. The focus group was limited to 14 students who have volunteered to participate. Thirty students were recruited and 14 participants came forth to volunteer for the focus group. While it is ideal that the focus group

participants be a reflection of the student body as a whole, there may be characteristics specific to individuals who would volunteer to participate versus those that did not volunteer to participate. Additionally, nine of the 14 students in the focus group were 9th graders, which as stated above, could have an effect on the outcome of the focus group.

Recommendations for Practice and Future Research

Recommendations for practice. The provision of nutrition information does nothing to harm an individual and only allows them the opportunity to decide what to do with that information. The decision to invest in the expense--time, labor, money--is where policymakers and policy advocates at all levels conflict. This intervention was completed with very minimal financial expense because the information required is already available within each school cafeteria. The National School Lunch Program has now instituted calorie minimums and maximums at each grade level. Because the majority of food items served in a school cafeteria come with packaging where nutrition information is already provided or can be easily obtained, this information could be very easily be combined to create meal totals through the use of an Excel or similar data analysis software. The major investment to the research came in the amount of time that was spent to create the database of nutrition information and the labels.

Enactment of chain restaurants posting nutritional information on their menu boards and menus has been slow at best. Many restaurants want to hide this information from consumers because, while consumers have a general understanding of the healthfulness of the foods they consume, they do not have a complete understanding of the extent of the nutritional quality. Prior studies have consistently shown that when consumers eat food away from home individuals underestimate the number of calories

and fat in their meal choices. Additionally, when this information is made available from a restaurant a majority of the time the information is only made available online. When a restaurant does make the information available in house the information is generally in a format that is not intuitive to understand or requires additional calculations to analyze, making it much more difficult for an individual to understand and accurately reflect on their choices (Gross Cohn, Larson, Araujo, Sawyer, & Williams, 2012). Some individuals may see this as too much effort and disregard the information entirely. If point of purchase nutrition information is to be an effective strategy for aiding individuals of all ages making more healthful and informed food consumption choices, it needs to be done in a format that is easy for the average individual to understand and interpret, thereby allowing them to feel more confident in the choices that they are making for the betterment of their health.

Information gathered from survey and focus group data indicated some level of interest and utility in the calorie and fat information posted. This is a simple intervention to implement with minimal expense and the information provided allows a student to make a more informed choice on their eating behaviors it is recommended that schools invest in making this information readily available in some form. It is also recommended that should this information be made available the method of delivery be one that gets the information available in a format that is simple, easily accessible, and easy to understand. Having this information available in a cafeteria setting also allows for opportunities of informal and formal learning through passive learning and curriculum tie-ins from other classes, such as health.

Recommendations for future research. As stated earlier, previous research with

adolescent populations and nutrition information have been varied in method and mixed in results. Although there are components in these studies that are enlightening, there is not a wide body of research to draw conclusions from. Recommendations for future research with this population maintaining similar intervention goals would include completing a research study in a school cafeteria where there is not as much variance in the nutritional content offered for each meal. An ideal situation would be one where the average number of calories and fat offered per meal maintained a level of consistency on a daily and weekly basis. This would allow for a better understanding of any observed fluctuations in average calories/fat purchased per student and an interpretation that would more accurately reflect the true influence of the intervention.

One of the components of this study was to extend the length of the intervention because prior studies indicated that a four week or one menu cycle intervention was not enough time to determine any wear out effects. One issue with many health-promoting interventions is that they are short lived. While this study extended the intervention to eight weeks, it was still a very brief amount of time. It is recommended that future studies that assess utilization of nutrition information in a high school population extend the length of the intervention by more than just the addition of a couple of weeks, but allow the intervention to continue for an entire school year. This would allow the school time to develop a culture around this intervention where students, after repeated exposure, would have a better understanding of the nutritional content of their food choices, but also where educators within the school can utilize this information outside of the cafeteria and into the classroom. Extending this intervention for an entire school year would allow for health classes or science classes to take advantage of this information and utilize it

within the curriculum to further educate students from multiple perspectives the uses for keeping track of one's consumed nutritional content. Along this theme, a third recommendation would be to pair this intervention with a curriculum component. This would allow students to learn how the benefits to utilizing this information but also an environment that would support the lessons learned in the classroom. Suarez-Balcazar et al. (2007) found that students who participated in an educational component as well as had access to cafeteria salad bar intervention were more likely to choose a salad bar option than those students who did not participate in the educational intervention. Many health classes cover a topic related to nutritional information; however, at most high schools health class is only required for one semester out of eight and not much time is devoted to this topic in that span.

A fourth recommendation is to conduct similar studies with a larger sample. This study utilized a survey sample as a method of data collection. However, the number of students who consented to participate was not ideal, and I would recommend a larger pre and post survey sample.

An important finding from this intervention was not so much that students purchased food differently as a result of the information posted but that they changed their behaviors after they purchased their food by choosing to not eat the same as they had prior to the intervention. This finding was not one that I had anticipated and I only discovered it as a result of focus group questioning. This study did not directly assess for behaviors after the purchase of a meal. Given this information, a fifth recommendation would be to assess not only how adolescents purchase their food after exposure to nutrition information at point of sale, but if they make any changes to the consumption of

their food after they have purchased it. A few previous studies have utilized strategies such as photographing or taking weights of meals before and after consumption as a method of data collection. These methods continue to be options for future research but they can be invasive and may lead an adolescent to change their behavior because they know they are being tracked over a period of time. Another option for data collection could be a confidential or anonymous survey with a representative sample, semi-structured interviews, or focus groups.

A goal of this study was to post calorie and fat information that would mimic as much as possible a retail food establishment that posts similar information on their menu boards or menus. While there were some similarities to the implementation of this intervention with a fast food restaurant, there were also many differences that might appear minor but could have had an effect on the outcome. The last recommendation for future research would be to assess the food choices of adolescents who purchase food at a retail food establishment, such as a fast food restaurant, outside of school. This environment would allow for a menu that is consistent on a daily basis and allow an individual to assess all meal options and their nutritional content without having to enter into multiple lines because this information would be posted next to each other on one menu board.

Concluding Remarks

Nearly every day there is a new article in the media relating to obesity, food and nutrition, and what is being done about this epidemic. News articles are frequently being written about how restaurants are serving people these mega meals that contain more calories and fat than an individual should consume in a day. While some consumers

believe that the government should not determine the types of food and the nutritional quality of those foods that should be served at restaurants, other health advocates argue that restaurants are being more intentional in offering these extreme meals in order to turn a profit, which is severely negatively impacting the health of our nation. The reality is that most people, while they may have a general ideal of the healthfulness of the foods they consume, cannot accurately predict the nutritional content of the foods they are consuming away from home (Burton, Creyer, Kees, & Huggins, 2006). Whether or not an intervention such as this demonstrates dramatic reductions in calories consumed or none at all, there is an opportunity to educate generations at a time on the importance of being aware of nutritional value of the foods they are consuming by implementing similar interventions in school cafeterias.

While this intervention did not demonstrate a significant reduction in overall calories and fat purchased per student, it did provide evidence to support student initiated behavior changes as a result of this information, demonstrating that students were able to think critically about the choices they had made regarding their food consumption at school. Prioritizing this information in a school environment opens up the possibility that students would then seek out this information and utilize it in other restaurants. Very soon it will be a requirement for all restaurants with 20 or more locations to post this information; however, if consumers are not educated on how utilizing this information can benefit them they will be less likely to do so.

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APPENDIX A
INSTITUTIONAL REVIEW BOARD APPROVAL

To: Daniel Schugurensky

From: Mark Roosa, Chair
Soc Beh IRB 

Date: 06/15/2012

Committee Action: Expedited Approval

Approval Date: 06/15/2012

Review Type: Expedited F7

IRB Protocol #: 1206007926

Study Title: Nutrition Information in a High school Cafeteria: Effect of Point of Purchase Nutrition Information During Lunch in Grades 9-12

Expiration Date: 06/14/2013

The above-referenced protocol was approved following expedited review by the Institutional Review Board.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date. You may not continue any research activity beyond the expiration date without approval by the Institutional Review Board.

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Soc Beh IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Soc Beh IRB. The new procedure is not to be initiated until the IRB approval has been given.

Please retain a copy of this letter with your approved protocol.

APPENDIX B
SURVEY ONE QUESTIONS

Survey 1

This is an anonymous survey assessing food selection during lunch at school. Please answer all questions to the best of your ability.

1. Age: _____ 2. Grade: _____ 3. Gender: M F
4. Race (circle one): White Black Hispanic Asian
American Indian Other
5. Do you participate in Free or Reduced Lunch? Yes No Not Sure

6. On a typical day I am most likely to purchase food from the following location (Please select only one major category):

- ___ Main cafeteria
___ South of the Border
___ Cougar Sandwiches (Hamburgers, cheeseburgers, chicken sandwiches, etc.)
___ Kellis Pizzeria
___ This and That (Popcorn chicken, mashed potatoes, etc.)
___ Salad Bar
___ Grab and Go (Pre-packaged to go items)

___ Snack bar (Please list items you typically purchase at the snack bar)

___ Vending machine (Please list items you typically purchase from the vending machine)

___ Bring lunch from home

___ None of the above

7. If calorie and fat information were made available in your school cafeteria how likely would you be to use this information to guide your food purchases?

- ___ I would not use calorie and fat information at all.
___ I might use calorie and fat information some of the time.
___ I would use calorie and fat information most of the time.
___ I would use calorie and fat information every day.

APPENDIX C
SURVEY TWO QUESTIONS

Survey 2

This is an anonymous survey assessing food selection during lunch at school. Please answer all questions to the best of your ability.

1. Age: _____ 2. Grade: _____ Gender: M F

4. Race (Circle one): White Black Hispanic Asian
American Indian Other

5. Do you participate in Free or Reduced Lunch? Yes No Not Sure

6. On a typical day I generally purchase lunch at the:

___ Main cafeteria

___ South of the Border

___ Cougar Sandwiches (Hamburgers, cheeseburgers, chicken sandwiches, etc.)

___ Kellis Pizzeria

___ This and That (Popcorn chicken, mashed potatoes, etc.)

___ Salad Bar

___ Grab and Go (Pre-packaged to go items)

___ Snack bar (Please list items you typically purchase at the snack bar)

___ Vending machine (Please list items you typically purchase from the vending machine)

___ Bring lunch from home

___ None of the above

7. Have you seen calorie and fat information posted in the cafeteria?

- a. Yes
- b. No

If you answered yes, how has the information affected your purchases during lunch in the cafeteria?

- The calorie and fat information did not affect my food purchases.
- Having calorie and fat information affected my food purchases some of the time.
- Having calorie and fat information affected my food purchases most of the time.
- Having calorie and fat information affected my food purchases every day.

8. How has having calorie and fat information posted in the cafeteria typically changed your lunch purchases?

- The calorie and fat information did not change my lunch purchases.
- I would use the information to purchase food items with fewer calories and/or fat.
- I would use the information to purchase food items with more calories and/or fat.

9. Over the last 8 weeks, how would you describe your use of calorie and fat information posted in the school cafeteria during lunch changed over time?

- I did not use calorie and fat information to guide my food purchases.
- I used the calorie and fat information more when I first noticed it and less as time passed.
- My use of calorie and fat information remained the same over time.
- I used the calorie and fat information less when I first noticed it and more as time passed.

APPENDIX D
FOCUS GROUP QUESTIONS

Focus Group Questions:

1. Student introductions – Students will be asked to go around the room and introduce themselves by providing their name, age, grade level, and a fun fact about them.
2. What do you think about high school lunches?
3. What do you think about nutrition information?
 - a. Did anyone notice the nutrition information posted in your school cafeteria?
4. What was your initial reaction when you first noticed the nutrition information posted in your school's cafeteria?
5. Does having calorie and fat information present in your school's cafeteria affect how you ordered or purchased your food?
6. Does having calorie and fat information present in your school's cafeteria change your opinion of the food served during lunch at your school?
7. Is there anywhere else where you would like this type of information made available?

APPENDIX E
INTERVENTION PHOTOGRAPHS

Photo 1: Three of the five cafeteria meal service stations.



Photo 2: One of the five cafeteria meal service stations.



Photo 3: Main cafeteria seating area



Photo 4: Method of displaying food options prior to the intervention.



Photo 5: Display of calorie and fat information labels next to each meal offering.



Photo 6: Display of calorie and fat information labels for the Grab N Go meal station.

