

NUTRITIONAL INFORMATION AT UINDY

By

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An Honors Project submitted to the University of Indianapolis Honors College in partial fulfillment of the requirements for a Baccalaureate degree “with distinction.” Written under the direction of Dr. Matthew Beekley and Dr. Jennifer Camden.

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First Reader

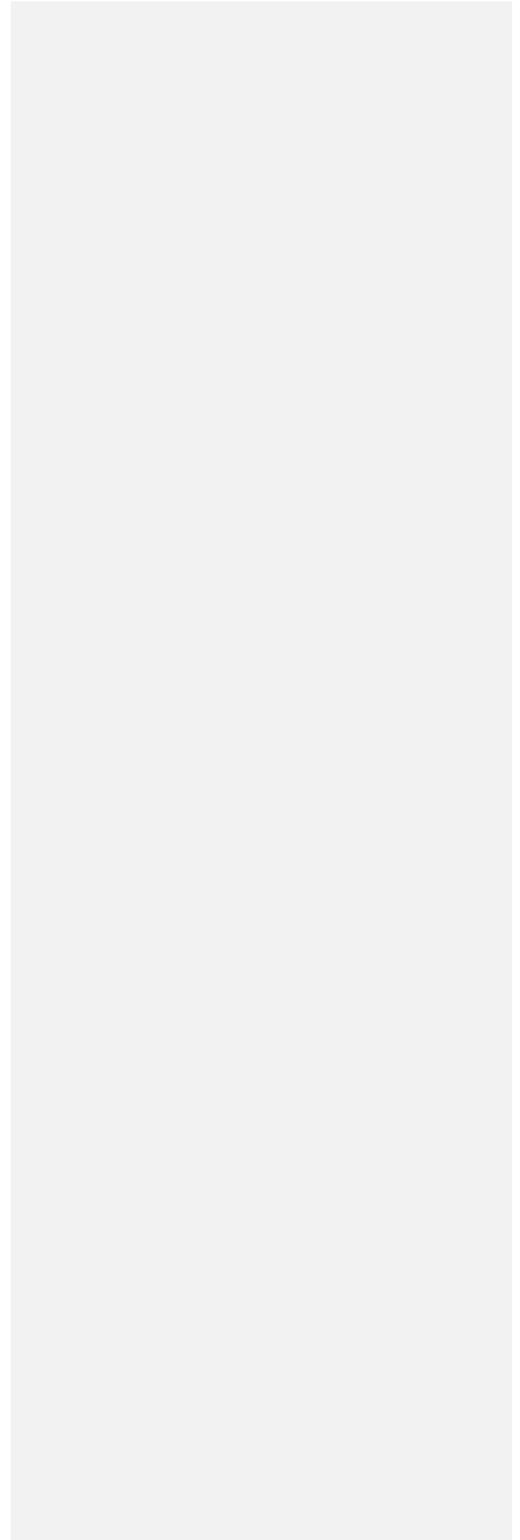
Second Reader

Abstract

The purpose of this project was to develop a system in the University of Indianapolis campus cafeteria that would provide students with information regarding the nutritional value of their food, thus allowing them the opportunity to make a more informed decision. This is relevant because of the prevalence of obesity in the world today. Obesity has been a health issue in the United States since the end of the 20th century. Research has demonstrated that things such as lifestyle modification, physical activity, and dietary changes have been successful in reducing the prevalence of obesity. An increase in nutritional awareness is one technique that has had some success as well. My goal was to come up with a system of providing the information that was both relatively easy to understand for students as well as easy to implement for the staff in the cafeteria. By working in contact with the cafeteria manager, Dianne Szalai, as well as with the cafeteria executive chef, Sean Emrick, I was able to perform a comparison of the eating decisions students made with and without the nutritional information postings. In order to do this, information had to be gathered from a meal without any information posted first. After this, an identical menu was provided, with the only difference being the provision of nutritional information for the main entrees of the meal. The comparison was based on changes in the amount of each entree type that was selected by students. By looking at any changes in the entrees students choose to eat, we were able to determine the amount of influence that the nutritional labels had on students' eating decisions. We selected a meal that provided a sufficient variety of relatively healthy (Blackened Tilapia, Grilled Spanish Flank Steak) and less healthy entree options (Stuffed Shells, Patty Melts) so that a comparison could be made. During the meal in which the nutritional information was provided, I provided surveys to 100 students to gather information regarding their thoughts and opinions of the system. The final product of this project

is a full report and analysis of the data gathered comparing the eating decisions students made with and without provision of nutritional information.

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Statement of Purpose

My honors project was a combined service and research project that involved developing a system for displaying nutritional information to University of Indianapolis students in an effort to motivate them to make more informed eating decisions in the campus cafeteria. I met directly with the cafeteria manager, Diane Szalai, as well as the Executive Chef, Sean Emrick, and the Assistant Director of Food Services, Dan Phillips. Through communication with each of these individuals, I was able to develop a system for displaying the nutritional value of the food options that would be easy for the cafeteria employees to set up as well as easy for students to read and understand. The display system on the serving line provided students with basic nutritional information in order to make their immediate eating decisions. I had also intended to create a database regarding the detailed nutritional information of the cafeteria food option, but it was removed from the project plan. As I began communicating with the new cafeteria manager, a couple of concerns were raised. I quickly realized that this was not a realistic goal due to the cafeteria undergoing many changes with the change in management, which has resulted in many ongoing changes to the cafeteria menu. It was also made clear to me that there are many ingredients involved in each menu item, as most if not all are prepared in the cafeteria and not frozen. This led me to recognize that I was not qualified to interpret the complexity of information regarding the nutritional value of the foods prepared in the cafeteria. This was

something discussed with the manager, and it was agreed that for the purposes of this project it was not likely to be completed.

I was able to complete most of the planning stages of this project throughout the remainder of the 2014 calendar year, and then began implementing the plan at the start of the 2015 calendar year (Second Semester of the 2014 -2015 academic year). I was able to determine the effectiveness of this nutritional awareness system based on a comparison of the amount of each menu item that was consumed throughout the course of a meal with the menu compared to without the menus. The information for this was provided by the cafeteria. I was also able to distribute surveys to students to determine their opinions of the system, as well as obtain any suggestions they had on how it could be adapted or improved. Through comparing the data from two identical meals before and after the intervention, I was able to observe changes in the amount of consumption of each observed entree item. The analysis of this data allowed me to gauge the effectiveness of providing nutritional information to students at the University of Indianapolis, and the results were reassuring.

Literature Review

Introduction

As obesity has continued to present issues for the health of society, people have turned to nutrition as a possible solution. First Lady Michelle Obama's campaign for healthier school lunches and the law that now requires chain restaurants to provide nutritional content of food to their customers are just two examples of how increasing consumer awareness of the nutritional value of the foods they eat has been used as a means to combat obesity. The University of Indianapolis has made small attempts toward joining the movement, but no data had been collected to determine the effectiveness of these interventions. These interventions included things such as posting the number of calories in the meal options on a TV monitor in the cafeteria, but methods such as these were lost in the transition to the new cafeteria management. I met personally with the previous cafeteria staff as well as the incoming cafeteria staff in order to prevent my plans for this project from getting lost as well. Using this project as a field test, I would like to propose a more direct approach that I hope the cafeteria will implement more extensively. Providing all of the nutritional information of the foods served by the University of Indianapolis cafeteria, as well as presenting a system of shapes, colors, or symbols that indicates the healthfulness of the foods places the knowledge in the hands of the students. My project provided students with immediate information regarding of the nutritional value of the foods

using a very simple system on the display line in the cafeteria for students to easily determine how healthy the food options are. As a result, students were better equipped with the nutritional information to make their meal decisions.

Obesity Epidemic

Obesity is defined by the National Institutes of Health as being at least thirty percent over the recommended weight for an individual's given height. The most basic underlying cause of obesity is overconsumption, i.e. taking in more calories than you are expending. (Understanding Obesity). According to 2012 statistics provided by the CDC, approximately 35% of American adults are obese (Adult Obesity Facts). Obesity was ranked by the U.S. Centers for Disease Control and Prevention as the fifth highest health risk in America in 2009 (Obesity and Overweight). One reason behind this high ranking is that obesity increases the risk of developing other health conditions such as type II diabetes, heart disease, hypertension, and metabolic syndrome (Understanding Obesity).

Portion Sizes vs Serving Sizes: A Reason Behind the Weight Gain

According to a 2010 study performed by the Research And Development Corporation (RAND), portion sizes for the average American meal have increased to four times the size they were in the 1950's (Schocker). In order to understand the importance of this statistic one needs to differentiate between a serving size and a portion size. A serving size, as defined by the American Dietetic Association, is the recommended amount of food to be consumed at one time.

This recommendation is calculated by the United States Department of Agriculture, and is based on nutritional content, average portion sizes in food consumption surveys, and estimation based on common measuring utensils (Herring). The American Dietetic Association defines a portion size as being “the amount of food you choose to eat at any one time-which may be more or less than a serving.” (Serving Size vs. Portion Size). Too often the portion size we choose to eat is far greater than the recommended serving size. A simple online search of the phrase “serving size” results in many web pages stating that the current serving sizes are “laughably small” and the Food and Drug Administration (FDA) and United States Department of Agriculture (USDA) need to change the standards in effort “to force food makers to include more realistic serving-size information on their labels.” (O’Connor). These serving size recommendations are currently being debated, and there is a proposal by the FDA that they be updated. These updates will include an adaptation to the serving sizes based on the amount of food people are actually eating as opposed to the amount they should be eating. However, the real issue at hand is not that the serving sizes are too small, but rather that the American appetite is outgrowing them (Ledikwe).

The tendency to overeat comes partially as a learned habit. People are unaware of what a true healthy portion size is because of the exposure to large and unhealthy portions that are presented at almost every out-of-home meal venue because most restaurants, from fast food to family style, provide consumers with food that often contains almost one half of the amount of calories, fats, and/or sodium that a person should consume in an entire day (Ledikwe). Because a

majority of students have been exposed to meals of this type for a bulk of their lives, they come to see the portion sizes as normal, and this is reflected in the portion sizes they choose to put on their plates in the cafeteria. If this type of meal is consumed even just once a week, it could amount to over 30,000 surplus calories a year, which is the equivalent of roughly nine pounds (Zinczenko). These statistics just further emphasize the logic behind America's expanding waistline.

College Meals and The University of Indianapolis

College is an ideal place for an individual to become more knowledgeable on the nutrition of his or her everyday diet because this is often the first opportunity for an individual to experience "significant freedom, including making independent food choices as they are eating away from home on a daily basis" (Fraisure). College students are developing eating habits that will continue into the rest of their lives after graduation. College students who develop the habit of overeating will experience weight gain during school, and this weight will continue to grow after they graduate as their habit of overeating becomes their lifestyle (Anderson). I believe we should break this habit in order to prevent our college students from becoming a part of the increasing obesity statistic. The University of Indianapolis is an ideal sample location for implementing different techniques that could help college students become more informed about nutrition. The University of Indianapolis provides a serve yourself buffet dining venue for its students known as The Marketplace. The cafeteria places no limitations on the amount of food

students can eat per meal, forcing them to approximate the serving sizes based on what they know. Because exaggerated portion sizes have become what Americans believe to be the correct serving size, this approximation tends to be oversized as well.

In the fall semester of 2012, I performed a survey on 100 students at the University of Indianapolis to estimate the number of students who are aware of the serving sizes they should be consuming. It was distributed by myself to students in the cafeteria during a lunch time meal. The survey I conducted included simple questions about common food items offered in the University of Indianapolis cafeteria, such as macaroni and cheese, grilled chicken, chicken wings, spaghetti, among others, as well as questions regarding year in school, whether or not the individual was a student athlete, gender, and ethnic background. However, according to the survey results, it appeared that regardless of age, ethnicity, gender, and level of activity, students at the University of Indianapolis were unaware of what a true serving size is. Only 7 percent of the students could accurately estimate the serving sizes for a majority of the foods listed on the survey. Approximately 64 percent of the participants estimated double the actual serving size for the foods provided. The remaining 29 percent still overestimated the servings, but not quite so drastically. The survey demonstrated that when students do not have a knowledge base as to how much they should be eating, they overestimate their portion sizes. If the University of Indianapolis wants to become a more nutritionally aware and healthier campus, the students must become more informed about the food they are consuming.

Posting information

Some colleges have implemented methods of presenting nutritional information to students to increase their awareness and allow the opportunity to make a more informed decision regarding food choices based on the nutritional value of the food. Some schools, such as Ohio State, have tried providing nutritional information to students. These schools have used a method of providing information by posting small cards by each food option that show the number of calories, and the grams of carbohydrates, fat, and protein. Kent State also provided the nutritional information to students by posting it online. Cafeteria directors and chefs said that they believe that the information postings have been helpful, but they do not have any measurable evidence that the postings have been successful, and instead only mention that they have noticed students paying attention to the postings and taking the time to read and use the information to make their choices (Theiss). However, The Ohio State University performed a study to compare sales of food items from before nutrition postings to after. The results showed that the students began eating foods with fewer calories following the nutrition intervention, but sales did not suffer as a result (Chu). Another study performed at San José State University used a “Fuel Your Life” campaign in which healthful foods were identified with display tags that featured the campaign

logo. The results of this study showed that sales increased for the tagged food items, though the increase in sales was not significant according to statistical tests (Freedman).

Posting information point of sales, specifically in restaurants, has been demonstrated to be ineffective, or at least to have mixed results (Gill). This is crucial to my project because it needs to be recognized that posting nutrition information is not always a successful endeavor. It also helped me to realize that simply adding a number value to the buffet line for the number of calories is not an effective way of communicating to and influencing the consumption decisions of consumers. In order to reach the consumers, something extra has to be done.

My goal was to expand on the calorie posting approach through the development of a system of shapes, symbols, or colors that distinguishes foods as healthy or not based on some aspect such as fat content, nutrient content, or another factor which is to be researched during the developmental phase of the project. My project also expands on this by providing a system rather than a single logo to designate the nutritional value of foods.

Measuring effectiveness

In order to determine the effectiveness of the posting implementation, I obtained information from the cafeteria regarding the amount of each menu item that was consumed throughout the meal. When gathering this information, I was able to set-up a specific menu with Chef Dan Phillips and the rest of the cafeteria staff and then afterward I gathered the statistics of the sales during the meal. This included information such as the number of people who came

through the cafeteria during the meal and the number of each menu item that was taken from the buffet line. I then implemented the nutrition labels and collected the same data a second time on the exact same menu, at the same meal time, and on the same day of the week. This was relatively easy for the cafeteria staff to accommodate because their current menu is one that rotates through on a cycle. Thus I only had to wait until the selected meal cycled back through. Collecting the data from an identical menu, at the same meal time, and on the same day of the week was critical to the project. This allowed me to control variables such as population size and type, which will allow the two meals to be as comparable as possible.

The data obtained provided information regarding the effectiveness of the nutrition posting system in two ways. I was able to determine the average amount of each food option taken per person by comparing the amount of each food option that was taken from the serving line before the nutrition postings divided by the number of people who came through the cafeteria during that meal. This provided the average amount of each food option that each student took. The same calculations were performed on the data from the meal with the nutrition postings, and values were compared. From this information, I was able to determine if students began choosing more of some of the healthier alternatives compared to the less healthy options as a result of nutritional awareness.

Another way that I was able to measure the effectiveness of the project was through survey responses. During the meal in which the nutritional labels were posted, I walked around

the cafeteria and distributed surveys to students. This survey, shown in Figure 1, allowed me to gain insight from the students about the postings and the influence it had on their eating decisions. This information is beneficial not only to the completion of this project, but also to the cafeteria as a guide if they choose to implement a similar system.

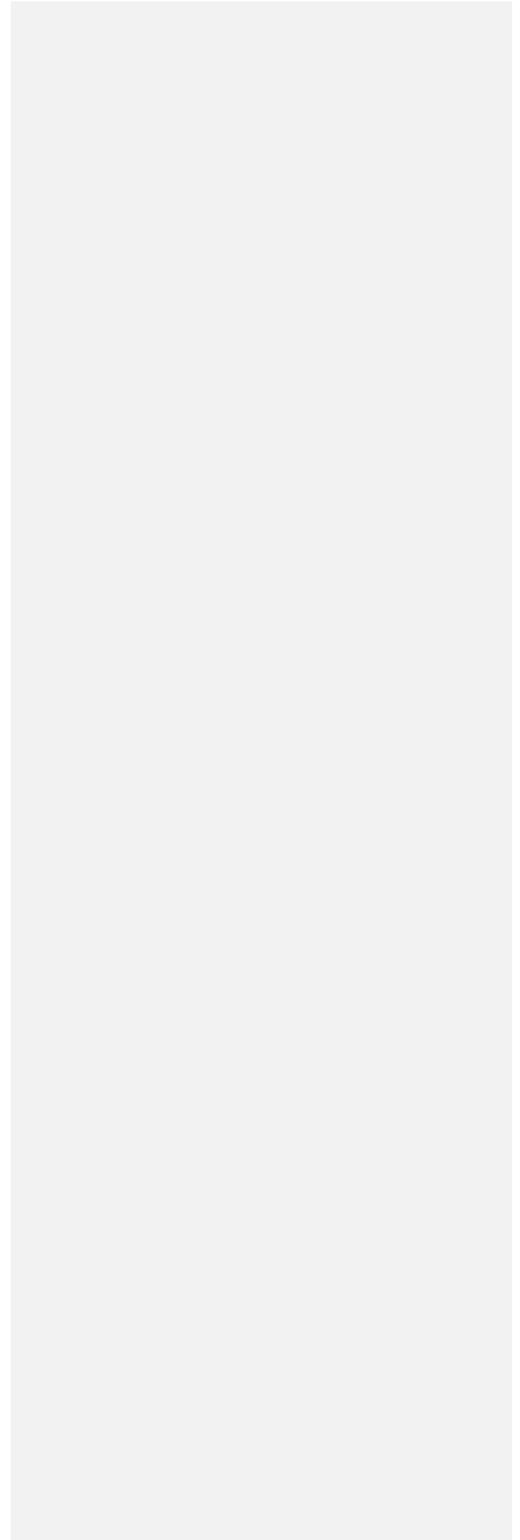
Did you see the traffic light postings by the entrée items?	YES	NO
Did you understand them?	YES	NO
Did it influence your eating decision?	YES	NO
Suggestions?		

Figure 1: The Survey

Summary

As a result of the obesity epidemic, nutrition and consumer knowledge of nutrition have become increasingly important. A number interventions have been made to provide information to consumers such as the ones discussed above. For this honors project, I intended to determine the effectiveness nutritional awareness would have on the consumption decisions of University of Indianapolis students in the UIndy cafeteria. Using the staggering results from the serving size survey I conducted in 2012 as evidence for need of nutritional knowledge on UIndy's campus, I researched to determine the most appropriate method to communicate the information to

students. The sections to follow outline the final protocol as well as results from the nutritional awareness intervention.



Project Procedures

Subjects

The participants in this study were students, approximately 750 for each meal, and faculty at the University of Indianapolis who eat in the university cafeteria, the Marketplace. No details or personal information was gathered regarding the participants. The students surveyed during the meal were selected at random, and the surveys remained anonymous as well.

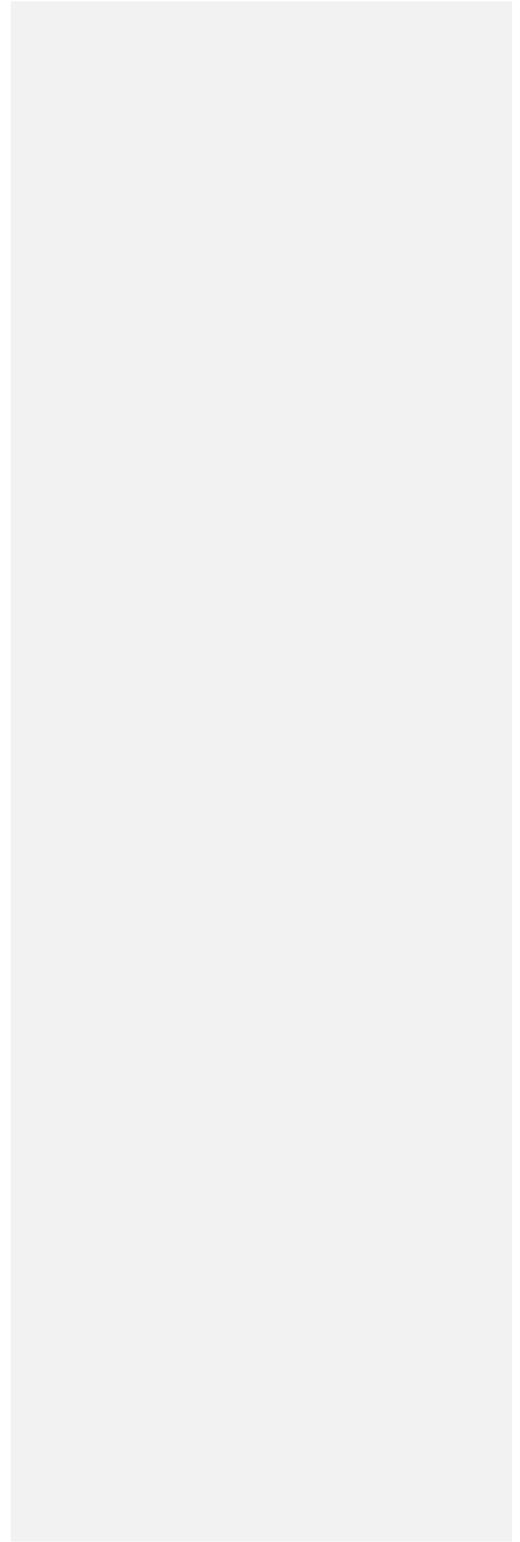
Procedures

The first phase of this honors project was to develop a simplistic and informative system of providing the nutritional information to the students. I had to do research regarding what is the most effective method of portraying this information in the display line (i.e. color coded, shape coded, smile//frown, etc). Through my research, I found that some methods of posting were some seemingly more effective than others (Theiss, Gill, Freedman). The methods I researched needed to be easy to understand and quick to interpret because students flow through the buffet line relatively quickly. During this process, I was able to work alongside the cafeteria staff in analyzing various meal menus provided to students, in order to select a suitable meal for the project. The meal needed to provide a variety of both relatively healthy and relatively unhealthy entree options in order to be feasible for the project. For this part of the project I was able to

access the menus currently in use by the cafeteria in the meal menu rotation. Using the meal and menu selected, I then had to perform a pre-evaluation of student consumption in the cafeteria. This required working with the cafeteria staff in order to record the amount of each of the selected entrees that students consumed. Following the meal I was able to gather the information necessary to determine how much of the healthy and unhealthy entrees were selected by gathering the data provided by the cafeteria staff concerning the number of menu items that were taken as well as the number of students who ate in the cafeteria.

The second phase of my project was to implement the system I had researched and developed in the first phase by actually posting the developed system. The same meal selected during the first phase was used to ensure direct comparison was possible. This required working again with Chef Dan to recreate the exact same meal and ensuring that it was served on the same day of the week and at the same meal time. This minimized error due to a different type and size of the sample population being observed. During the meal in which the system was posted, the same statistical information regarding the amount of each food item served was collected. I was also present during this meal to distribute surveys to 100 random students in the cafeteria to determine their thoughts and opinions regarding the system. Once I had obtained all of this data I was able to perform an analysis to determine any statistical changes in consumption from pre- to post-implementation. Based on this analysis I was able to gauge the effectiveness of providing students with nutritional knowledge concerning the foods they eat. This effectiveness was based

both on changes in the types of food students choose to eat as a result of nutritional awareness and on the survey responses obtained.



Product Produced

The final product of this honors project is an analysis of the researched and developed system of posting. These results provide information regarding the response of the students to the implementation of the system. The results of this project are useful to the cafeteria staff if they intend to implement a system of nutritional posting sometime in the future. Using the results of my research project, they will have some guidance and baseline information from which they can expand.

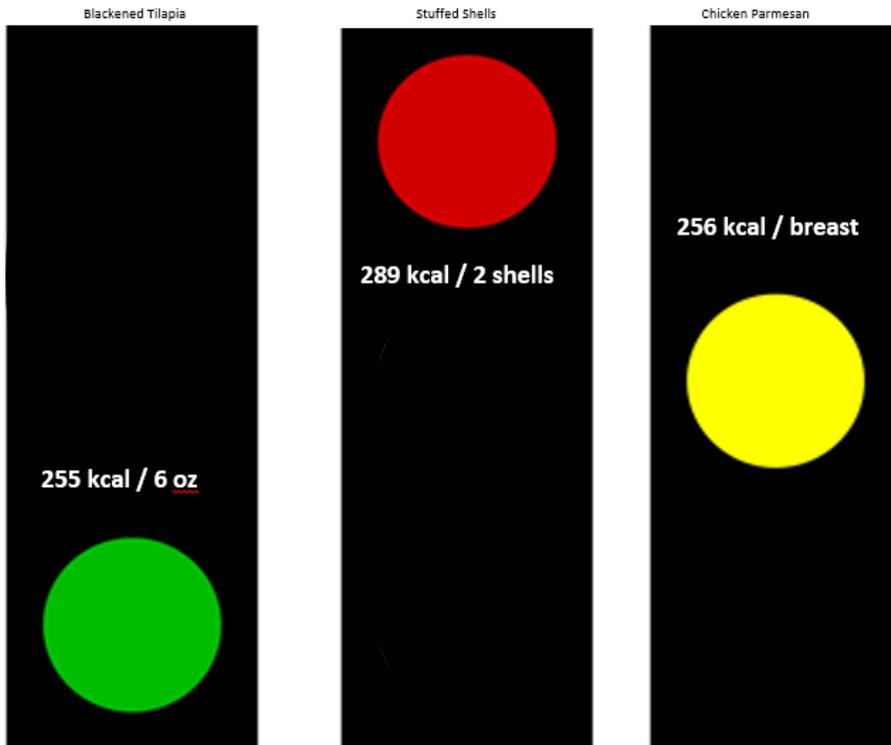
When developing a plan for comparing the amount of each entree selected by students, Dr. Matthew Beekley and developed a mathematical equation that would produce a single number to be used for comparison. This equation, shown in Figure 2, provided a means for us to take into account the total number of servings of each observed menu item and the total number of students who came through the cafeteria.

Figure 2: The Equation

$$\frac{\text{\# of servings used during the meal}}{\text{\# of students in the cafeteria}} = \text{Average serving per student}$$

The nutrition labels that I decided to use for this project were color coded traffic light labels based on the system instituted by the Food Standards Agency in the United Kingdom (Traffic-light food labelling, 2008). These labels can be seen in Figure 3. Entrée items that were considered to be unhealthy were labeled using a red light (Patty Melts and Stuffed Shells), entrée items considered healthy were labeled using a green light (Grilled Spanish Flank Steak and Blackened Tilapia), and the entrée items that fell somewhere in between were labelled with a yellow light. I felt that this style of label would be the most effective because it is a common object that most students would be familiar with, and that could be easily interpreted. I had also communicated with a nutritional cafeteria director from the downtown Lily building, and she said they used a system in which the serving utensils were color-coded as red, yellow, or green (Buettner). She informed me that this system was beneficial because those colors are respectively associated with “stop”, “proceed with caution”, and “go”. This allows the employees to easily distinguish which foods they should be consuming. Using the traffic light labels allowed me to draw from these color associations as well. On the traffic light nutrition labels, I decided to display only the number of kilocalories per serving. This information is the most general, but also the most familiar to students as a result of the kilocalorie postings in places such as restaurants as well as on nutrition labels from store bought food items. An example of the nutrition labels is provided in Figure 3.

Figure 3: The traffic light nutrition labels used for the intervention



Results

The data gathered from the meals was provided on information sheets which the cafeteria staff fills out regularly with each meal. See Figure 4 below for an example of this. This sheet includes values regarding the amount of each menu item to be prepared, the amount of each item used, and the amount of each item remaining at the end of the meal. The amount of each item used was the value I primarily needed from this sheet. The other necessary piece of information

was the relative number of students who came through the cafeteria on the night of the meal. For the meal without the traffic light nutrition labels, I was unable to have an exact value. Thus an estimation was used instead based on the typical number of students who come through the cafeteria. The value from the meal in which the traffic light nutrition labels were posted was a recorded value from the cafeteria staff. Dividing the number of servings of each entree item taken from the serving line by the number of students who came through the cafeteria would provide a value for the number of servings of each menu item taken per person. This allowed the values from the two meals to be compared more directly.

Figure 4: Sample Cafeteria Data Collection Sheet

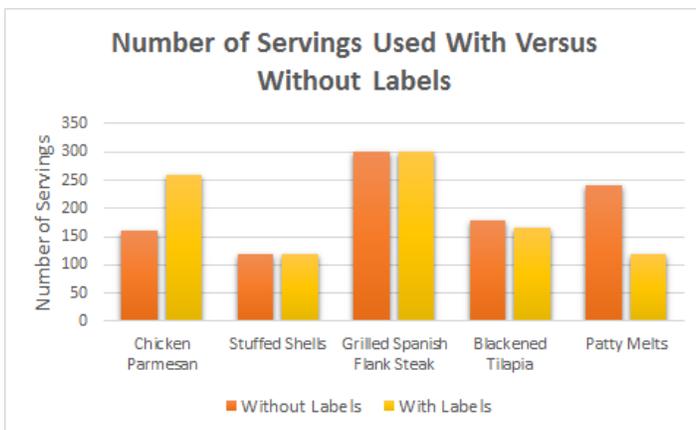
Week #5 Dinner Wednesday

Item	FOOD ITEM	AMT	USED	L/O
1	Grilled Potabello Mushroom Steaks	3cs		
2	GF Sauce/GF Pasta	1pan/1pan		
3	Fresh Baby Carrots/Frozen Veg	1pan/1pan		
4	Rice /Sliced Beef & au jus	1pan-1flat		
	PIZZA			
	Cheeseburger Pizza			
1	Nacho Chips			
2	Queso/Ched. Cheese Sauce			
3	Chicken Parmesan	4cs		
4	Stuffed Shells	4cs		
5	Grilled Spanish Flank Steak	1cs		
6	Roasted Potatoes			
7	Fresh Veg	20#		
8	Fr. Veg	20#		
9	Blackened Tilapia	5cs		
10	Patty Melts	250pc		
11	Whipped Potatoes	1cs		
12				
13	White/Brown Rice			
14	FF	3cs		
15	Grilled Chicken	3cs		
	Expo			
	Pasta			

Based on the raw information gathered, there were a series of comparisons that could be made between the meal with and the meal without the traffic light nutrition labels. The number of chicken parmesan servings, the yellow light entree item, increased from 160 servings without the traffic light nutrition labels to 260 servings with the traffic light nutrition labels. The servings of stuffed shells, a red light food item, remained constant at 120 servings for both meals. The servings of the grilled spanish flank steak, a green light food item, also remained constant at 300 servings for both meals. The blackened tilapia servings, a green light food item, decreased from

180 servings without the traffic light nutrition labels to 165 with them. The patty melt servings, a red light menu item, were cut in half with the traffic light nutrition labels compared to without the labels ($n_{\text{with}} = 120$, $n_{\text{without}} = 240$). These results are depicted in graphical form in Figure

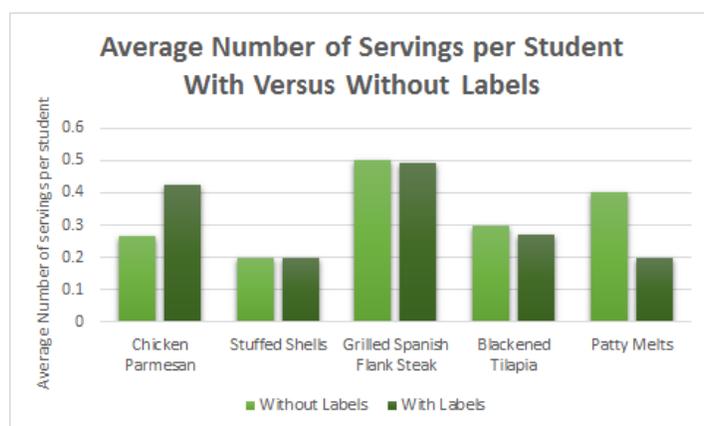
Figure 5: Comparison of Number of Servings with and without the labels.



The comparison of the calculated average number of servings of each entree item per student also provided some adequate information. The chicken parmesan serving average per student increased from 0.27 servings/ student to 0.43 servings/ student when the traffic light nutrition labels were used. The stuffed shells serving average per student remained constant at 0.20 servings/ student. Similarly, the grilled spanish flank steak average number of servings per student stayed at roughly 0.50 servings/ student both with and without the traffic light nutrition labels. The blackened tilapia value actually dropped slightly from around 0.3 servings per person without to 0.27 servings per person with the traffic light nutrition labels. The patty melts saw the most significant change in the average number of servings per person with a decrease from 0.4

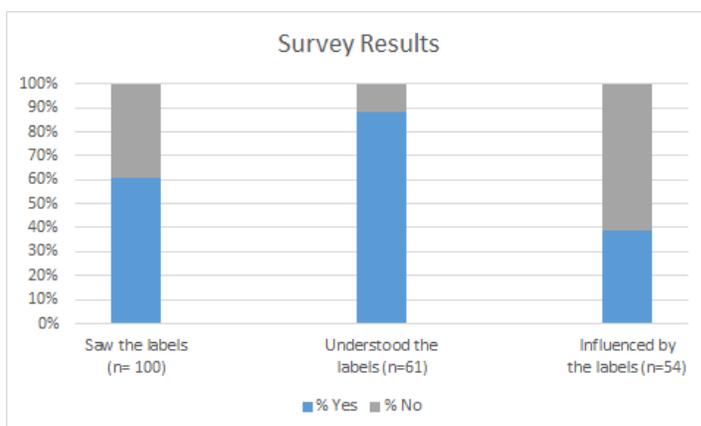
servings per person without the labels to 0.20 servings per person with them. The results of this comparison can also be found in graphical form in Figure 6.

Figure 6: Average number of servings per person with versus without the labels



The responses of the survey regarding the nutritional postings I developed had a series of results that provided valuable information. The first thing to note is that of the 100 students I surveyed, almost 40% of the students did not even see the traffic light nutritional postings (n=39). The remaining 61 students surveyed did notice the traffic lights. Of the 61 students who did see the traffic light nutrition, 88.5% of the students understood how to use the labels (n = 54). The remaining 7 students who did see the labels indicated that they were unsure of their meaning or usage. From the pool of students who indicated that they both saw and understood the traffic light nutrition labels (n=54), less than half of these individuals indicated that their eating decisions were influenced by the labels (n =21). The remaining 33 students from this pool all marked that the labels did not have an influence on the entree they selected. These results are depicted below in Figure 7.

Figure 7: Comparison of “Yes” versus “No” responses for the survey questions



The survey also provided a space for students to leave comments or suggestions regarding the traffic light nutrition labels used. A total of 14 students provided some feedback on this portion of the surveys. From the students who did not see the labels at all, suggestions were to make the labels more visible (3 students) and to put the labels in front of the food as opposed to above the food. Of those students who saw the labels but did not understand them, the only suggestion was to make the font size larger. The students who both saw and understood the labels, but did not utilize them to make their eating decisions also had several suggestions. Two students indicated that they supported the labels and would like to see them continued. Two other students suggested adding the amount of things like trans fats, sugars, and % daily calories instead of just the number of calories per serving. One other student recommended adapting the traffic light labels so that they would be more accessible to color blind individuals. Finally, the students who saw the labels, understood the labels, and felt that their eating decisions were influenced by the labels left a couple of suggestions as well. 3 of these students wrote that they

“loved the idea”, another student indicated that the traffic light labels were not needed but the calorie count was helpful.

Discussion

The results of the traffic light nutrition label intervention presented above provide a variety of implications. The raw data from the meal indicated that the number of servings of chicken parmesan increased for the meal with the traffic light nutrition labels. This item was marked with a yellow traffic light label, and thus I had not anticipated a large change in the number of servings. A potential explanation for this increase might be the increase in the availability of the item during the meal with the labels present. The stuffed shells and the grilled spanish flank steak saw no change. This is likely due to the fact that both of these entree items ran out by the end of the meal time. The blackened tilapia actually decreased by about 15 servings with the traffic light nutrition labels posted. This change is relatively small and could be simply the result of any change to the circumstance such as weather, diets, etc that may influence the students eating decisions. The patty melts raw value for total number of servings was cut in half. This could have been a result of the postings, but other factors again such as weather, diets, etc could have accounted for this change as well. The fact that these were a red light item is supportive of the traffic light intervention because the red light was meant to discourage students from eating too much of that item.

Some interesting information came from the average number of servings per student calculations that I performed as well. The first red light item, stuffed shells, and green light item, grilled spanish flank steak, values did not undergo any change from the meal without labels to the meal with the labels. The yellow light item, chicken parmesan, however, did see a large increase (from 0.27 servings per student to 0.43 servings per student). The blackened tilapia,

another green light item saw a slight decrease of 0.03 servings per student, but this value is relatively small. The other red light item, patty melts saw a 0.2 servings per person decrease. These reductions in average number of servings per student may be an explanation for the increase in the chicken parmesan servings per person. If this is the case then that would indicate that students opted for the yellow light, chicken parmesan, as a substitute for the less healthy red light item, the patty melt.

The results of the survey have their own set of implications regarding the traffic light nutrition label intervention. The fact that 40% of the students surveyed did not even notice the labels indicates that the labels need to either be designed in such a way as to better catch the eye or placed in a more optimal location. Design could be changed easily, however the location, on top of the display glass as seen in Figure 8 is really the only available space for the labels to be placed as point of selection labels. Another reason students may have not noticed the labels is that they are moving through the line at a relatively quick rate and thus have little time to be observant to the environment. One method of helping resolve this issue would be to also provide small traffic light colored labels by the entree items on the menu posted by the entrance to the cafeteria. The cafeteria manager, Diane Szalai, indicated that this would be something the cafeteria would consider doing.

Figure 8: Photo of the traffic light nutrition labels in place.



The number of students who saw the traffic light nutrition labels but neither understood and therefore were not influenced by them, was relatively small at only 7 students. This was actually reassuring to me because it suggested that a large majority of the individuals who did

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Of those students who both saw and understood the labels, roughly 40% suggested that their eating decisions were influenced by the traffic light nutrition labels. While this value may be less than half, I still felt it was supportive of the intervention. This reassured me that knowledge of nutritional information does have an impact on students' eating choices.

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be familiar with the top to bottom set up of the traffic lights. Therefore, the labels might need to be adapted so as to emphasize this aspect of the traffic light, but that would be an easy alteration to make. The suggestions from the surveys seemed very supportive of the program overall. This was reassuring for me, and potentially beneficial for the cafeteria if they choose to go forward with the implementation of this or another food labelling system.

Limitations

There were several limitations to this intervention. The first issue was inability to obtain an exact value for the number of students who came through the cafeteria the night in which the traffic light nutrition labels were not used. Having to use an estimate as opposed to the actual value could skew the data. Another limitation was the fact that some of the food ran out during the meal. This limits the intervention because we do not know whether students coming to the cafeteria after they ran out would have selected those items or not had the options been available. Another limitation was that I did not advertise the traffic light labels before the intervention, and thus students had no prior information to prepare them or instruct them on how to use and interpret the information on the traffic lights. Had I communicated efficiently with students prior to the traffic light nutrition label intervention, the percent of students who did not notice the labels would have likely been reduced.

Conclusion

The results of this intervention indicate that providing students at the University of Indianapolis with nutritional information regarding the information they eat in the cafeteria can influence students' eating decisions. This was supported by the decrease in the amount of red light food item, patty melts, that were served with the labels posted as well as by the students' responses to the survey I distributed. These results indicate that a similar system to this one

might be beneficial for the cafeteria to use. The system used by the cafeteria would need to address the issues and limitations of the traffic light intervention, as discussed above.

Reflection

I believe this project effectively allowed me to strengthen my skills that are important to my professional development. Performing research was the first skill that I got to practice when the project began. Being an exercise science major, I was already familiar with the process of searching for and reviewing journal articles, dissecting them for the key points and relevant information. After this I was able to work on my communication skills during the planning stages while I was working with the cafeteria staff as well as my advisors on developing the intervention to be used. Self-leadership became the skill I found myself practicing most often, and I felt that this was an important part of the honors project, as it is meant to be an independent study project.

Throughout the duration of the project I came across several challenges. Time constraints and time management, as I quickly realized, were key to this project being completed. Because there was no rigidly structured time allotted for this project in the way that classes typically are, I had to prepare a schedule for myself. I had not realized how difficult this part of the process would be because I have grown accustomed to having my schedule laid out for me. But this honors project allowed me to improve my time management abilities.

Another challenge I faced during this project was my lack of experience, and therefore incapacity to perform portions of the project. For example, I had originally intended to create a database of all the offered menu items in the cafeteria. However as I began speaking with the cafeteria staff and learning about the food served, I realized quickly how unequipped I was for

the task of developing a nutritional database. First there was the issue of the changes being made to the menu with the transition from Ted Polk, the old cafeteria manager, to Diana Szalai, the new cafeteria manager. Secondly, a majority of the menu items served in the cafeteria are prepared using a combination of various ingredients. My nutritional knowledge did not extend as far as to analyze food at this level, and thus I was incapable of fulfilling this goal I had originally outlined for myself.

Finally, I learned several things about myself as well; my strengths and weaknesses. This was one of the most important parts of the learning process for me for the duration of this project. I learned that I sometimes overestimate my abilities, which may allow me to challenge myself regularly, can also result in “biting off more than I can chew” so to speak and leave me overwhelmed. I learned that my time management skills needed some improvement, and that communication is one of the most important factors in the success of a project. This project not only allowed me to expand my educational and professional development, but my personal development as well. I believe that the results gained from my project are relevant, and potentially useful to the cafeteria if they choose to move forward with nutrition labels long term.

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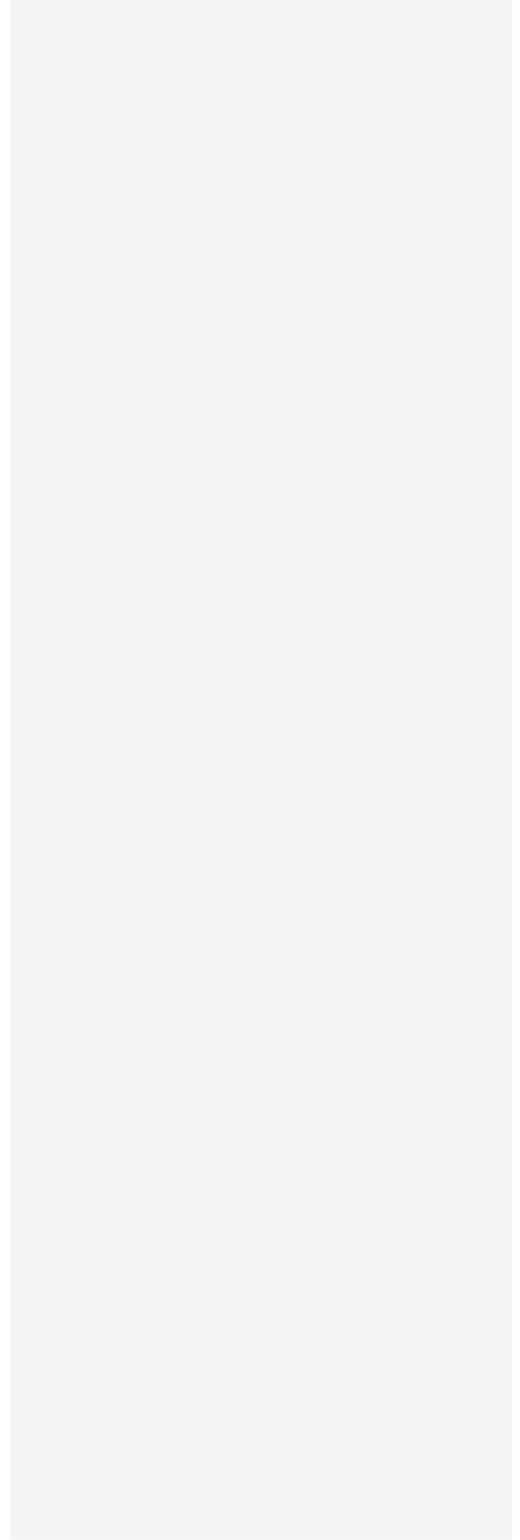
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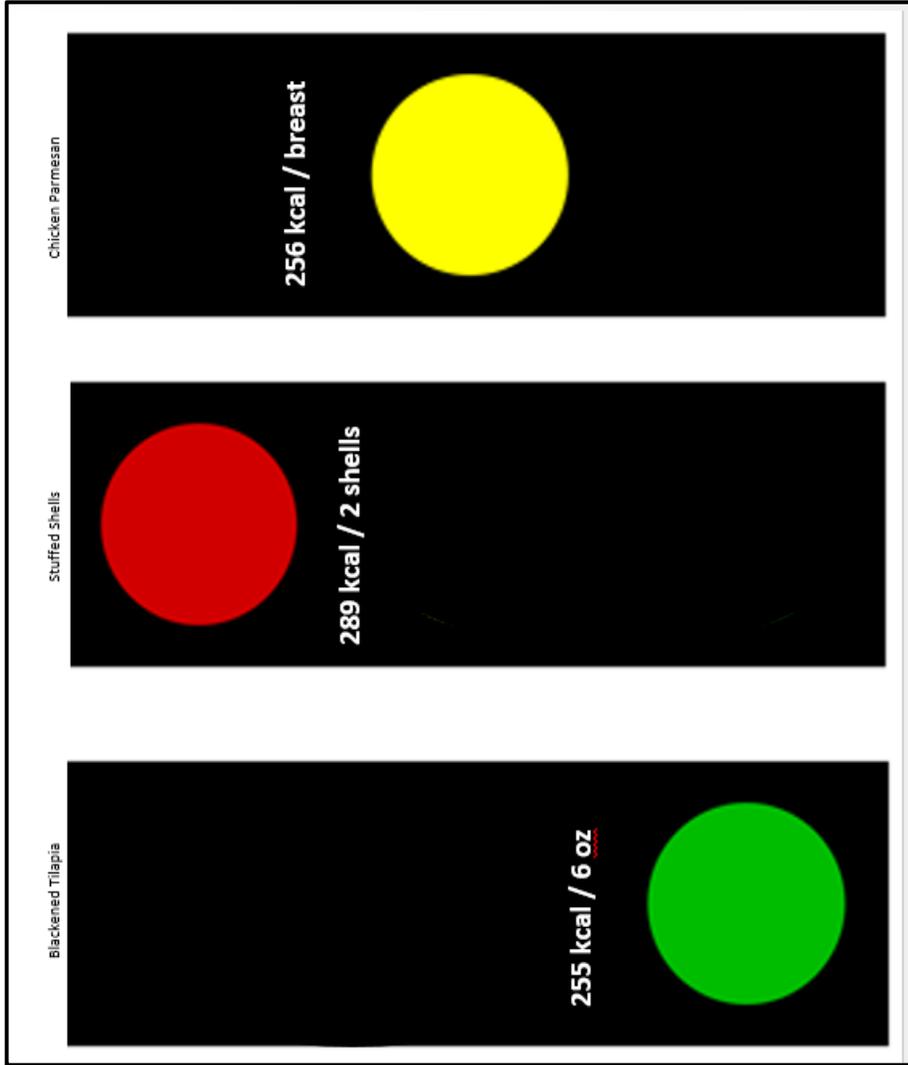


Figure 3: The traffic light nutrition labels used for the intervention

Results

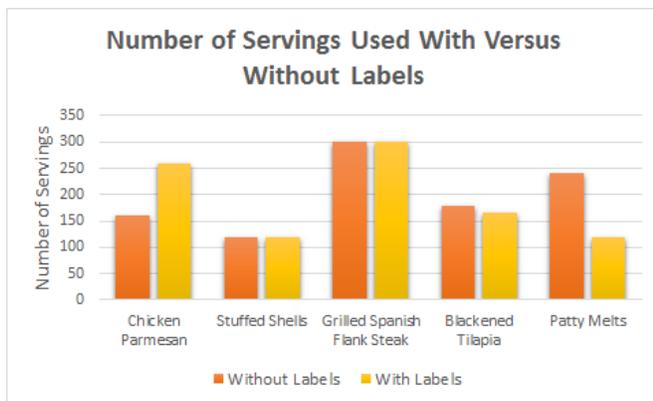
The data gathered from the meals was provided on information sheets which the cafeteria staff fills out regularly with each meal. See Figure 4 below for an example of this. This sheet includes values regarding the amount of each menu item to be prepared, the amount of each item used, and the amount of each item remaining at the end of the meal. The amount of each item used was the value I primarily needed from this sheet. The other necessary piece of information was the relative number of students who came through the cafeteria on the night of the meal. For the meal without the traffic light nutrition labels, I was unable to have an exact value. Thus an estimation was used instead based on the typical number of students who come through the cafeteria. The value from the meal in which the traffic light nutrition labels were posted was a recorded value from the cafeteria staff. Dividing the number of servings of each entree item taken from the serving line by the number of students who came through the cafeteria would provide a value for the number of servings of each menu item taken per person. This allowed the values from the two meals to be compared more directly.

Figure 4: Sample Cafeteria Data Collection Sheet

Week #5 Dinner Wednesday				
Item	FOOD ITEM	AMT	USED	L/O
1	Grilled Potabello Mushroom Steaks	3cs		
2	GF Sauce/GF Pasta	1pan/1pan		
3	Fresh Baby Carrots/Frozen Veg	1pan/1pan		
4	Rice /Sliced Beef & au jus	1pan-1flat		
PIZZA	Cheeseburger Pizza			
1	Nacho Chips			
2	Queso/Ched. Cheese Sauce			
3	Chicken Parmesan	4cs		
4	Stuffed Shells	4cs		
5	Grilled Spanish Flank Steak	1cs		
6	Roasted Potatoes			
7	Fresh Veg	20#		
8	Fr. Veg	20#		
9	Blackened Tilapia	5cs		
10	Patty Melts	250pc		
11	Whipped Potatoes	1cs		
12				
13	White/Brown Rice			
14	FF	3cs		
15	Grilled Chicken	3cs		
	Expo			
	Pasta			

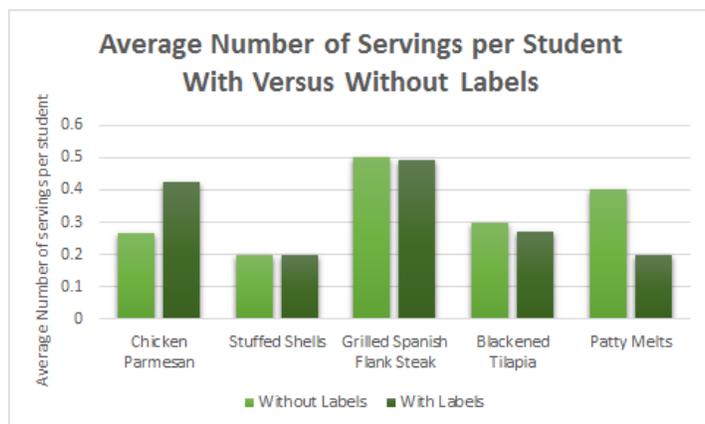
Based on the raw information gathered, a series of comparisons could be made between the meal with and the meal without the traffic light nutrition labels. The number of chicken parmesan servings, the yellow light entree item, increased from 160 servings without the traffic light nutrition labels to 260 servings with the traffic light nutrition labels. The servings of stuffed shells, a red light food item, remained constant at 120 servings for both meals. The servings of the grilled spanish flank steak, a green light food item, also remained constant at 300 servings for both meals. The blackened tilapia servings, a green light food item, decreased from 180 servings without the traffic light nutrition labels to 165 with them. The patty melt servings, a red light menu item, were cut in half with the traffic light nutrition labels compared to without the labels ($n_{with} = 120$, $n_{without} = 240$). These results are depicted in graphical form in Figure 5.

Figure 5: Comparison of Number of Servings with and without the labels.



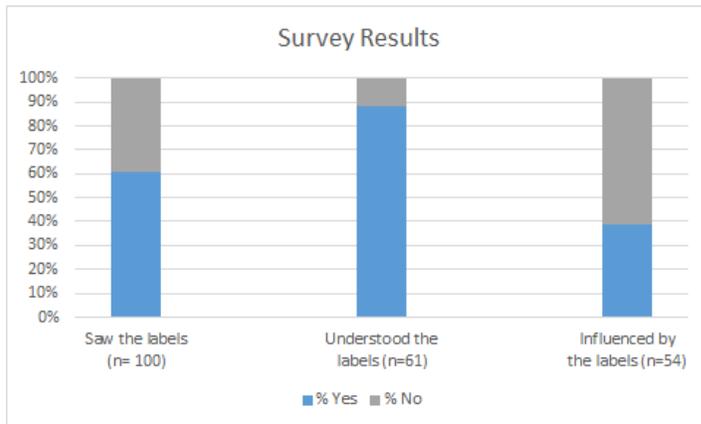
The comparison of the calculated average number of servings of each entree item per student also provided some adequate information. The chicken parmesan serving average per student increased from 0.27 servings/ student to 0.43 servings/ student when the traffic light nutrition labels were used. The stuffed shells serving average per student remained constant at 0.20 servings/ student. Similarly, the grilled spanish flank steak average number of servings per student stayed at roughly 0.50 servings/ student both with and without the traffic light nutrition labels. The blackened tilapia value actually dropped slightly from around 0.3 servings per person without to 0.27 servings per person with the traffic light nutrition labels. The patty melts saw the most significant change in the average number of servings per person with a decrease from 0.4 servings per person without the labels to 0.20 servings per person with them. The results of this comparison can also be found in graphical form in Figure 6.

Figure 6: Average number of servings per person with versus without the labels



The responses of the survey regarding the nutritional postings I developed had a series of results that provided valuable information. The first thing to note is that of the 100 students I surveyed, almost 40% of the students did not even see the traffic light nutritional postings (n=39). The remaining 61 students surveyed did notice the traffic lights. Of the 61 students who did see the traffic light nutrition, 88.5% of the students understood how to use the labels (n = 54). The remaining 7 students who did see the labels indicated that they were unsure of their meaning or usage. From the pool of students who indicated that they both saw and understood the traffic light nutrition labels (n=54), less than half of these individuals indicated that their eating decisions were influenced by the labels (n =21). The remaining 33 students from this pool all marked that the labels did not have an influence on the entree they selected. These results are depicted below in Figure 7.

Figure 7: Comparison of "Yes" versus "No" responses for the survey questions



The survey also provided a space for students to leave comments or suggestions

Commented [1]: Include your survey as an appendix.

regarding the traffic light nutrition labels used. A total of 14 students provided some feedback on this portion of the surveys. From the students who did not see the labels at all, suggestions were to make the labels more visible (3 students) and to put the labels in front of the food as opposed to above the food. Of those students who saw the labels but did not understand them, the only suggestion was to make the font size larger. The students who both saw and understood the labels, but did not utilize them to make their eating decisions also had several suggestions. Two students indicated that they supported the labels and would like to see them continued. Two other students suggested adding the amount of things like trans fats, sugars, and % daily calories instead of just the number of calories per serving. One other student recommended adapting the traffic light labels so that they would be more accessible to color blind individuals. Finally, the students who saw the labels, understood the labels, and felt that their eating decisions were

influenced by the labels left a couple of suggestions as well. Three of these students wrote that they “loved the idea”, another student indicated that the traffic light labels were not needed but the calorie count was helpful.

Discussion

The results of the traffic light nutrition label intervention presented above provide a variety of implications. The raw data from the meal indicated that the number of servings of chicken parmesan increased for the meal with the traffic light nutrition labels. This item was marked with a yellow traffic light label, and thus I had not anticipated a large change in the number of servings. A potential explanation for this increase might be the increase in the availability of the item during the meal with the labels present. The stuffed shells and the grilled spanish flank steak saw no change. This is likely due to the fact that both of these entree items ran out by the end of the meal time. The blackened tilapia actually decreased by about 15 servings with the traffic light nutrition labels posted. This change is relatively small and could be simply the result of any change to the circumstance such as weather, diets, etc that may influence the students eating decisions. The patty melts’ raw value for total number of servings was cut in half. The fact that these were a red light item is supportive of the traffic light intervention because the red light was meant to discourage students from eating too much of that item. However, other factors again such as weather, diets, etc could have accounted for this change as well.

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Some interesting information came from the average number of servings per student calculations that I performed as well. The first red light item, stuffed shells, and green light item, grilled spanish flank steak, values did not undergo any change from the meal without labels to the meal with the labels. The yellow light item, chicken parmesan, however, did see a large increase (from 0.27 servings per student to 0.43 servings per student). The blackened tilapia, another green light item saw a slight decrease of 0.03 servings per student, but this value is relatively small. The other red light item, patty melts saw a 0.2 servings per person decrease. These reductions in average number of servings per student may be an explanation for the increase in the chicken parmesan servings per person. If this is the case then that would indicate that students opted for the yellow light, chicken parmesan, as a substitute for the less healthy red light item, the patty melt.

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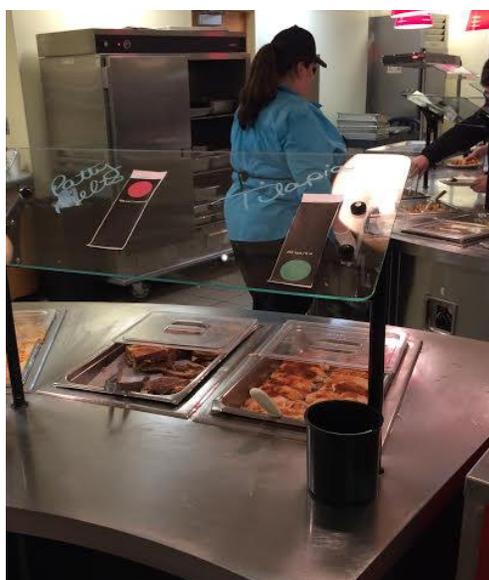


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There were several limitations to this intervention. The first issue was inability to obtain an exact value for the number of students who came through the cafeteria the night in which the traffic light nutrition labels were not used. Having to use an estimate as opposed to the actual value could skew the data. Another limitation was that some of the food ran out during the meal.

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Conclusion

The results of this intervention indicate that providing students at the University of Indianapolis with nutritional information regarding the food they eat in the cafeteria can influence students' eating decisions. This was supported by the decrease in the amount of red light food item, patty melts, served with the labels posted as well as by the students' responses to the survey I distributed. These results indicate that a similar system to this one might be beneficial for the cafeteria to use. The system used by the cafeteria would need to address the issues and limitations of the traffic light intervention, as discussed above.

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