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## Effects of Point of Purchase Marketing on Selection of Vegetables in a University Greek House Foodservice

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*University of Mississippi. Sally McDonnell Barksdale Honors College*

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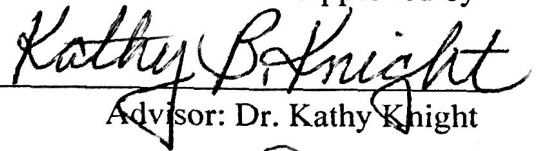
EFFECTS OF POINT OF PURCHASE MARKETING ON SELECTION OF  
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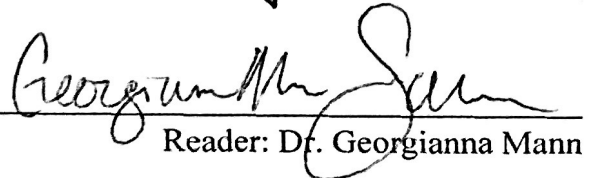
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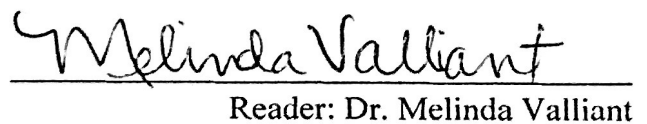
A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of  
the requirements of the Sally McDonnell Barksdale Honors College.

Oxford  
May 2018

Approved by

  
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## **Dedication Page**

This thesis is dedicated to my friends, family, and *Harry Potter*.

## **Acknowledgements**

I would like to begin by thanking Dr. Kathy Knight for agreeing to work with me on this project. I really did not have an exact image for what I was hoping to accomplish, but she spent countless hours helping me along the way. It truly could not have happened without her guidance and direction. I would also like to thank Dr. Scott Knight for his help in data analysis, and his willingness to help with this important aspect of my thesis. I would like to further thank Dr. Georgianna Mann and Dr. Melinda Valliant for serving as my Second and Third readers and for their support and critiques.

I also would like to thank the Sally McDonnell Barksdale Honors College for the opportunities during my undergraduate experience, and for challenging me in the classroom.

I would also like to thank my family and friends. Thank you for listening to me talk about my thesis far more than you probably ever wished to hear about. Thank you for encouraging me on the good and bad days. Lastly, thank you for being there for me always your friendships mean the world to me. Also, to my roommates, thank you for letting me watch and listen to *Harry Potter* when I needed inspiration. I promise I will never force you to do that ever again.

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## **Abstract**

Weight gain is common for undergraduate college students because of factors such as body maturation, increased consumption of fast food, and less physical activity. Weight gain may continue after college if diet and exercise habits do not improve, so learning healthy habits during college can contribute to a healthy adulthood. Recent research has reported that weight gain is inversely related to fruit and vegetable consumption. Because a large portion of college students' diets come from on-campus dining options, fruit and vegetable intake may be lacking because many of these venues may not serve these items or serve them in a way that is not appealing to students. Greek communities on college campuses usually encompass a significant portion of the student population, so research is needed on how to influence Greek students to make healthy dining choices. The purpose of this project was to determine if a three week point-of-purchase intervention targeting vegetables would have an effect on the amount of vegetables selected from one sorority's salad bar. Weights of vegetables served and left over were measured during the first week of the study. The point-of-purchase materials were placed at the beginning of the foodservice line for a two week period and amounts of vegetable served and left over were weighed during that two weeks. Data was analyzed using Analysis of Variance (ANOVA) to look for differences in weekly means of total vegetable consumption, followed by Student-Newman-Kewles Test (SNK) to separate the means (determine which means were significantly different) when differences were found. Student's t-tests were conducted on the weekly means for each

vegetable to determine differences over time. Only tomato selection significantly increased from week 1 to week 2. However, significant differences in the means were seen between weeks 2 and 3 for broccoli, edamame, and tomatoes and between weeks 1 and 3 for cucumber, edamame, and tomatoes. Point-of-purchase marketing did increase the selection of vegetables. With the increasing obesity rates of college students (including those who are Greek) it is important that this area of continues to be explored.



## Chapter 1: Introduction

With the current media focus on weight and the obesity epidemic in America, many students come to college with the fear of weight gain. College students of all races and genders struggle with weight gain, which may be referred to as the “Freshman 15.” Hellmich found that on average college students gained an average of about 7½ to 9 pounds their freshman year and an average 10 to 14 pounds total during their college years (2012). In another study conducted at a private school in the Northeast, Alfano found that more than 17 percent of the college students were overweight or obese, compared to 14 percent at the beginning of their college experience. Weight gain in college may be due to a difference in diet because of the freedom to choose food items, more alcohol consumption, less physical activity, and stress (Alfano, 2006).

Furthermore the USDA 2015- 2020 *Dietary Guidelines* provide information regarding the importance of consuming fruits and vegetables. Fruits and vegetables are said to be associated with positive health outcomes, but over half of the population is not meeting the recommended intake. Research has also shown that consumption of fruits and vegetables decreases the risk for chronic diseases. The *Dietary Guidelines* say that an individual consuming 2000 calories should consume 4.5 servings of fruits and vegetables per day (2015).

Another factor that may affect students’ weight is whether or not students join a Greek organization (Moosa, 2011). Greek organizations are popular on college campuses

around the United States and include from 4 to 75 percent of the undergraduate population, depending on the college or university. These organizations provide community during the transition to college while also providing many social and service opportunities. Greek organizations also often have houses where members can live, and where meals and snacks are served to members daily.

The Greek house director is tasked with developing the menu and ordering the ingredients for the meals that will be served, but they are often not equipped with education or experience in nutrition or food service management (Moosa, 2011). They may not have the knowledge to be able to successfully market healthy food to their student members, so there is a need to determine the best ways to get students to make healthier, more nutritious choices when dining.

The meal service at Greek Houses is similar to that of an all-you-can-eat buffet where there is little portion control. Members grab a plate and go through a line getting at much or as little food as they want, and have the option to go back for seconds. Members pay dues which cover the cost of breakfast, lunch and dinner Monday through Thursday, and breakfast and lunch on Fridays; therefore eating at the house is seen as desirable since it is already paid for.

One possible solution to improving the nutritional health of students in the Greek system is posting nutrition information to prompt the students to select more fruits and vegetables. There have been a limited number of studies done about nutrition in the Greek system. However, one study surveying 72 sorority women revealed that members did not meet the recommendations of 2 cups of fruit per day, but those eating six or more meals did meet the 2.5 cups of vegetables recommendation (Mize and Valliant, 2012).

This study also determined that members of sororities were not eating a balanced diet (2012).

The purpose of this study is to determine if providing point-of-purchase information in Greek food service setting will increase selection of vegetables by students. This will be completed by measuring the intake of fruits and vegetables from the salad bar by college students without nutrition education materials posted and with nutrition education materials posted.

## **Chapter 2: Literature Review**

### **Transition to College**

The transition to college has an effect on weight gain in students (G. Prushinski, C. Etaugh, M. Sas and A. Newell, 2017). A study conducted using surveys and weight measurements of students found that there is weight gain by students during their freshman year of college but it may not be as significant at 15 pounds. The “Freshman 15” is a popular belief, but there is not much evidence to support this claim. The study measured the weight changes in participants during their freshman year and used surveys to assess self-esteem, body image, eating patterns, exercise, social life, and alcohol consumption, and measurements of their beginning and end weight. The study revealed that there was significant weight gain in males and females (+4.3 lbs for females and +4.9 lbs for males) (Prushinski et al.). In the first months of the study, female weight gain was originally associated with an increase in exercise, nighttime snacking, eating with people, and consumption of alcohol, but at follow-up, weight gain was related to eating with people.

The freshman weight gain was further explored by Wengreen and Moncur who conducted the Freshman Health Study, a longitudinal study that examined changes in weight, exercise, and other behaviors related to health during the first semester of college, and found that some students experienced significant weight gain during transition to college (2009). Participants’ weights and measurements were

collected at the beginning and end of the semester, and the students' also completed a survey. Seventy-seven percent of the study's participants maintained their body weight to within 5% of their baseline body weight, 23% of participants gained 5% or more of their body weight, and no participant lost 5% of their body weight or more (Wengreen and Moncur, 2009). Breakfast consumption and more sleep were also associated with weight gain. Wengreen and Moncur conclude that some people may have significant weight gain while transitioning to college.

Deforche et al. further examined the transition to college and the effects that it may have on healthy behaviors. The subjects were 291 high school students who would be in college 1.5 years later. The participants' anthropometric measurements, physical activity levels, sedentary behaviors, and dietary intake were taken at the beginning of the study and again 1.5 years later (2015). The results showed that the students gained close to 2 kg, had an increase in BMI, and experienced a change in health behaviors (Deforche et al.). These changes were associated with less participation in sports, students' spending less time exercising and more time online or studying, less fruit and vegetable consumption, and more consumption of alcohol.

In an effort to understand the possible causes behind freshman weight change, Childers, Haley and Jahns examined "the internal and external factors that guide students' eating decisions" (2011). Participants kept a diary for two weeks about their food habits and their thoughts and feelings towards their food choices, and participated in a focus group. The results of the study revealed that the major factors that determined the students' eating decisions were based on campus environment, emotional issues, family, and weight control (Haley and Jahns). Campus life factors included schedule, social

eating, and emotional eating. Accessibility of food played a larger role than expected in that the college students did not have large budgets which limited food choices. The food diaries revealed that students' food decisions affected their overall health because many students find themselves in negative eating cycles due to adapting to time management in college.

Boyce and Juijer (2015) examined the interaction between baseline BMI and perceived stress in university freshman. The study surveyed participants to assess their weight and then again after 7 months. The results showed that participants gained 1.10 kg during their freshman year. The study also reveals that behaviors did not change but the living situations played a role in weight gain.

### **College Environment Stressors**

The college environment also places stressors on students that can lead to weight gain. A study by Huang et al. (2003) of college students assessing overweight, obesity, diet, and physical activity showed that college students may be overweight, obese, and still fail to meet dietary recommendations. In order to determine overweight and obesity status, participants self-reported their weight and height from which their BMI was then calculated. Fruit, vegetable, and fiber intake was evaluated using the *Berkeley Fruit, Vegetable, and Fiber Screener* (Block et al., 2000). Physical activity was assessed using the *Youth Risk Behavior Survey* (CDC, 2016). It was found that men were more likely to be overweight, two thirds of people did not consume enough fruits and vegetables, and women did not eat enough fiber. Male students were also exercised more days than females. Huang et al. found that a large portion of participants were overweight and had less healthy diets (2003). It is also noted that it is difficult to categorize overweight and

obesity in the college population because they are in transition from adolescence to adulthood. The authors suggested that because of the lack of fruit and vegetables consumed, there is a raised concern in future disease risk. Why is this the case? Because a preponderance of evidence suggests that increasing fruit and vegetable intake plays an important role in the prevention of chronic diseases (Ammerman,

The American Cancer Society (1996) has stated that greater consumption of vegetables, fruits, or both together has been associated with a lower risk of lung cancer. They reported that fruits and vegetables contain more than 100 beneficial vitamins, minerals, fiber, and other substances such as phytochemicals which are protective against several types of cancer. Beans, another vegetable, have also been shown to be protective against cancer. Other agencies such as The United State Department of Agriculture and the United States Department of Health and Human Services (2000), the National Institutes of Health (1997), and the American Diabetes Association have all affirmed that fruit and vegetable consumption leads to reduced risk for cancer, heart disease, and Type II Diabetes, respectively.

In a study to identify the factors that contribute to college students eating patterns LaCaille et al. (2011) recruited 49 students and placed them into six focus groups. The six focus groups' purpose was to identify factors that contribute to college students eating patterns. The participants were asked open-ended questions that related to eating and physical activity habits. Eating behavior was affected negatively by alcohol consumption, the perceived inconvenience of food preparation, food cost, and perceived lack of food choices in campus dining. Personal motivation was a factor in determining the eating habits of men, and social life had an effect on eating habits in women.

Kandiah et al. (2005) studied the effect of stress on appetite and eating habits of college students, and found that people who are stressed have a change in appetite and choose sweet foods over healthier options. Three hundred fifteen students were surveyed using a 45-item stress eating survey. The results also showed that people who want to eat healthy typically eat less healthy when under stress. As determined by Kandiah et al (2005), there is a significant effect of stress on appetite and eating habits in the college population.

Raynor and Levine (2009) examined associations between the five-factor model (FFM) of personality and several key health behaviors in six hundred three college students. The FFM classifies all personality dimensions into 5 broad domains: openness, conscientiousness, extraversion, agreeableness, and neuroticism. The majority of students reported eating less than 2 servings of fruits and vegetables and half the participants reported engaging in physical activity less than two days a week. The study also found that many students participated in risky health behaviors, and that Greek affiliation predicts risky behavior.

Hartwell et al. examined the effect of emotions on food consumption in a cafeteria with four hundred eight potential diners. Participants were asked to complete the emotional status questionnaire before eating and again once they had finished. When there was a change in pre- and post- emotions, participants ate food that had a higher fat percentage. When people were humiliated their meals were not fulfilling, and when they were encouraged meals became for fulfilling. They reported that hat emotions can play a role in what people eat and suggested that negative emotions are reduced when people eat with others.



## **Gender Roles**

Weight management in college can differ between male and female students and classification year of the student. In a longitudinal cohort study which followed freshman through their sophomore years found that weight gain was common in over two-thirds of male and female college students. Participants were assessed at three separate times during their freshman year, and assessed either three times or twice during their sophomore year depending on the cohort number to which they were assigned. The results of the study reveal that both male and females exhibited significant gains in weight and percent body fat over the two-year period (Gropper et al., 2014). The study also found that there is a negative relationship between weight, eating habits, motivation and eating regulation in females, but this was not found in males. The women who had a more regulated eating pattern had lower BMI, weight, and fat. Men with less eating regulation and less motivation had a higher BMI and body fat.

## **Greek Affiliation**

Does Greek Affiliation have any effect on college weight gain? Although this is a question that is often asked, there have been few studies conducted that address the role of the Greek system in college students weight and behavior. Scott-Sheldon, K. Carey and M. Carey administered questionnaires examining risky behaviors, eating, physical activity, and sleeping and found no significant difference in behavior between freshmen and upperclassmen, but that Greek affiliation does significantly impact eating and exercise behavior among college students (2007). Of the students surveyed, 17% were members of Greek organizations. Eating behavior was assessed by analyzing how many

meals they ate per day and their consumption of sugary drinks. Physical activity was assessed by participants indicating how often they exercised, and sleeping habits were addressed by asking how many hours of sleep participants typically got per day. The data also revealed that it would be beneficial for all college students to receive dietary guidance on regular eating.

A study by Allison and Park found different results in their longitudinal investigation examining disordered eating among sorority and non-sorority women revealing that members of sororities gained significantly more weight than people who are not in sororities (2014). The study shows that both groups began college with the same eating attitudes and behaviors, but sorority members gained more weight than non-sorority members, and sorority members' eating behaviors and attitudes did not change throughout college. The authors' suggested that while students may begin college with similar attitudes and beliefs, sorority members continue to diet and monitor eating habits throughout college unlike those not in sororities.

Basow, Foran, and Bookwala (2007) assessed differences in body objectification, social pressure, and disordered eating attitudes in 265 college women, some of whom were in sororities and some were not. Two hundred sixty five women were recruited to participate in the study, but ninety nine women completed the questionnaire. Sorority members were more likely to have disordered eating, and that women who were planning to join a sorority had similar eating behaviors as those already involved in a sorority. It was also determined that sorority members had more body shaming than those not in sororities.

## **Relationship between Vegetable Consumption and Weight Gain**

In a multicenter, prospective cohort study, Vergnaud et al. (2012) analyzed the effects of fruit and vegetable consumption on weight gain on over 300,000 participants from ten countries. The participants were weighed at the beginning and end of the study, and dietary assessment was measured through the administration of surveys where the intake of fruits and vegetables were recorded. The association between fruit and vegetable consumption and weight change was analyzed using a multilevel mixed-effects linear regression model (2012). The results from the study revealed that an increase in vegetable intake in men was inversely associated with weight gain. In women, the association between fruit and vegetable intake and weight gain varied depending upon the location.

Buijsse et al. (2009) looked at total fruit and vegetable intake in relation to subsequent weight change patterns among susceptible populations. Fruit and vegetable consumption versus weight change was analyzed through linear regression. Participants with higher fruit and vegetable intakes were less likely to participate in risky health behaviors such as smoking and drinking. Also, fruit and vegetable consumption was inversely related to weight change, in that a 100g increase in fruits and vegetables per day was related to lower odds for weight gain. The authors concluded that increased fruit and vegetable intake can slow weight gain Buijsse et al. (2009).

Schwingshackl et al. (2015) performed a meta-analysis on prospective cohort studies that analyzed fruit and vegetable consumption and weight change. The results revealed that higher fruit and vegetable intakes can either decrease body weight or lower

weight gain, and that high fruit and vegetable consumption was associated with less consumption of refined carbohydrates (Schwingshackl et al., 2015).

### **Vegetable Consumption**

According to the *2013 Behavioral Risk Factor Surveillance System (BRFSS)* (2017) data only one-in-ten adults meet the federal fruit and vegetable recommendations. Although consumption does vary greatly from state to state, consistently lower intakes were found among men, young adults, and adults living in poverty. Ha and Caine-Bish (2009) assessed the dietary intake of vegetables in college students through the use of food diaries. Participants recorded their intakes over a 3-day period. The intake values were then compared with the MyPyramid food guidance system (2009). Results revealed that consumption of fruits and vegetables was low with over seventy percent of participants eating a cup or less per day.

Tam et al. (2017) examined the body mass index (BMI) values of students as related to their fruit and vegetable intakes. Students kept a three-day diet record and a physical activity record. The participants were educated on serving sizes of vegetables prior to keeping the food records, and the average numbers of servings of fruits and vegetables were determined by dividing the sum of the total amount consumed by three. The average amount of fruits and vegetables consumed was three servings per day. This falls below the five to nine recommended servings of fruits and vegetables by the Center for Disease Controls and Prevention.

Coats et al. (2015) examined the fruit and vegetable consumption of freshmen students at Mississippi State University. Participants completed a demographic survey

and their fruit and vegetable intake was screened. Over 65% of the participants did not consume the five servings of fruits and vegetables each day recommended by the United States Department of Agriculture (USDA) (Coats et al. (2015).

### **Food Habits**

The eating habits of students also play a role into the weight gain among the college student population. Hertzler and Bruce (2002) surveyed a convenience sample of college students focusing on cooking ability, recipes, and food choices, and found that college students were eating out most day and had little cooking knowledge. The study also revealed that men and women are equally completing the tasks of cooking and getting recipes.

The Eating Among Teens II (EAT-II) project conducted by Nelson et al. (2009) examined the differences in young adult eating habits specifically the dietary intake, meal patterning, and home food environments. The researchers distributed and analyzed data from the EAT-II survey and determined that sociodemographic factors vary from student to student, but most young adults are not meeting the dietary recommendations set by the United States Department of Agriculture (USDA).

Desai et al. (2008) investigated the increasing rate of obesity among college students by recruiting students through email to participate in a survey. BMI was associated with Greek affiliation as well as physical activity, family history, and college year. The survey asked for basic body measurements, school name, activities, eating disorder history. The students also filled out the Eating Attitudes Test-26 (EAT-26). The relationship between eating behaviors and behavior and BMI was examined alongside

Greek affiliation. The researchers found that overweight or obese students had higher than average total EAT-26 scores (Desai et al., 2008).

Kasperek et al. (2008) analyzed the effect of exercise, fruit and vegetable intake, and alcohol consumption on weight change in freshmen through surveys given to 193 students. The study consisted of an initial survey that asked questions about demographics and whether or not the student was on a meal-plan. The results from this survey helped the researchers to pinpoint which students would be evaluated based on BMI, and/or physical activity level and/or alcohol consumption. The students' fruit and vegetable intake decreased and half of students gained weight. Most students' activity levels remained the same.

Wansink and Hanks (2013) founded the *Smarter Lunchroom* movement after investigating how small changes in school cafeterias can influence the choice and consumption of healthy foods. One of these changes, the effect of food order in the buffet line was studied by Wansink and Hanks (2013) through monitoring the selections of people in two separate buffet lines. Food offered was identical but the order of service was reversed in line two. The foods placed first in line were more likely to be selected than those placed at the end of the line. The differences in selection were consistent throughout the entire study. This is valuable information to foodservice organizations using buffet lines because it shows that ordering foods does have an effect on consumption.

### **Point-of-Purchase**

In an effort to examine the effect of point-of-purchase materials on food choices and assist consumers in making healthier decisions when purchasing food and drinks,

material highlighting the benefits of certain foods was placed in an on-campus convenience store for five weeks. The foods in the store were labeled with a “Fuel Your Life” tag if healthy, and the purpose of the study was to determine if these labels would increase the sales of the healthy foods (Freedman and Connors, 2010). The intervention resulted in an increase in total sales of healthier items.

Tseng et al. (2015) used the *Nutrition Environment Measures Survey (NEMS)* to study the availability of healthy foods in a campus’ dining facilities and found that healthfulness was varied across campus dining options. Healthful options were found available in half of campus dining halls. The scores of the *NEMS-CD* ranged widely, and food courts had higher scores than other sit down dining options. Higher scores indicated a greater availability of healthful options (2015).

Peterson et al. (2010) examined the changes in healthful food selections by college students after point-of-selection intervention. Peterson et al. developed a survey in order to assess the students’ opinions about healthy food options. Changes in healthful food selections by college students after point-of-selection intervention were analyzed after a three week intervention. They placed healthy choice indicators at point-of-selection to increase availability perception among students to increase purchases. The results of the study show that point-of-purchase intervention can affect the eating habits and behaviors of students.

### **Chapter 3: Methods**

The Greek house system, on the University of Mississippi campus has houses that contain living, studying, food service, and sleeping areas. While not all members actually live in the houses, members can take advantage of the common areas anytime. The houses have House Directors who manage the staff, develop the menus, and the purchase the food. Most members do not have a campus meal plan once they join a Greek house, and often get their nutrition from the meals provided at their respective house. Meals at Greek houses are typically buffet-style, and there is no restriction on what a person chooses from available foods or how much they eat.

The purpose of this project was to determine if a point-of-purchase nutrition intervention targeting vegetables offered during lunch would have an effect on the amount of vegetables selected from one sorority's salad bar. The intervention followed the method which Peterson et al. (2010) used in their study except there was no reordering of the food in the foodservice line.

Approval from the University of Mississippi's Institutional Review Board (IRB) was granted at the beginning of the study, and allowed the primary investigator to place point-of-purchase materials on the tray line of a sorority house at lunch and measure the amount of vegetables set out and recovered from the salad bar. The house serves lunch daily, Mondays through Fridays, to approximately 400 female members between the ages of 18-23 years.



## **Intervention**

The study lasted for three weeks in the spring. Vegetable selection was monitored through weighing the amount of food before and after the 11 A.M. through 1 P.M. lunch period. Amounts of vegetables set out and recovered were measured by weighing during the first week of the study. The point-of-purchase materials were placed at the beginning of the foodservice line for a two week period and amounts of vegetables set out and recovered were weighed during that two weeks. All point-of-purchase material can be found in Appendix B.

## **Statistical Analysis**

Data was analyzed using Analysis of Variance (ANOVA) to look for differences in weekly means of total vegetable selection. Weeks served as treatments because each week received a different level of point-of-purchase information (none, one-week, and two-weeks of information). This was followed by Student-Newman-Kewles Test (SNK) to separate the means (determine which means were significantly different) when differences were found. Student's t-tests were conducted on the weekly means for each vegetable to determine differences over time.

## Chapter 4: Results

Daily before- and after-lunch weights for each individual vegetable for the three-week time period are found in Appendix A. This data was then analyzed to calculate weekly means and standard deviation for total vegetable selection. Additionally, means and standard deviations were calculated for weekly selection for each separate vegetable. The results of the ANOVA for this data is found in Table 1.

**Table 1: Analysis of variance for total vegetable selection over time and treatment.**

Week	Mean (lbs)	Std. Deviation
1	1.36 <sub>3</sub>	1.087
2	1.89	1.086
3	2.26 <sub>3</sub>	1.185

$\alpha \leq 0.05$

<sub>3</sub> indicates significant difference between means in comparisons of week 1 and week 3.

Due to significant differences indicated in the ANOVA, individual t-tests were used to separate the means of the six vegetables. The results of these tests can be found in Table 2. Figure 1 shows the change in vegetable selection over the three week study. The vegetables are individually plotted on a linear graph in order to show change that occurred in selection.

The only significant difference found in vegetable selection between weeks 1 and 2 was for grape tomatoes. Broccoli, edamame, and grape tomato selection increased between weeks 2 and 3. Cucumber, edamame, and grape tomato selection increased between weeks 1 and 3.

**Table 2: Analysis of variance for individual vegetable selection over time and treatment.**

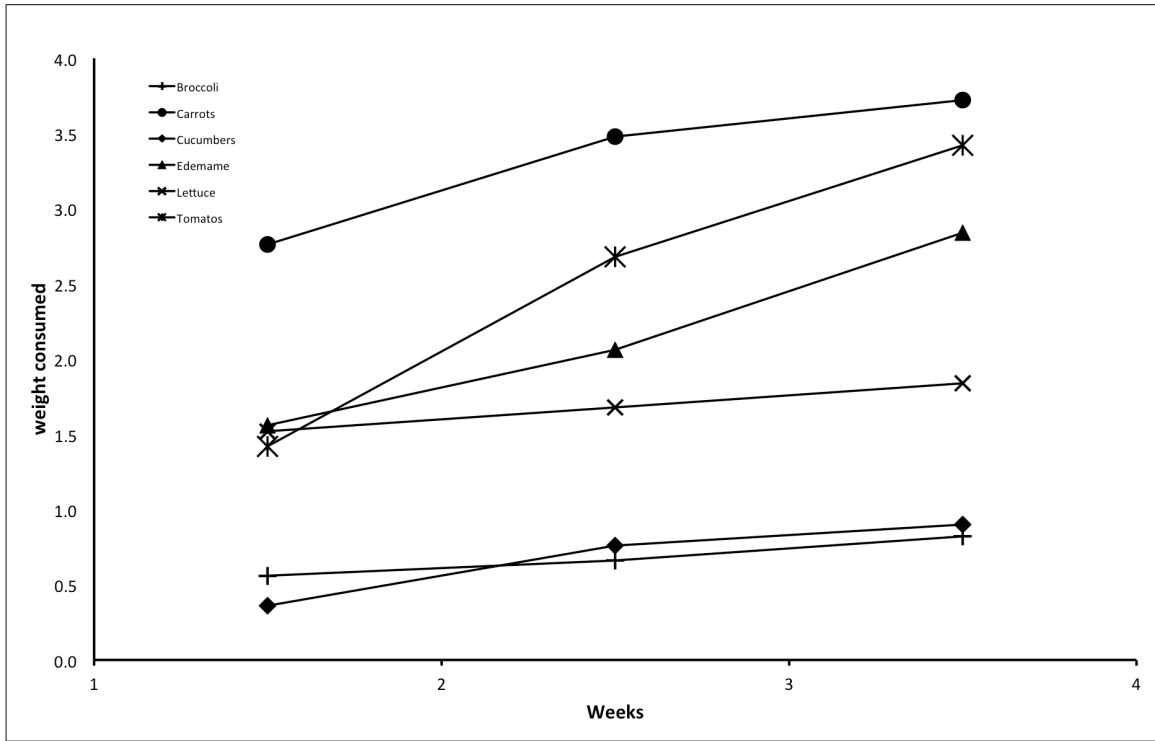
Vegetable	Week	Mean (lbs)	Std. Deviation
Broccoli	1	0.56	0.270
	2	0.66 <sub>2</sub>	0.114
	3	0.82 <sub>2</sub>	0.084
Carrots	1	2.76	1.324
	2	3.48	0.319
	3	3.72	0.111
Cucumbers	1	0.36 <sub>3</sub>	0.462
	2	0.76	0.134
	3	0.90 <sub>3</sub>	0.158
Edamame	1	1.56 <sub>3</sub>	0.907
	2	2.06 <sub>2</sub>	0.888
	3	2.84 <sub>2 3</sub>	0.271
Lettuce	1	1.52	0.004
	2	1.68	0.084
	3	1.84	0.321
Grape Tomatoes	1	1.42 <sub>1 3</sub>	0.683
	2	2.68 <sub>1 2</sub>	0.312
	3	3.42 <sub>2 3</sub>	0.259

<sub>1</sub> Indicates significant difference between means in comparisons of week 1 and week 2.

<sub>2</sub> Indicates significant difference between means in comparisons of week 2 and week 3.

<sub>3</sub> Indicates significant difference between means in comparisons of week 1 and week 3.

**Figure 1. Vegetable selection over time.**



(Point of purchase materials were introduced week 2)

## **Chapter 5: Discussion**

Greek houses offer breakfast, lunch, and dinner during the week, and most members eat most of their meals there due to convenience and the fact that the meals are paid for in membership dues. Because this is where many members are getting their nutrients, an intervention to increase vegetable selection by the members was considered beneficial.

This focused on increasing the selection of vegetables by members of a Greek organization through the use of point-of-purchase materials to market the health benefits of eating these vegetables. The hypothesis that increased amounts of vegetables would be selected during meals due to point of purchase intervention is supported by the results of this study.

When the means of the total amounts of vegetables from weeks 1 through 3 were compared there was no significant difference between the total amount of vegetables selected from the salad bar between weeks 1 and 2 but there was a difference in amounts between weeks 1 and 3. This supports Peterson et al. (2010) who suggested that it probably takes more than one week for point-of-purchase materials to be effective.

When mean differences of the individual vegetables were compared, only tomato selection was significantly increase from week 1 to week 2. However, significant differences in the means were seen between weeks 2 and 3 for broccoli, edamame, and tomatoes and between weeks 1 and 3 for cucumber, edamame, and tomatoes. No differences in the means were seen for carrots or lettuce.

These differences were not due to variability in food source as all vegetables were procured from the same vendor. Seasonality was not a factor because all vegetables were purchased during late winter. As Peterson et al. (2010) also suggested, there is also the possibility that students are already eating a significant amount of lettuce and they were not just going to take more. Lettuce and carrots could have stayed the same because they were already more popular in general. Also, the density of lettuce would be less than that of other vegetables offered, so the lack of a significant difference in lettuce selection could be due to the fact that students could only get so much lettuce on a plate. Some of the point-of-purchase materials such as “dipping in ranch or peanut butter” could have shown students how to eat other vegetables in other ways.

## **Chapter 6: Conclusions**

A goal of the study was to determine if marketing vegetables through point-of-purchase materials would increase the overall selection of the vegetables offered during on the salad bar during lunch at a Greek organization. Results revealed that point-of-purchase marketing did increase the selection of vegetables. While there is little research conducted towards nutrition and food service in the Greek system on college campuses, with the increasing obesity rates of students it is important that this area of continues to be explored.

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## **Appendices**

**Appendix A: Raw data**

Week 1	Day	Vegetable	Starting Weight	Ending Weight
	Monday			
		Broccoli	2 pounds	1.3 pounds
		Tomatoes	5 pounds	3.2 pounds
		Edamame	5.5 pounds	3.6 pounds
		Carrots	5 pounds	1.8 pounds
		Cucumbers	3 pounds	2 pounds
		Lettuce	3 pounds	1 pound
	Tuesday			
		Broccoli	2 pounds	1.4 pounds
		Tomatoes	5 pounds	3.5 pounds
		Edamame	5.5 pounds	3.9 pounds
		Carrots	5 pounds	1.7 pounds
		Cucumbers	3 pounds	3.2 pounds
		Lettuce	3 pounds	1.3 pounds
	Wednesday			
		Broccoli	2 pounds	1.4 pounds
		Tomatoes	5 pounds	3.6 pounds
		Edamame	5.5 pounds	3.5 pounds
		Carrots	5 pounds	1.5 pounds
		Cucumbers	3 pounds	2.4 pounds

		Lettuce	3 pounds	1.2 pounds
	Thursday			
		Broccoli	2 pounds	1.2 pounds
		Tomatoes	5 pounds	2.9 pounds
		Edamame	5.5 pounds	3.2 pounds
		Carrots	5 pounds	1.6 pounds
		Cucumbers	3 pounds	2.7 pounds
		Lettuce	3 pounds	1 pound
	Friday			
		Broccoli	2 pounds	1.9 pounds
		Tomatoes	5 pounds	4.7 pounds
		Edamame	5.5 pounds	5.5 pounds
		Carrots	5 pounds	4.6 pounds
		Cucumbers	3 pounds	2.9 pounds
		Lettuce	3 pounds	2.9 pounds
Week 2	Day	Vegetable	Starting Weight	Ending Weight
	Monday			
		Broccoli	2 pounds	1.5 pounds
		Tomatoes	5 pounds	2.8 pounds
		Edamame	5.5 pounds	5.0 pounds
		Carrots	5 pounds	1.9 pounds
		Cucumbers	3 pounds	2.1 pounds
		Lettuce	3 pounds	1.4 pounds
	Tuesday			
		Broccoli	2 pounds	1.3 pounds

		Tomatoes	5 pounds	2.4 pounds
		Edamame	5.5 pounds	3.3 pounds
		Carrots	5 pounds	1.3 pounds
		Cucumbers	3 pounds	2.3 pounds
		Lettuce	3 pounds	1.3 pounds
	Wednesday			
		Broccoli	2 pounds	1.2 pounds
		Tomatoes	5 pounds	2.0 pounds
		Edamame	5.5 pounds	2.9 pounds
		Carrots	5 pounds	1.1 pounds
		Cucumbers	3 pounds	2.1 pounds
		Lettuce	3 pounds	1.3 pounds
	Thursday			
		Broccoli	2 pounds	1.4 pounds
		Tomatoes	5 pounds	2.3 pounds
		Edamame	5.5 pounds	3.1 pounds
		Carrots	5 pounds	1.7 pounds
		Cucumbers	3 pounds	2.4 pounds
		Lettuce	3 pounds	1.4 pounds
	Friday			
		Broccoli	2 pounds	1.3 pounds
		Tomatoes	5 pounds	2.1 pounds
		Edamame	5.5 pounds	2.9 pounds
		Carrots	5 pounds	1.6 pounds
		Cucumbers	3 pounds	2.3 pounds

		Lettuce	3 pounds	1.2 pounds
Week 3	Day	Vegetable	Starting Weight	Ending Weight
	Monday			
		Broccoli	2 pounds	1.2 pounds
		Tomatoes	5 pounds	1.9 pounds
		Edamame	5.5 pounds	2.8 pounds
		Carrots	5 pounds	1.3 pounds
		Cucumbers	3 pounds	2.1 pounds
		Lettuce	3 pounds	1.3 pounds
	Tuesday			
		Broccoli	2 pounds	1.3 pounds
		Tomatoes	5 pounds	1.8 pounds
		Edamame	5.5 pounds	2.9 pounds
		Carrots	5 pounds	1.3 pounds
		Cucumbers	3 pounds	2.0 pounds
		Lettuce	3 pounds	1.4 pounds
	Wednesday			
		Broccoli	2 pounds	1.1 pounds
		Tomatoes	5 pounds	1.4 pounds
		Edamame	5.5 pounds	2.7 pounds
		Carrots	5 pounds	1.1 pounds
		Cucumbers	3 pounds	2.3 pounds
		Lettuce	3 pounds	1.2 pounds
	Thursday			

		Broccoli	2 pounds	1.2 pounds
		Tomatoes	5 pounds	1.5 pounds
		Edamame	5.5 pounds	2.7 pounds
		Carrots	5 pounds	1.3 pounds
		Cucumbers	3 pounds	2.2 pounds
		Lettuce	3 pounds	1.3 pounds
	Friday			
		Broccoli	2 pounds	1.1 pounds
		Tomatoes	5 pounds	1.3 pounds
		Edamame	5.5 pounds	2.2 pounds
		Carrots	5 pounds	1.4 pounds
		Cucumbers	3 pounds	1.9 pounds
		Lettuce	3 pounds	0.6 pounds

## **Appendix B: Point of purchase materials**

**Appendix B.1.**

DID YOU KNOW THAT BROCCOLI IS HIGH IN  
VITAMIN C?

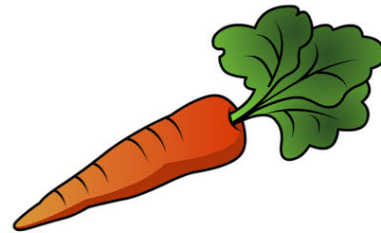


"C" A HIGHER IMMUNE SYSTEM BY ADDING  
MORE BROCCOLI TO YOUR DIET!



**Appendix B.2.**

CARROT ABOUT  
YOUR SIGHT!



EAT MORE CARROTS TO PROVIDE YOUR  
BODY WITH AN EXCELLENT SOURCE OF  
VITAMIN A!

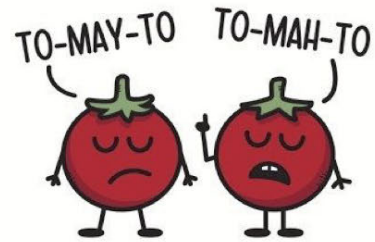
Appendix B.3.

YOU SAY

"TO-MAY-TO"

I SAY

"TO-MAH-TO"



... BUT THERE'S ONLY ONE WAY TO SAY

"EXCELLENT SOURCE OF  
VITAMIN A AND C"!

**Appendix B.4.**

CUCUMBERS AREN'T JUST FOR FACIALS.



THEY ARE GOOD FOR **DIGESTION** TOO!

**Appendix B.5.**

BE A FIBER SUBSCRIBER!

VEGETABLES ARE A GREAT  
SOURCE OF FIBER!

**Appendix B.6.**

DON'T GO BREAKING YOUR HEART



EATING A DIET RICH IN  
VEGETABLES AND FRUITS

MAY REDUCE RISK FOR **HEART DISEASE**,  
INCLUDING HEART ATTACK AND STROKE.

Appendix B.7.

ENRICHING YOUR DIET WITH  
VEGETABLES AND FRUITS MAY  
HELP PROTECT AGAINST  
CERTAIN TYPES OF CANCERS.



**Appendix B.8.**

NOT SURE ABOUT VEGGIES?  
TRY DIPPING THEM IN  
PEANUT BUTTER OR RANCH DRESSING!



**Appendix B.9.**

A **COLORFUL** PLATE IS A **HAPPY**  
PLATE!

ADD AN ARRAY OF **VEGETABLES** TO YOUR  
MEAL TO PROVIDE YOUR BODY WITH  
THE **NUTRIENTS** IT NEEDS!



**Appendix B.10.**

DID YOU KNOW THAT VEGETABLES ARE A  
GOOD SOURCE OF VITAMIN C?



HELP OUT YOUR IMMUNE SYSTEM BY ADDING  
VEGETABLES TO YOUR DIET.