

## Effects of Point-of-Purchase Marketing on Selection of Vegetables in a University Greek House Food service

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### ABSTRACT

Excessive weight gain and other health issues have been inversely related to fruit and vegetable consumption, yet these items are often lacking in many college students' diets. The purpose of this project was to determine if a two-week point-of-purchase intervention promoting vegetables would have an effect on the amount of vegetables selected from a sorority house salad bar. Educational point-of-purchase marketing materials placed at the front of the foodservice line after the first week for the final two weeks. Vegetables served and remaining were weighed throughout the study. Data was analyzed using Analysis of Variance to determine differences in weekly means of total vegetables selected, followed by Student-Newman-Kewles Test to separate the means 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 found between weeks 2 and 3 for edamame and tomatoes and between weeks 1 and 3 for cucumber, edamame, and tomatoes. Point-of-purchase marketing did increase the selection of vegetables.

### INTRODUCTION

College students often struggle with weight gain, which has been associated with dietary changes, alcohol consumption, decreased physical activity, and/or stress (Alfano, 2006; Boyce & Kuijter, 2015; Deforche, Dyck, Deliens, & Bourdeaudhuij, 2015). Hellmich (2012) found that, on average, college students gained 7.5 to 9 pounds (3.40 kg to 4.08 kg) their freshman year and a total average of 10 to 14 pounds (4.54 kg to 6.35 kg) during their college years. In a private college in the northeast United States, more than 17 percent of the college students were overweight or obese, compared to 14 percent at the beginning of their college experience (Alfano, 2006).

Differences in diet because may occur because students have more freedom to choose food items, have little cooking knowledge, and are

driven by social norms. Hertzler and Bruce (2002) surveyed a convenience sample of college students about food-related choices and skills, and found that college students were eating out most days and had little cooking knowledge. The Eating Among Teens II (EAT-II) project conducted by Nelson, Larson, Barr-Anderson, Neumark-Sztainer, & Story (2009) examined the differences in young adult eating habits, specifically the dietary intake, meal patterns, and home food environments. Results from the EAT-II survey indicated that socio demographic factors vary from student to student, but most young adults are not meeting the dietary recommendations set by the US Department of Agriculture (USDA) *Dietary Guidelines for Americans* (2015). Further, it has been demonstrated that student fruit and vegetable intake often decreases during freshman year while activity

levels remain the same, resulting in weight gain (Kasperek, Corwin, Valois, Sargent, & Morris, 2008).

Fruit and vegetable consumption is often suggested as a positive weight management strategy. Higher fruit and vegetable intakes can decrease body weight/weight gain, and high fruit and vegetable consumption is associated with less consumption of refined carbohydrates (Schwingshackl et al., 2015; Buijsse et al., 2009; Vergnaud et al., 2012).

The USDA 2015- 2020 *Dietary Guidelines for Americans*(2015) provides information regarding the importance of consuming fruits and vegetables, which are associated with positive health outcomes and decreased risk for chronic diseases. The *Dietary Guidelines* suggest that adults consuming 2000 calories should consume 4.5 servings of fruits and vegetables per day. However, over half of the US population is not meeting the recommended intake. According to the Centers for Disease Control and Prevention(CDC) *Behavioral Risk Factor Surveillance System* data only one in ten adults meet the federal fruit and vegetable recommendations (Moore & Thompson, 2015). College students, similarly, have low fruit and vegetable intake.(Ha & Caine-Bish, 2009; Tam, Xi, Chan, & Gouzoubachain, 2017).

Coats, Byrd, Buys, and Fountain(2015) examined the fruit and vegetable consumption of freshmen students at Mississippi State University, through the use of a demographic survey. Over 65% of the participants did not consume the five servings of fruits and vegetables each day recommended by the USDA.

Much research has focused on increasing fruit and vegetable consumption in children and adolescents, and this research can be used to inform programming for college populations. The USDA-supported *Smarter Lunchrooms Movement* is centered on small changes in school cafeterias that can influence the choice and consumption of healthy foods (Huang et al., 2013; Wansink & Hanks, 2013). This study's vegetable promotion strategy of using point-of-purchase marketing materials was suggested by the *Smarter Lunchrooms Movement* (Zhuzhina, 2016).

Another factor that may influence weight gain in college students is whether or not they join a Greek fraternity or sorority[hereafter known as

fraternities(generally) or sorority (the specific women's sorority participating in this research)] (Moosa, 2011). Fraternal organizations are popular on college campuses in the US, because these organizations provide many social and service opportunities to their members. These organizations also often have houses where members can live, and where meals and snacks are served to members daily. However, these meals and snacks may be calorie dense and are similar to that of an all-you-can-eat buffet where there is little portion control. The fraternity 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 best practices to encourage students to make healthier, more nutritious choices when dining.

There have been a limited number of studies on nutrition in the fraternity system. However, one study surveying 72 sorority women revealed that members did not meet the recommendations of 2 cups (473 ml) of fruit per day, and members of sororities were not eating a balanced diet (Mize & Valliant, 2012). One possible solution to improving students' dietary quality in the fraternity system is posting nutrition information to prompt the students to select more fruits and vegetables.

Point-of-purchase materials have shown to assist consumers in making healthier decisions when purchasing food and drinks. In one study, material highlighting the benefits of certain foods was placed in an on-campus convenience store for five weeks(Freedman & Connors, 2010). The foods in the store were labeled with a "Fuel Your Life" tag if healthy, and the sales of all foods were recorded. The intervention resulted in an increase in total sales of healthier items. In another study using point-of purchase materials in a college setting, Buscher et al. (2001) increased sales of whole fruit and yogurt, but not of vegetables, and the researchers suggested that the materials be very visible and "attention-grabbing". They also reported that a large poster at the front of the cafeteria was more effective than smaller, individual signage placed right in front of food items. Peterson et al. (2010) examined the changes in food selections by college students after point-of-selection intervention by assessing 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 found that the healthy choice indicators at point-of-selection increased the purchase of healthy foods.

The purpose of this study was to determine if providing point-of-purchase information in one sorority's food service would increase selection of vegetables by students. Selection of vegetables from the salad bar by college students were measured without nutrition education materials posted and with nutrition education materials posted.

### METHODOLOGY

In order 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, this intervention followed the method of Peterson et al. (2010) with the exception that there was no reordering of the food in the foodservice line. The house served lunch daily, Mondays through Fridays, to approximately 400 female members between the ages of 18-23 years. University of Mississippi's Institutional Review Board (IRB) approved this study.

### Intervention

The study lasted for three weeks during the spring of 2018. Vegetables selected were measured before, during and after the intervention, weeks 1, 2, and 3, respectively.

**Table 1.** Analysis of variance for total vegetable selection over time and treatment during point-of purchase nutrition intervention in a university sorority house.

Week	Mean (kg)	Std. Deviation	F value
1	0.617 <sup>a</sup>	1.087	4.818 *
2	0.857	1.086	
3	1.025 <sup>b</sup>	1.185	

Note: Values across rows with different superscripts differ significantly (Student-Newman-Kewles Test;  $P < .05$ ).

Daily before- and after-lunch weights for each individual vegetable for the three-week time period were also recorded. This data was then analyzed to calculate mean intake values for each vegetable. Due to significant differences indicated in the ANOVA, individual Student's t-tests were used to separate the means of the six

**Table 2.** Analysis of variance for individual vegetable selection over time and treatment during a point-of-purchase nutrition intervention in a university sorority house.

Vegetable	Week	Mean (kg)	Std. Deviation	F value
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Amounts of vegetables served and remaining were weighed before and after the 11:00 A.M. through 1 P.M. lunch period. After the first week, 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. The point-of-purchase materials were 5 X 7 inch (12.7 X 17.78 cm) signs that contained motivational quotes about vegetable intake. Examples include: "Did you know that peppers are a good source of Vitamin C?", "Not sure about veggies?" – Try dipping them in peanut butter or ranch dressing!", and "Be a Fiber Subscriber – Vegetables are a GREAT source of fiber!".

### Data Analysis

An Analysis of Variance (ANOVA) was used to determine 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 when differences were found. Student's t-tests were conducted on the weekly means for each vegetable to determine differences over time. Significance was determined at  $p < 0.05$ .

### RESULTS

The results of the ANOVA for weekly means and standard deviation for total vegetable selection for each separate vegetable is found in Table 1.

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

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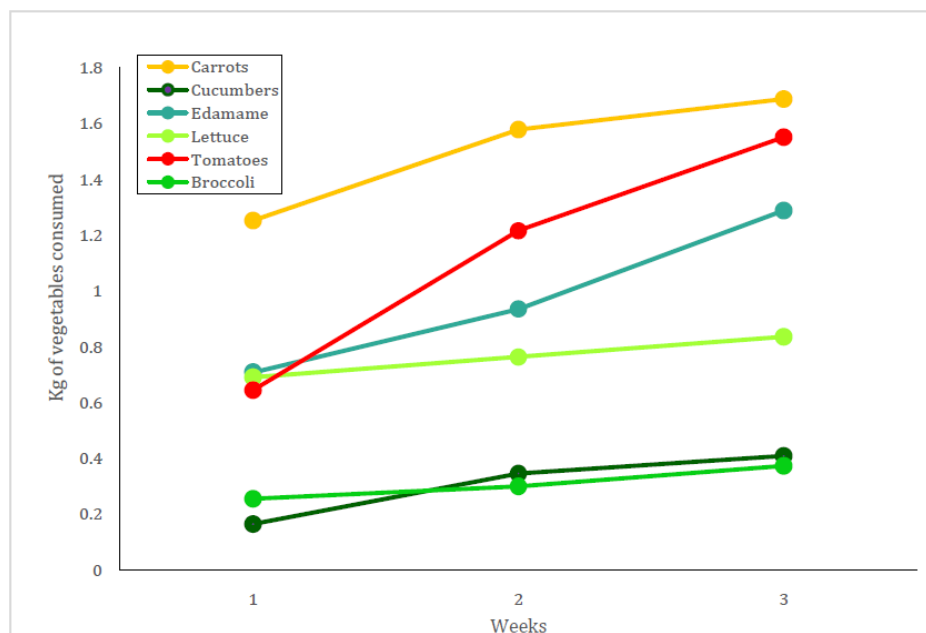
Broccoli	1	0.254	0.270	2.774
	2	0.299	0.114	
	3	0.372	0.084	
Carrots	1	1.252	1.324	0.177
	2	1.578	0.319	
	3	1.687	0.111	
Cucumbers*	1	0.163 <sup>a</sup>	0.462	0.033
	2	0.345	0.134	
	3	0.408 <sup>b</sup>	0.158	
Edamame*	1	0.708 <sup>a</sup>	0.907	3.707
	2	0.934 <sup>a</sup>	0.888	
	3	1.288 <sup>b</sup>	0.271	
Lettuce	1	0.689	0.004	0.507
	2	0.762	0.084	
	3	0.835	0.321	
Grape Tomatoes*	1	0.644 <sup>a</sup>	0.683	24.307
	2	1.216 <sup>b</sup>	0.312	
	3	1.552 <sup>c</sup>	0.259	

\*Significant difference determined by ANOVA ( $P < 0.05$ )

Note: Values down rows with different superscripts differ significantly (Student's  $t$ -test;  $\alpha = .05$ ).

The vegetable intake values are individually plotted on a linear graph in order to show change that occurred in selection. Figure 1 shows the change in vegetable selection over the

three-week study and illustrates that while there was no statistical difference in the means for some of the vegetables, selection of all vegetables increased.



**Figure 1.** Individual vegetable selection over time and treatment during a point-of-purchase nutrition intervention in a university sorority house.<sup>†</sup>

<sup>†</sup>Point of purchase materials were introduced at the beginning of week 2

### DISCUSSION

Fraternity houses offer breakfast, lunch, and dinner during the week, paid for by membership dues, and many members participate due to convenience. An intervention to increase vegetable selection is beneficial as this is where many members are getting their nutrients, an

intervention to increase vegetable selection by the students was considered beneficial. This study focused on increasing the selection of vegetables by members of one sorority with 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 more than one week is required for point-of-purchase materials to be effective, and Freedman and Connors (2010) and Peterson et al. (2010) who both increased sales of healthy food items with point-of-purchase materials. The findings differ from Buscher et al. (2001), however, in that individually placed signs were effective.

When mean differences of the individual vegetables were compared, only tomato selection was significantly increased from week 1 to week 2. This may be that the point-of-purchase materials featuring tomatoes were more colorful and likely more effective as suggested by Huang et al. (2013). Significant differences in the means were seen between weeks 2 and 3 for 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 was the possibility that students were already eating a significant amount of lettuce and they were just not going to take more. The density of lettuce is less than that of the other vegetables offered, so the lack of a significant difference in lettuce selection could be due to limited plate space for lettuce on the 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. Perhaps if the study had been conducted for a longer time, significant increases in the selection of carrots and broccoli would have resulted from this knowledge.

## CONCLUSIONS

The goal of this 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 college sorority house. 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. In addition, this strategy may be useful in encouraging the general population to select more vegetables, which may lead to decreased obesity rates overall.

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