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# Effects of Advertising Methods on Fruit Consumption in Sixth-Grade Population

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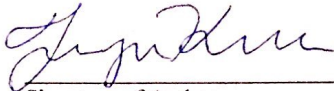
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## ABSTRACT

### EFFECTS OF ADVERTISING METHODS ON FRUIT CONSUMPTION IN SIXTH- GRADE POPULATION

by

Teryn Keller

**Background:** The HHFKA authorizes funding and establishes policy for USDA's child nutrition programs including the NSLP and the SBP to align with the DGA. It is inconclusive whether these dietary requirements increase healthy food selection let alone increase consumption because data is difficult to track, and plate waste studies are time consuming and labor intensive. Several studies have shown an association between advertising methods and increased fruit selection. However, research examining the degrees of impact these advertising methods have on student selection and consumption is lacking.

**Purpose:** The purpose of this study was to investigate whether different methods of advertising in school cafeterias have different effects on influencing children's food choices. The researchers predicted branding would have the greatest effect on fresh fruit selection and consumption. Fresh fruit selection and consumption were observed in a sixth-grade student population during school lunch with majority of students participating in the free and reduced lunch program.

**Methods:** An average of 412 student selection observations and 200 student consumption observations were collected over six days testing three advertising methods with a control

group for each treatment. The three treatment groups consisted of branding, digital advertising, and variety.

**Results:** This study found that digital advertising and variety had a significant effect on students' fruit selection during school lunch by 8.5% and 17.6%, respectively. Digital advertising and branding had a significant decrease on student consumption, but variety increased consumption by 0.9%.

**Conclusion:** In conclusion, advertising methods can increase the selection of fresh fruit, but additional strategies such as nutrition education, garden-based learning, and taste tests should be implemented to increase fresh fruit consumption.

EFFECTS OF ADVERTISING METHODS ON FRUIT CONSUMPTION IN SIXTH-  
GRADE POPULATION

by

Teryn Keller

A Thesis

Presented in Partial Fulfillment of Requirements for the Degree of  
Master of Science in Health Sciences

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## ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
DGA	Dietary Guidelines for Americans
HHFKA	Healthy Hunger-Free Kids Act of 2010
NSLP	National School Lunch Program
PBH	Produce for Better Health Foundation
POS	Point of Sale
SBP	School Breakfast Program
SFA	School Food Authority
USDA	United States Department of Agriculture

## CHAPTER I

### Introduction

Childhood obesity affects 12.7 million children and about 17% of the population aged 2-19 years old, according to the Center for Disease Control and Prevention (CDC).<sup>1</sup> The Healthy, Hunger Free Kids Act of 2010 (HHFKA) authorizes funding and establishes policy for United States Department of Agriculture (USDA) child nutrition programs including the National School Lunch Program (NSLP) and the School Breakfast Program (SBP) to align with the Dietary Guidelines for Americans (DGA).<sup>2</sup> Under this Act, schools are required to increase the availability of fruits, vegetables, whole grains, and fat-free and low-fat fluid milk, reduce levels of sodium, saturated fat, and trans fat in school meals, and meet nutritional needs within a child's calorie requirement.<sup>2</sup> A study using national data found that these changes, such as the removal of sugar-sweetened beverages from school vending machines, were associated with lower likelihood of obesity and overweight students.<sup>3</sup> Johnson et al. (2016), a longitudinal study in Washington state noted an increased mean adequacy ratio from a mean of 58.7 prior to policy implementation to 75.6 after policy implementation and decreased energy density from a mean of 1.65 to 1.44.<sup>4</sup> However, there is not conclusive evidence to demonstrate these standards have positive effects in the majority of schools. Cohen et al. (2012) reports only about 60% of foods served at lunch were consumed, and only half the calories served were consumed after the NSLP standards were implemented.<sup>5</sup> These findings suggest schools should emphasize more palatable foods to increase

consumption, a controversial topic that has recently made headlines and resulted in the liberalization of nutrition regulations of the HHFKA.<sup>6</sup> However, studies comparing food waste, especially in fruits and vegetables, before and after the new school meal standards are limited because they are time-consuming and labor intensive.

In an effort to decrease food waste, a provision called “offer vs. serve” allows students to decline foods they do not intend to eat and select three or more distinct meal components including a fruit or vegetable.<sup>7</sup> School cafeteria production records or point of sale (POS) purchases made by students do not account for food waste, so only selections can be easily tracked, leaving the question of how much students are consuming unanswered. The Smarter Lunchrooms Initiative encourages schools to implement cost effective or no cost strategies to encourage children to make healthier choices in the lunch room. The Smarter Lunchrooms categories include “Focus on Fruit, Vary the Vegetables, Highlight the Salad, Move More White Milk, Boost Reimbursable Meals, Lunchroom Atmosphere, Student Involvement, and School Community Involvement.”<sup>8</sup> “Focus on Fruit” strategies include: at least two kinds of fruit are offered, sliced or cut fruit is offered, a variety of mixed whole fruits are displayed in nice bowls or baskets (instead of stainless steel pans), fruit is offered in at least two locations on all service lines, one of which is right before each POS, at least one fruit is identified as the featured fruit-of-the-day and is labeled with a creative, descriptive name at the point of selection, and a fruit taste test is offered at least once a year.<sup>9</sup> In school year 2013-2014 approximately 56% of School Food Authorities (SFA) reported awareness of the Smarter Lunchrooms Initiative. More than 50% of SFAs reported that some or all their schools

used at least one strategy in each category. Almost 90% of SFAs reported some or all of their schools used strategies from two or more categories.<sup>10</sup>

Scientists have pegged several factors as the scapegoats for the childhood obesity epidemic, one of these being the community environment in which children live, including the lack of accessibility to places to play and be active, variation in licensure of child care centers, restricted access to healthy foods, increased portion sizes, lack of breastfeeding support, and one particular area of interest: the advertising of less healthy foods.<sup>1</sup> Nearly half of middle and high schools in the United States allow advertisements of less healthy foods, including foods high in total calories, fat, salt, sugars, and low in nutrients.<sup>11</sup> Furthermore, the media targets children and adolescents with advertisements for these types of foods.<sup>11</sup> The Institute of Medicine concluded, “food advertising to children affects their preferences, purchasing behaviors, and consumption habits for different food and beverage categories, as well as for different product brands.”<sup>11</sup> In schools, these advertising strategies include posters and signage, logos or brand names on food and beverage coolers, using food sales as fundraisers, events sponsored by corporations, use of advertising in school publications, and classroom curricula and scholarships sponsored by corporations.<sup>11</sup> The CDC proposes that such advertising may have an impact on children and their food choices.<sup>11</sup> Cornell University conducted a study that sought to answer whether branding can improve school lunches and found that it does, in fact, have a profound effect on the food choices of children.<sup>12</sup> The PBH Foundation emphasized the importance of increasing the prominence of fruits and vegetables in comparison to less healthy options, citing research that examined the effects of visibility and proximity of food on food choices made.<sup>13</sup> However to date, research is



lacking in examining how different advertising strategies might have different degrees of impact on students and their food choices. To that end, this study seeks to fill those gaps and to investigate whether some methods of advertising have a greater impact on food choices than others. The main research question this study seeks to answer is whether different methods of advertising in school cafeterias during school lunch have different impacts on the food choices they make and if these methods affect student consumption. The researchers hypothesize that all three methods will influence the choices they make, but that branding method will exhibit the greatest influence on selection and consumption.

Study results have the potential to improve food choices in schools because advertising methods that prove most effective could be utilized to change the environment of school cafeterias and encourage healthier diets. A national study showed having fruits and vegetables available wherever foods were sold, offering only low-fat and fat-free milk, and having three or more USDA standard components were associated with significantly lower odds of overweight students and obesity in high school students.<sup>3</sup> School nutrition has great significance in the realm of childhood obesity because it is one of the few environments where student's make food choices independent of direct influence of parents and other adults. Improved nutrition in schools could ultimately mold children to make healthier diet choices throughout the rest of their lives.

## CHAPTER II

### Literature Review

Children do not eat enough fruits and vegetables, and evidence shows frequent consumption of fruits and vegetables is inversely associated with obesity, highlighting the need for effective interventions to encourage changes leading to healthier eating habits.<sup>14</sup> A variety of scalable, inexpensive environmental changes has proven to promote healthy eating and decrease waste in school cafeterias.<sup>12,15,16</sup> Choices are often made with little thought or effort, shedding light on the high price for prominent shelf space at supermarkets and impulse purchases at the cash register or POS. Variety has proven to be effective in multiple studies.<sup>17,18</sup> People consume more when they have options, especially if they are allowed to choose more than one item.<sup>13</sup> Branding is constantly being used by packaged food companies to increase sales, and the strategy has proven to be effective, which is why companies such as Coca-Cola spend billions of dollars on advertising each year.<sup>19</sup>

#### *Branding*

Marketing through branding includes a variety of techniques: celebrity endorsements, licensed media characters, or messages that advertise a product's attributes such as flavor, taste, nutritional value, or convenience.<sup>20</sup> However, Bragg et al. (2013) found products that incorporate popular athletes, sports teams, and physical activity into packaged food and beverages often do not meet nutritional standards.<sup>21</sup> Branding is effective in promoting unhealthy foods, but the same technique can be used to promote healthy food items.

The Dixon et al. (2014) study looked at a different aspect of branding: counter-advertising. Counter-advertising has been used for years to promote unhealthy foods through health claims, celebrity endorsements, and emotion to create a positive attitude toward a brand. However, counter-advertising could provide a strategy for reducing the unhealthy food advertising to parents while promoting healthier food. The 2 x 2 x 5 between-subjects study tested a control group against two counter-advertisements (content claim and sports celebrity endorsement). Results showed that compared to the control, parents who saw the counter-advertisement were less likely to buy into the unhealthy food claims and were less inclined to purchase these unhealthy foods, suggesting counter-advertising can reduce misleading influence of unhealthy food marketing.<sup>22</sup>

The Hanks, Just and Bromberg (2016) study tested the effects of marketing vegetables in elementary school cafeterias and vegetable consumption. Three treatment conditions were tested: a vinyl banner displaying vegetable characters that were fastened around the base of the salad bar; short television segments with health education delivered by vegetable characters; or a combination of the two. Students took significantly more vegetables from the salad bar when exposed to the vinyl banner and the vinyl banner in combination with the television segments. Branded media can make a large impact on children's school lunch selection underlining the opportunity for marketers and children to benefit from branded media in the lunchroom. Media can be presented in a positive way to encourage children to make better choices.<sup>15</sup>

The prevalence of branding processed, packaged foods to increase the attractiveness of the packaged foods to children is increasing. To counteract the branding

of packaged foods, Wansink, Just and Payne (2012) studied whether healthy foods could be branded in the same way to increase attractiveness and consumption by children. Children were offered an apple with a branded Elmo sticker vs. a plain apple in competition with a cookie. The Elmo sticker almost doubled the choice of apples compared with the pretest control (baseline choice). However, there was no effect of the Elmo sticker on the cookie. The study suggests that branding healthy food choices such as fruits and vegetables may persuade children to make healthier choices in competition with more packaged, highly processed foods. This type of branding can also be applied to age groups who have not yet learned or mastered reading.<sup>12</sup>

### *Variety*

Variety and effects on food intake were closely studied in the 1980's. Rolls et al. (1980) tested whether having a variety of foods in a single meal increased food intake. Previous studies allude that, "as a particular food is eaten, its taste becomes less pleasant, but the taste of other foods remains relatively unchanged."<sup>18</sup> The study compared a variety of foods in succession during a meal to intakes when the same food was offered. Results showed a significant increase in food consumption when a variety of food was offered. For example, subjects ate significantly more when three flavors of yogurt were offered. Flavors were distinctive in taste, texture, and color. However, when subjects were offered three flavors of yogurt differing only in taste, there was not a significant increase in food intake.<sup>18</sup> School lunch strives for children to eat more at lunch, ensuring they are receiving an adequate number of calories and that they are consuming healthy and nutritious foods. Incorporating a variety of foods instead of the same foods repeatedly will increase school lunch consumption.

The Bucher, Horst and Siegrist (2011) study tested the effects of variety on vegetable consumption. The first two groups were only offered one vegetable side, and the third group was offered two vegetable sides. Participants who had a variety of vegetables to choose from consumed significantly more calories from vegetables compared to the participants who were offered only one choice. Having a choice of vegetables increases an individual's likeliness to choose and consume more vegetables.<sup>17</sup> This strategy can be easily replicated in a school cafeteria environment, encouraging young students to try a variety of fruits and vegetables.<sup>17</sup>

Jansen et al. (2010) tested 94 children who were presented with both visually appealing fruit through color and shape and regular fruit. The study compared fruit's visual appeal to the visual appeal of candy, which often possesses a variety in color and shape. This study sought to find what attributes of sweets make them attractive to children by applying the attributes to fruit, and found visual appeal had a strong effect on consumption of fruit.<sup>23</sup>

### *Digital Advertising*

The use of technology among children and adolescents has changed in recent years. Mobile marketing is particularly advantageous to marketing food and beverage to youth because 95% of adolescents are online and 37% report owning a smartphone. Youth also appear to be more vulnerable to "stealth" advertising, enticing ads, promotions, and product placements.<sup>24</sup> Several characteristics make adolescents a primary target for digital marketing including their role in adopting new media early, social interaction, and independence.<sup>25</sup> Major food and beverage marketers use these

elements to target the adolescent population and pose particular risk by increasing adolescent consumption of the unhealthy foods these companies offer.

In the 2009 Pempek and Calvert study, results suggested online advergames, or online games that help market a product, market unhealthy foods effectively. However, these advertising methods were also successful in advertising healthier foods and beverages. Children who played the healthier version of the advergame selected and ate significantly healthier snacks than those who played the less healthy version.<sup>26</sup>

Technology used to market unhealthy products can be used to market healthy products in the same way. Marketing healthier products could help children select healthier food items and thereby help relieve the obesity epidemic.

In the Blanchette and Brug (2005) study, a computer/multimedia channel intervention combined entertaining aural, visual, and text-based messages with nutrition education. This intervention resulted in increased consumption of one serving of fruit and vegetable a day.<sup>27</sup> However, these technology-based nutrition education programs are expensive. This study also suggests exposure to television advertisements of less healthy food such as snack foods were associated with lower intakes of fruits and vegetables.<sup>27</sup>

## CHAPTER III

### Methods

This study utilized sixth-grade students during their lunch period. Sixth-grade students were chosen for several reasons. Research has shown children have a powerful allegiance to certain brands when that brand has been marketed to them over time, which has dictated their attachment to many unhealthy foods.<sup>28</sup> Because children are easily influenced, this study showed whether it is possible to influence their decisions towards healthier choices. The ages of participants range from 10-years-old to 12-years-old, including males and females.

The study took place in a metro Atlanta school, which provided an environment where children are free to make food choices independent of direct influence from their parents. Additionally, the data were more quantifiable and accessible in a school, as children do not typically make their own purchases at a grocery store, and grocery store selections could be difficult or impossible to measure when working with a population of children. The study used a public rather than private school since private schools likely represent a specific sect of the population of children of a higher socioeconomic status. The school has 64.6% students enrolled in the free and reduced lunch program to represent a prominent school lunch participation rate. The school has a diverse demographic background and a multiplicity of races, ethnicities, and socioeconomic classes to ensure that the sample population represents the tendencies of the whole population. It does not reflect any one specific interest, for example, an art school with a large emphasis on performing arts.

<b>Table 1: Demographic Data of Student Population</b>				
<b>Gender</b>	<b>Ethnic Hispanic</b>	<b>Black</b>	<b>White</b>	<b>Total</b>
Female	124	144	61	329
Male	139	127	85	351
Total	263	271	146	680*

\*This number represents the total number of students at participating school.

Branding, digital advertising, and variety were tested in this study. This study required six separate trials: three trials on control days, testing the baseline preferences of children at three separate lunch periods, and three trials on the days of the experiment, with each trial utilizing a different advertising strategy. Three separate controls were conducted because three different fruits were served on days of experiment. The lunch periods included children from various sixth-grade classes in each period, with no pattern associated with ability or special interests in each period. On day one, a control trial was achieved to get a baseline assessment of the childrens' food preferences. During the control trial, no methods of advertising were used. The children went through the lunch line as they normally would on a typical day. This was repeated on days two and three. During the branding trial, the whole fruit was served with a sticker. During the digital signage trial, a fruit was advertised using the application, MealViewer on television screens located in front of the lunch line. During the variety trial, a variety of fruit through color and type was offered. These trials occurred on days four, five, and six. All trials were conducted over a two-week period. Student selections were recorded with a 0 or 1 (0=not selected, 1=selected). The student selections were collected and input into a dataset using SPSS Statistics version 22. Consumption was also recorded at the end of



each lunch period on a scale of 1-5 (1=none consumed, 2=1/4 consumed, 3=1/2 consumed, 4=3/4 consumed, 5=all consumed).

<b>Table 2. Intervention Group and Fruit Served During School Lunch</b>	
<b>Intervention Group</b>	<b>Fruit</b>
Branding Control	Apple
Branding	Apple with sticker
Digital Ad Control	Banana
Digital Ad	Banana with MealViewer advertisement
Variety Control	Grapes
Variety	Grapes and kiwi

## CHAPTER IV

### Results

An average of 430 student selection observations were collected, and an average of 200 student consumption observations were collected over the course of the six-day study. Three days of control data were collected without an advertising intervention. On the intervention days, data were collected with the corresponding treatment: branding, digital advertising, and variety. The proportion of students who obtained the lunch item within each control and intervention group was calculated. There was a 3.2% increase ( $P=0.347$ ) in student selection between the control group and the branding intervention group, a significant ( $P=0.007$ ) 8.5% increase in student selection between the control group and the digital advertising intervention, and a significant ( $P=0.000$ ) 17.6% increase in student selection between the control group and the variety intervention. Figures 1-3 give detailed comparisons and Table 3 gives proportions of student selection data. We compared the p-values with an adjusted significance level of 0.017 since we are considering three tests.

<b>Table 3. Number and Percent of Participants Among the Control and Intervention Groups of Sixth-grade Students Fruit Selection</b>			
<b>Variable</b>	<b>Yes</b>	<b>No</b>	<b>Percent</b>
Branding Control (n=433)	190	243	43.9%
Branding (n=427)	201	226	47.1%
Digital Ad Control (n=431)	137	294	31.8%
Digital Ad (n=476)	192	286	40.3%
Variety Control (n=375)	266	109	70.9%
Variety (n=434)	384	50	88.5%

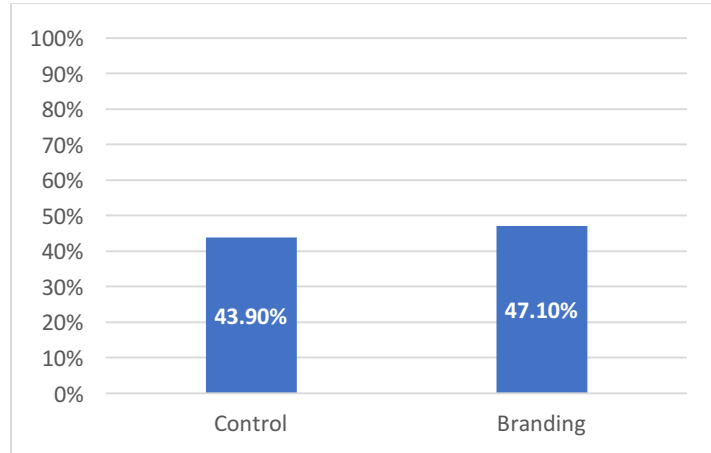


Figure 1. The effect of branding on fruit selection. Values are percent of participating students who chose fruits.  $P = 0.347$ .

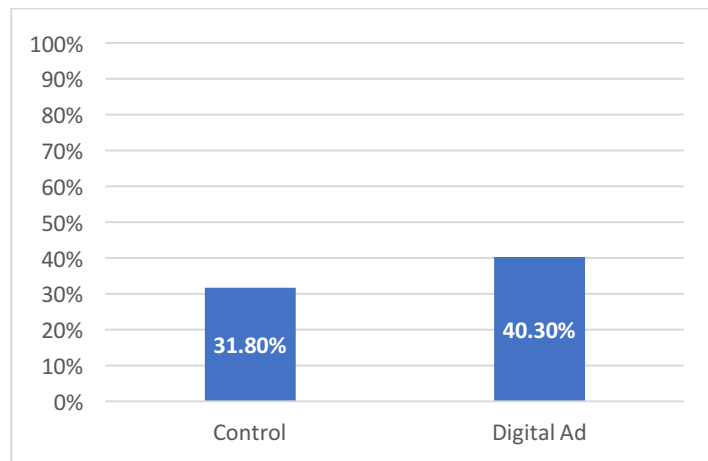


Figure 2. The effect of digital advertising on fruit selection. Values are percent of participating students who chose fruits.  $P = 0.007$ .

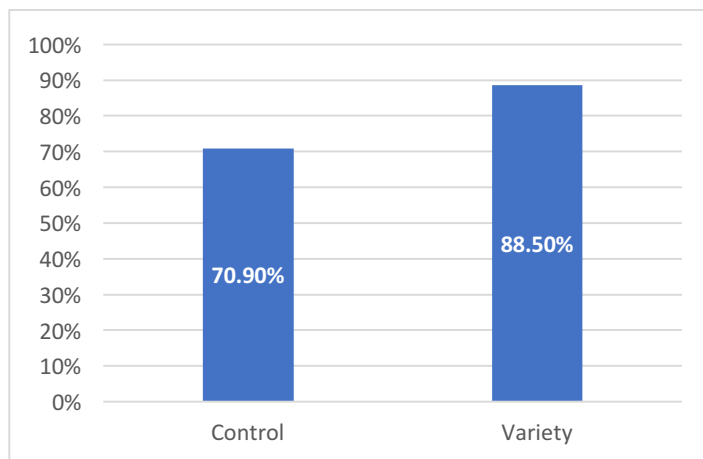


Figure 3. The effect of variety on fruit selection. Values are percent of participating students who chose fruits.  $P = 0.000$ .

For the secondary measurement of how much of the side item was consumed, the Mann-Whitney test was used to assess the effect of each manipulation on consumption rated from 1 (representing “none”) and 5 (representing “all”). Mann-Whitney U test results were compared to examine whether the differences were significant. Branding ( $P=0.000$ ) and digital advertising ( $P=0.007$ ) significantly reduced consumption. Variety was not significant ( $P=0.082$ ). Figure 4-6 give detailed comparisons. Consumption was also compared using another scale: students who consumed half or more (rated 3-5) and students who consumed less than half (rated 1-2). The proportion of students who consumed half or more of the lunch item within each control and intervention group was calculated. There was a significant decrease ( $P=0.000$ ) in the branding intervention, a significant decrease ( $P=0.019$ ) in the digital advertising intervention, and a 0.9% increase in the variety intervention ( $P=0.425$ ). Table 4 describes proportions.

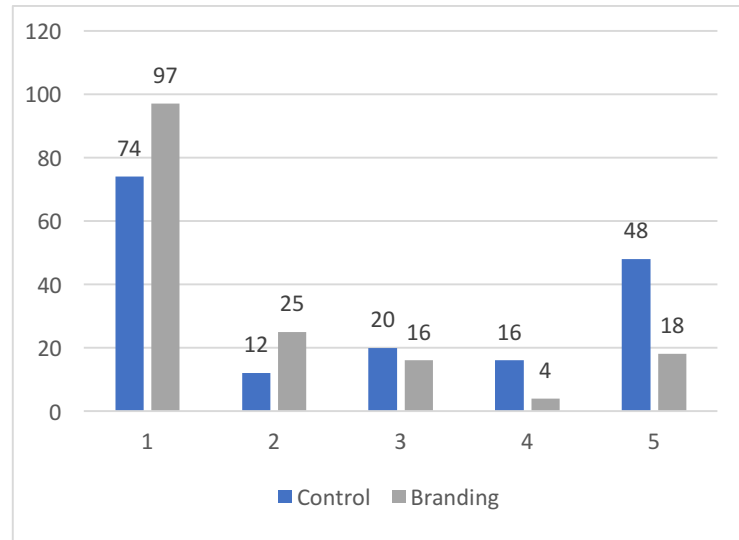


Figure 4. The effect of branding on fruit consumption. Values are numbers of participating students who consumed fruits.  $P=0.000$

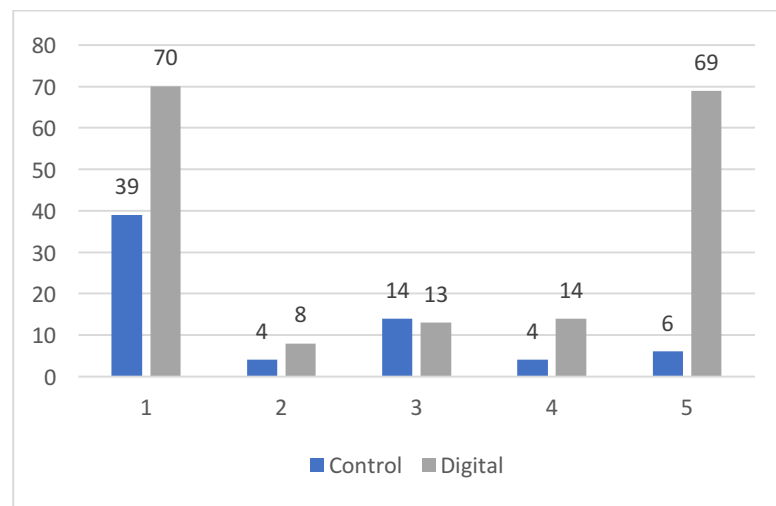


Figure 5. The effect of digital advertising on fruit consumption. Values are numbers of participating students who consumed fruits.  $P=0.007$

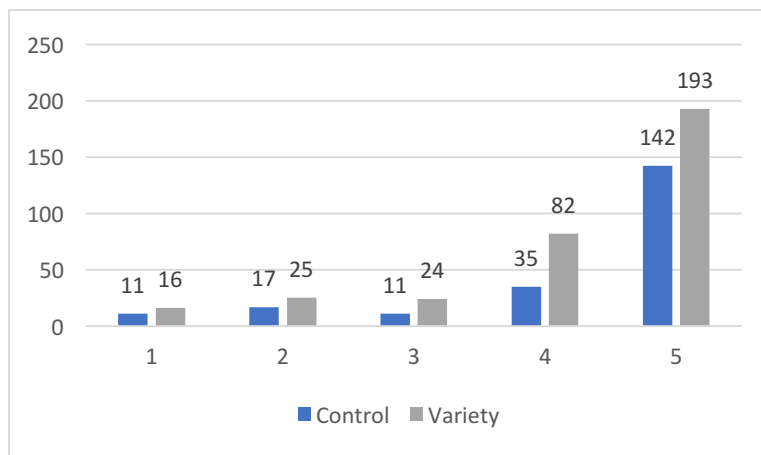


Figure 6. The effect of variety on fruit consumption. Values are numbers of participating students who consumed fruits.  $P=0.082$

<b>Table 4 Number and Percent of Participants Among the Control and Intervention Groups of Sixth-grade Students Fruit Consumption</b>			
<b>Variable</b>	<b>&lt;0.5*</b>	<b>≥0.5</b>	<b>Percent ≥0.5</b>
Branding Control (n=170)	86	84	49.4%
Branding (n=160)	122	83	23.8%
Digital Ad Control (n=137)	43	94	68.6%
Digital Ad (n=174)	78	96	55.0%
Variety Control (n=216)	28	188	87.0%
Variety (n=340)	41	299	87.9%

**\*fruit consumption with a scale of < 3 (1/2 consumed)**

## CHAPTER V

### Discussion & Conclusion

#### *Discussion*

The purpose of this study was to determine if these advertising methods influence fruit selection and consumption among sixth-grade students. Selection increased in all intervention groups, with a significant increase in the variety intervention group. Consumption significantly decreased in the branding and digital advertising intervention groups but increased by 0.9% in the variety group. Previous studies report students discard roughly 47% of their fruit.<sup>5</sup> Compared to this average, the digital advertising and variety intervention groups had a higher consumption rate.

There were several limitations to this study. The data collected was de-identified. However, a unique identifier for each student would allow for a relationship to be derived from student selection before and after the intervention as well as the associated consumption score. The inclusion of this information would be helpful to draw further conclusions based on the individual.

During collection, several limitations arose. Leftover fruit items from the day before were served first during Lunch A before the daily scheduled side item was served. This decreased the total number of students who were given the option to choose the specific fruit item that was being tested. Additionally, fruit served was estimated and ordered based on past production data to limit food waste. Therefore, when the specific fruit item being tested ran out for the day in Lunch C, some students were not given the option to choose the specific fruit item that was being tested. Students who were not



given the option to choose the specific fruit item were not included in the study. Students also share, trade, and play with their food during lunch, which made tracking consumption difficult. Each lunch period is 27 minutes long. If a student was at the end of the lunch line, they would have less time than a student who was at the beginning of the lunch line to consume their lunch. Therefore, students are not given equal amounts of time to consume their lunch, which may affect student consumption data. Data was only collected at one school and one age group over a two-week period. Ideally, data from multiple schools, different age groups, and over a longer period would result in more data and opportunity for further analysis.

Strengths of this study include strong cooperation among the foodservice manager and staff. The food service manager was willing to order specific fruit items for the study and was proactive about potential problems that could arise. The foodservice staff was cooperative in seamlessly ensuring the specific fruit item being tested was available to students in the lunch line. Data were collected twice during the collection of student selection for data verification. Data collectors were trained each day before data collection.

During the variety intervention, there was increased conversation about the specific fruit item being tested (kiwis and grapes). Kiwi, an unfamiliar fruit, was offered with grapes, a familiar fruit. The opportunity to allow students to try a new fruit for the first time increased their awareness and conversation about school lunch. Repeated exposures to less familiar foods can contribute to increased consumption and food acceptability. Children need eight to 15 exposures to a new food to gain acceptance.<sup>29</sup> A study by Daniel (2015) reports low-income parents eat unhealthier food and face a bigger

financial burden when buying new foods for their child to try. Parents who experience financial constraints minimize food waste by purchasing familiar foods they know their child will eat and avoiding new items or reintroducing foods that their children may refuse.<sup>30</sup> It is important that schools provide a healthy environment for children, including the opportunity to try new foods.

Furthermore, we did not measure total consumption of student trays. Rather we looked at the consumption of the specific fruit item we were testing. However, data providing total consumption could offer different results. The goal of school nutrition is to increase student consumption of school meals, and even if the student did not consume more of the fruit offered that day, the variety and advertising of the meal could have resulted in an increase in overall consumption.

In addition to advertising methods, comprehensive nutrition approaches such as nutrition education, garden-based learning, and taste tests need to be taken to increase fresh fruit consumption. School cafeteria fruit and vegetable tasting programs lead to greater preferences for less commonly served fruits and more self-efficacy to consume fruits and vegetables in children.<sup>31</sup> Students who participated in garden-based learning significantly increase their preference for vegetables generally and for those that were grown in the school garden.<sup>32</sup> Song et al. (2016) assessed the effect of a cafeteria intervention on fruit and vegetable consumption, student ability to select fruits and vegetables, and their acceptability of healthy foods in fourth and fifth graders. Cafeteria interventions included improving food presentation, incentivizing healthy choices, and allowing the students and foodservice staff to interact more frequently. Additionally, nutrition education was provided in the classroom through reading, writing, math, and

hands-on activities. The intervention target group had significant improvement in eating vegetables for lunch, frequency of fruit and vegetable consumption measured in number of days, and food preferences of oatmeal, whole grain noodles, and vegetables.<sup>33</sup>

Cafeteria interventions following the smarter lunchroom movement strategies in conjunction with nutrition education interventions have proven to be influential in students' lunch selection and consumption.<sup>32,33</sup>

### *Conclusion*

All fruit selections were increased by the intervention of different advertising techniques. There was a significant decline in fruit consumption in the branding and digital advertising intervention groups. There was an increase in consumption in the variety group by 0.9%. This study found variety had a significant effect on fruit selection at school lunch in a sixth-grade population. Combining a less commonly served fruit (kiwi) with a familiar fruit (grapes) increased fruit selection. Variety in type and color of fresh fruit can be an affective and cost-efficient tool to introduce new fruits to students during school lunch. The decline in consumption indicates a need for nutrition education to complement efforts of increasing fruit consumption in the lunch room. Further research is needed to explore nutrition education programs in combination with advertising methods on fresh produce during school lunch to increase fruit consumption.

## REFERENCES

1. Childhood Obesity Causes & Consequences. CDC Web Site. [www.cdc.gov/](http://www.cdc.gov/). 2015. Updated April 10, 2016. Accessed May 10, 2016.
2. Nutrition Standards in the National School Lunch and School Breakfast Programs; Final Rule. In: USDA Web Site. [www.fns.usda.gov/](http://www.fns.usda.gov/). Updated January 26, 2012. Accessed May 10, 2016.
3. Terry McElrath Y, O'Malley P, Johnston L. Potential impact of national school nutritional environment policies: cross-sectional associations with US secondary student overweight/obesity, 2008-2012. *JAMA Pediatr.* 2015;169:78-85.
4. Johnson DB, Podrabsky M, Rocha A, Otten JJ. Effect of the healthy hunger-free kids act on the nutritional quality of meals selected by students and school lunch participation rates. *JAMA Pediatr.* 2016;170:e153918.
5. Cohen JFW, Richardson S, Austin SB, Economos CD, Rimm EB. School Lunch Waste Among Middle School Students. *American J Prev Med.*44:114-121.
6. Green ED, J. Trump Takes Aim at School Lunch Guidelines and a Girls' Education Program. *New York Times* 2017. May 2, 2017:A17.
7. Updated Offer vs. Serve Guidance for the NSLP and SBP Beginning SY2015-2016. USDA Web Site. <https://www.fns.usda.gov/updated-offer-vs-serve-guidance-nslp-and-sbp-beginning-sy2015-16>. Updated December 24, 2015. Accessed May 10, 2017.
8. The Smarter Lunchroom Strategies. The Smarter Lunchrooms Movement Web Site. <https://www.smarterlunchrooms.org/scorecard-tools/smarter-lunchrooms-strategies>. Accessed May 10, 2017.
9. Smarter Lunchrooms Annotated Scorecard. Smarter Lunchrooms Movement Web Site. <https://www.smarterlunchrooms.org/sites/default/files/documents/SLM%2060%20point%20Scorecard%20Lit%20Review.pdf>. Updated January 2017. Accessed May 10, 2017.
10. Special Nutrition Program Operations Study 2013-2014. USDA Web Site. [www.usda.gov/](http://www.usda.gov/) Updated March 20, 2014. Accessed May 10, 2017.
11. Children's Food Environment State Indicator Report, 2011. CDC Web Site. [www.cdc.gov/](http://www.cdc.gov/). Accessed July 23, 2016.
12. Wansink B, Just DR, Payne CR. Can branding improve school lunches? *Arch Pediatr Adolesc Med.* 2012;166(10):967-968.
13. Price JR, Riis, Jason. Behavioral Economics and the Psychology of Fruit and Vegetable Consumption: A Scientific Overview, 2012. Produce for Better Health Foundation Web Site. [http://pbhfoundation.org/pdfs/about/res/pbh\\_res/PBH\\_2012\\_LitReview.pdf](http://pbhfoundation.org/pdfs/about/res/pbh_res/PBH_2012_LitReview.pdf). Accessed July 23, 2016.
14. Promoting Fruit and Vegetable Consumption Around the World. World Health Organization Web Site. [www.who.int/](http://www.who.int/). Accessed February 7, 2017.

15. Hanks AS, Just DR, Brumberg A. Marketing Vegetables in Elementary School Cafeterias to Increase Uptake. *Pediatrics*. 2016.
16. Wansink B, Just DR, Hanks AS, Smith LE. Pre-Sliced Fruit in School Cafeterias. *Amer J ourl Prev Med*.44:477-480.
17. Bucher T, van der Horst K, Siegrist M. Improvement of meal composition by vegetable variety. *Public Health Nutr*. 2011;14:1357-1363.
18. Rolls BJ, Rowe EA, Rolls ET, Kingston B, Megson A, Gunary R. Variety in a meal enhances food intake in man. *J Entomol Ser A*. 1981;26:215-221.
19. Zmuda N. Coca-Cola Maintains Marketing Spend Amid Sluggish Demand. Ad Age Web Site. <http://adage.com/article/cmo-strategy/coca-cola-maintains-marketing-spend-amid-sluggish-demand/294251/>. Updated July 22, 2014. Accessed July 23, 2016.
20. Cheyne A, Mejia P, Nixon L, Dorfman L. Food and Beverage Marketing to Youth. *Current Obesity Reports*. 2014;3:440-450.
21. Bragg MA, Liu PJ, Roberto CA, Sarda V, Harris JL, Brownell KD. The use of sports references in marketing of food and beverage products in supermarkets. *Public Health Nutr*. 2013;16(4):738-742.
22. Dixon H, Scully M, Kelly B, Donovan R, Chapman K, Wakefield M. Counter-advertising may reduce parent's susceptibility to front-of-package promotions on unhealthy foods. *J Nutr Educ Beahav*. 2014;46:467-474.
23. Jansen E, Mulkens S, Jansen A. How to promote fruit consumption in children. Visual appeal versus restriction. *Appetite*. 2010;54:599-602.
24. Lawrence RG. Framing Obesity. *Int J Press Polit*. 2004;9(3):56-75.
25. Montgomery KC, Chester J. Interactive Food and Beverage Marketing: Targeting Adolescents in the Digital Age. *J Adolescent Health*. 2009;45(3, Supplement):S18-S29.
26. Pempek TA, Calvert SL. Tipping the balance: Use of advergames to promote consumption of nutritious foods and beverages by low-income african american children. *Arch Pediatr Adolesc Med*. 2009;163:633-637.
27. Blanchette L, Brug J. Determinants of fruit and vegetable consumption among 6-12-year-old children and effective interventions to increase consumption. *J Hum Nutr*. 2005;18(6):431-443.
28. Kelly B, Freeman B, King L, Chapman K, Baur LA, Gill T. The normative power of food promotions: Australian children's attachments to unhealthy food brands. *Public Health Nutr*. 2016;FirstView:1-9.
29. Birch L. Pass the Sugar, Pass the Salt: Experience Dictates Preference. *Developmental Psychology*. 1990.
30. Daniel C. Economic constraints on taste formation and the true cost of healthy eating. *Social Science & Medicine*. 2016;148:34-41.
31. Lakkakula A, Geaghan J, Wong W-P, Zanovec M, Pierce S, Tuuri G. A cafeteria-based tasting program increased liking of fruits and vegetables by lower, middle and upper elementary school-age children. *Appetite*. 2011;57:299-302.
32. Ratcliffe M, Merrigan K, Rogers B, Goldberg J. The effects of school garden experiences on middle school-aged students' knowledge, attitudes, and behaviors associated with vegetable consumption. *Health Promotion Pract*. 2011;12:36-43.

33. Song H-J, Grutzmacher S, Munger A. Project ReFresh: Testing the Efficacy of a School-Based Classroom and Cafeteria Intervention in Elementary School Children. *J School Health*. 2016;86:543-551.