

Marketing Vegetables: Leveraging Branded Media to Increase Vegetable Uptake in Elementary Schools

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Short Title: Marketing Vegetables in Elementary Schools

Abbreviations: No abbreviations to disclose.

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What's Known on This Subject:

Children do not eat enough fruits and vegetables and are often inundated with advertisements for less nutritious foods. In fact, many have called for bans on food advertising to children.

What This Study Adds:

This research builds on previous work that illustrates how branded media that appeals to children can lead both boys and girls to take more fresh vegetables.

Contributors' Statement Page

Contributor's Statement:

Andrew S. Hanks: Dr. Hanks conceptualized and designed the study, trained researchers in data collection methods, analyzed and interpreted the data, drafted the initial manuscript, critically reviewed the manuscript, and approves the final manuscript as submitted.

David R. Just: Dr. Just conceptualized and designed the study, interpreted the data, critically reviewed the manuscript, and approves the final manuscript as submitted.

Adam Brumberg: Mr. Brumberg conceptualized and designed the study, trained researchers in data collection methods, critically reviewed the manuscript, and approves the final manuscript as submitted.

Drs. Hanks and Just and Mr. Brumberg all accept full responsibility for all aspects of the manuscript.

Abstract

Objectives

Children do not eat enough servings of vegetables underscoring the need for effective interventions encouraging this behavior. The purpose of this research is to measure the impact that daily exposure to branded vegetable characters has on vegetable selection among boys and girls in elementary schools.

Methods

In a large urban school district 10 elementary schools agreed to participate in the study and were randomly assigned to one of four treatment conditions: 1) no changes to the cafeteria; 2) vinyl banner displaying vegetable characters which was fastened around the base of the salad bar; 3) short television segments with health education delivered by vegetable characters; 4) combination of vinyl banner and television segments. We collected 22,206 student-day observations over a six week period by tallying the number of boys and girls taking vegetables from the school's salad bar.

Results

Results show that 90.5% (from 12.6% to 24.0%; $p=0.04$) more students took vegetables from the salad bar when exposed to the vinyl banner only, while 239.2% (from 10.2% to 34.6%; $p<0.001$) more students visited the salad bar when exposed to both the television segments and vinyl banners. Both boys and girls responded positively to the vinyl banners ($p<0.05$ in both cases).

Conclusions

Evidence from this study highlights the positive impact of branded media on children's food selection. These solutions for both marketers and children can be powerful tools in encouraging healthier choices for children.

Introduction

Despite many of the health benefits of fruits and vegetables,¹ children are still not eating the recommended amounts.² To increase fruit and vegetable intake in school aged children, lawmakers recently passed the Healthy, Hunger-Free Kids Act of 2010 (HHFK) granting the United States Department of Agriculture (USDA) authority to update nutrition regulations for the National School Lunch Program (NSLP). All public and nonprofit-private schools are eligible to participate in the NSLP and if they choose to participate, they are required to comply with the prescribed standards.

Nutrition requirements associated with the new act include increasing the variety of vegetables served, ensuring that each lunch includes a serving of fruit or vegetables, serving more whole grain breads and pastas, and serving only 1% and fat free milk varieties, and only fat-free flavored milk.³ These new requirements aim to increase student exposure to healthier foods at lunch with the expectation that increased exposure will lead to increased intake.^{4,5,6,7} Recent research in low-income schools suggests that the new requirements are working to some extent,^{8,9} though evidence indicates that more food is wasted in restrictive settings.¹⁰

In contrast to the regulatory approach, previous research illustrates how modifications to a child's external environment influences food choice in the lunchroom. For example, retrofitting one of two lunch lines to serve healthier foods only can decrease caloric intake among children¹¹ and simply paying children to eat their vegetables can also be effective.¹² Furthermore, there is evidence that peer pressure and serving foods in more attractive bowls increases fruit and vegetable uptake.^{5,13,14} However, there is less evidence demonstrating the impact of using conventional marketing techniques to increase fruit and vegetable intake among children. The primary objective of this research is to measure the impact of a vegetable

marketing campaign during school lunch in elementary schools to increase uptake of salad and other vegetables.

In the same year (2013) that the Institute of Medicine (IOM) called for companies and marketers to promote healthier diets,¹⁵ the Produce Marketing Association joined forces with Sesame Workshop and the Partnership for a Healthier America in a two-year collaborative effort to promote fruit and vegetable consumption among children through a no-licensing fee use of the Sesame Street brand. This collaboration is in part a product of research illustrating the positive impact some forms of media have on consumption of fruits and vegetables.^{16,17,18} In addition, research dealing specifically with iconic characters can also increase fruit and vegetable consumption in children,^{19,20,21} though these studies often have small sample sizes and limited scope. Furthermore, there is mixed evidence documenting the differential impact of marketing interventions between boys and girls.^{22,23} Notably, there are gender differences in food consumption patterns when there is no intervention and often boys eat fewer vegetables than girls,^{24,25} thus it is worth studying whether or not there is also an asymmetric response between genders to marketing techniques.

Despite the evidence supporting marketing strategies to encourage healthier food choice among children, some critics advocate for a complete ban on food advertising aimed at children. For example, Susan Linn of Campaign for a Commercial-Free Childhood, Michele Simon of Eat Drink Politics, and others push for complete elimination of marketing to children.^{26,27,28} These critics argue that children are already too frequently exposed to advertisements, especially for energy dense foods,^{29,30,31,32,33} leading to poor food choices.^{6,34,35} Consistent, however, with the IOM call, a more general consensus is to regulate marketing to children for the time being, leaving open the option to advertise healthy foods to them.^{24,36} Thus, there is opportunity to

build on previous research by identifying effective marketing tactics to promote vegetables to children on a larger scale than has been previously done.

In a collaborative effort between Cornell University's Center for Behavioral Economics in Child Nutrition Programs, Founder's Farms, and schools in a large urban school district, researchers expanded the scope of previous research by working with 10 elementary school cafeterias in a large urban school district to study the impact on vegetable choice resulting from the use of vinyl banners printed with branded vegetable characters, a flat screen television running segments of these characters delivering health education messages, or both (see Figure 1). In addition, researchers in select cafeterias tallied the number of boys and girls taking salad from the salad bars to determine if they responded differently to the marketing interventions.

Methods and Participants

Study Design

The study took place over a span of six weeks, from April 8 through May 24, 2013. The study was confined to this six week period due to researcher availability for collecting data and school willingness to allow researchers to carry out the study. In weeks one and two of the study, no changes were made and data were collected for baseline measures. The interventions were then implemented and maintained throughout weeks three through six. We scheduled a four-week intervention period to minimize novelty effects.

A total of 12 schools initially agreed to participate in the study, though during the data collection phase, two schools chose to withdraw. To identify the causal impact of branded media on student behavior, schools were randomly assigned into one of the four treatment groups: 1) vinyl banner (N=2); 2) television segments (N=3); 3) vinyl banner and television segments (N=3); 4) control (N=2). The weekend before the treatment period began volunteer researchers

visited the schools assigned to a treatment and assisted food service staff in installing the banners and televisions which remained in the cafeterias during the whole treatment period. Students enrolled in the schools were blinded to the group assignments. With this study design, the following hypotheses were generated:

H1: Children in schools with the vinyl banners will select more vegetables;

H2: Children in schools with the television segments playing will select more vegetables;

H3: Children in schools with both types of media will select more vegetables, though the effects are not additive.

Given the mixed results in previous research dealing with differences in behavioral responses to interventions based on gender, we do not include a hypothesis here but rather rely on the analysis to help us better understand what differences, if any, might arise.

Branded Media Interventions

For this study, the branded media consisted of a vinyl banner with vegetable characters printed across the front and short segments shown on a flat screen television. Researchers fastened each vinyl banner to the metal casing on the lower portion of the salad bar just below the area where the salad components are served and wrapped the banner around the whole salad bar. They also placed small stands above the sneeze shield to hold a second rectangular banner (see Figure 1). Second, flat screen televisions were placed on small tables near the school's salad bar to attract children's attention. Short video segments of the vegetable characters were shown and these characters delivered nutrition education messages. The third treatment consisted of a combination of the vinyl banners and television segments. In all the intervention schools, small decals printed with the vegetable characters were placed on the floor to direct traffic to the salad bars.

The characters shown in the branded media are vegetables with human attributes such as arms, legs, and a mouth, as well as super human strength. Vegetables promoted by the characters are broccoli, carrots, spinach, peas, onions, garlic, zucchini, tomatoes, eggplant, and mushrooms. Independent from this research, these vegetable characters were conceived, developed, and licensed by a small private company. Through Founder's Farm, the company donated the vinyl banners, televisions, television segments, and floor decals to the participating schools. In addition, the company worked with Founders Farm to recruit volunteers to assist in carrying out the study.

School Characteristics

Schools in this study were selected from a large urban Northeastern US school district and agreed to participate in a randomized controlled field study. Median household income in this district is \$51,865 and 82% of the students receive a free or reduced price lunch.^{37,38} Residents are 33% white, 28.6% Hispanic, 25% African American, and 12% Asian.³⁷ We note that schools in the control group had the lowest average enrollment at 465 students whereas schools in the combined vinyl banner and television segment intervention had the highest enrollment at 668 students. Furthermore, the percentage of students receiving a free or reduced price lunch was lowest in the schools with the combined intervention at 70% and highest in schools with the television segment only intervention at 91%. The small sample of schools does not allow for a more comprehensive analysis to determine the success of randomization. Cornell University IRB approved this research.

Data and Analysis

Two types of data were collected to measure the impact of media on student behavior. First, food preparation records were collected for all 10 schools. These records report the

number of servings taken for each food item as well as the number of children receiving lunch. Each vegetable serving taken is consistent with the serving size requirement in the HHFK legislation which dictates that school age children in grades from Kindergarten through eighth must receive $\frac{3}{4}$ cup of vegetables each day.³ In these data, the outcome measures of interest are the number and percentage of students taking salad and vegetables during lunch. The percentage measure is calculated by dividing the number of students taking salad and vegetables by the number of students receiving lunch.

We also collected a tally count of the number of boys and girls serving themselves vegetables at the salad bar. To collect these counts, trained researchers visited cafeterias during the lunch hour at four randomly selected schools (one from each treatment group). These researchers held hand clickers in each hand and used the right clicker to tally boy students and the left clicker to tally girl students. These data were collected during the baseline period on April 16 and April 17 and during the treatment period on April 25, April 26, April 30, May 1, May 6, May 7, May 14, and May 15.

Three outcome measures of interest were generated from the count data: 1) number of students taking vegetables from the salad bar; 2) percentage of students taking vegetables from the salad bar, calculated by dividing count values by the total number of children receiving lunch; and 3) separate counts of girls and boys taking vegetables from the salad bar. Since the total number of boys or girls in the school is not provided, it is not possible to calculate the percentage of boys or girls visiting the salad bar. Based on the total number of lunches taken each day in the cafeteria, the total number of student-day observations is 22,206. The count data are different from the food preparation records because the count data only tally the number of

students taking vegetables from the salad bar. In contrast, food preparation records track the number of vegetable and salad servings taken from both the salad bar and from the lunch line.

For analysis, we use a random effects regression model with random effects at the school level. We consider a random effects model appropriate to adjust the standard errors based on unobservable characteristics at the school level and because we have no a priori reason to test for significance of school level fixed effects. Independent variables indicate the intervention group to which a school is assigned, whether the observation is measured during the intervention or baseline period, and the interaction between these two variables. Results are first reported for food preparation records and then for the count data. Reported values in the figures and calculated percent changes are derived from estimated means resulting from the fitted regression model. Reported p-values correspond to interaction effects resulting from the regression model.

Results

Data reported in Figure 2, extracted from food production records, illustrate the increase in average daily vegetable and salad servings taken in the participating schools. Most notable is the increase in vegetable and salad servings taken by students in schools with the branded media relative to schools in the control group. Our analyses of food production records show an increase from 60 to 185 in average daily vegetable and salad servings taken ($p=0.028$) by students in schools with vinyl banners and television segments. While schools with only the vinyl banners *or* television segments did experience increases in servings of salad and vegetables taken, the increases are not statistically significant. Note that these percentage increases are compared to a statistically insignificant change in vegetable and salad servings taken in the control schools.

Different than the food production records, the count data measure the frequency of children taking vegetables from the salad bar only. In schools with the vinyl banners, an increase of 12.6% to 24.0% ($p=0.04$; Figure 3) of students took vegetables from the salad bar. In schools with both the television segments and vinyl banners, there was an increase from 10.2% to 34.6% of students taking vegetables from the salad bar ($p<0.001$). These increases are compared to a statistically insignificant change in the percentage of students taking vegetables from the salad bars in the control schools.

The count data also differentiates students by gender. Specifically, more girls took vegetables from the salad bar (from 42 to 95; $p=0.02$; Figure 4) when the vinyl banners were installed and more girls took vegetables from the salad bar (from 35 to 126; $p<0.001$; Figure 4) when both the television segments and vinyl banners were installed. Boy students were only influenced by the vinyl banners such that in schools with this intervention alone, an increase from 25 to 66 took vegetables from the salad bar ($p=0.01$; Figure 5).

Discussion and Conclusion

In this field experiment, branded media exposure dramatically increased the percentage of students taking vegetables overall, and at the salad bar. In fact, across all media types there was a 134.6% increase in the percentage of students taking vegetables from the salad bar, and schools with the vinyl banners and combination of television segments and vinyl banners experienced the most significant behavioral response, supporting hypothesis 1. Given that the television segments alone did not have a significant impact we do not have evidence to support hypothesis 2. Thus it is possible that the increase resulting from the combined intervention is mostly driven by exposure to the vinyl banner, which supports hypothesis 3.

This six-week field study builds on previous research by studying how children respond to new branded media in a familiar food environment. In addition, exposure lengths of four weeks exceed media exposure in previous research. The strongly positive results highlight the value of marketing healthy options to children and are consistent with the suggestions from groups such as the IOM to leverage marketing expenditures in a positive way.

Similar to previous literature we also find that boys and girls have different uptake rates of fruits and vegetables, yet, we do find some differences in their responses to the branded media. Specifically, we find that boys are more likely to take vegetables from the salad bar when a vinyl banner is in place but we document no significant change in behavior in boys when both the television segments and vinyl banners are used. Given that data from the food preparation records (Figure 2) indicates that the combination of the two media methods are effective, it is possible that the combination is effective for boys in terms of increasing the overall amount of vegetables taken, but not in terms of taking vegetables from the salad bar itself. Finally, in a separate set of analyses testing for a novelty effect, we did find that boys responded positively to the combination of the vinyl banner and television segments in weeks one and two of the intervention, but this wore off by the third week. These discrepancies in the results provide interesting avenues for research, at least in terms of identifying if and when boys and girls respond differently to various types of media.

Most of the vegetable characters used in this study represent food items often found on school lunch lines and in school salad bars. Notably, the vegetable characters represent three of the categories outlined in the new requirements, thus promoting uptake of a variety of vegetables. Each week schools are required to serve dark greens such as spinach or broccoli, red and orange vegetables such as tomatoes or carrots, beans or peas (or other legumes such as

lentils), or starchy vegetables such as corn or potatoes.³ Furthermore, based on data from production records, there is general consistency between what children saw through the branded media and what was offered both on the lunch line and in the salad bars, resulting in increases in vegetable uptake among the children.

The strength of these findings should be considered in the context of the following limitations. First, the four week intervention period may not be long enough to eliminate novelty effects. In addition, measures of amounts actually eaten were not collected. Next, no post-intervention data were collected to measure behavior without the branded media. Furthermore, in the participating schools 82% of students receiving lunch received it for free or at a reduced price biasing the results towards lower-income children. We also note that the small sample of schools limits the generalizability of the results and renders it difficult to determine how well balanced the treatment groups are. Finally, while all 10 schools in the study already had a salad bar prior to the study, this is uncommon, though advocates are pushing to bring salad bars to more schools.^{39,40}

The research presented here highlights an opportunity for marketers and children to both benefit from branded media. Persuasive influences of marketing media can be leveraged in a positive way, encouraging children to make more nutritious choices. In addition, school food service managers can utilize this and other marketing opportunities in relatively inexpensive ways, such as providing descriptive names for the foods they offer and making them more convenient to take.^{14,41} With childhood nutrition as the ultimate goal, the synergistic combination of marketing strategies and healthy choices has great potential for improving what children take and eat, both in and out of school.

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Figure Legends

Figure 1: Example of Media in Schools

Figure 2: Average Daily Vegetable Servings Taken

Figure 3: Average Daily Percentage of Students Taking Vegetables from Salad Bar

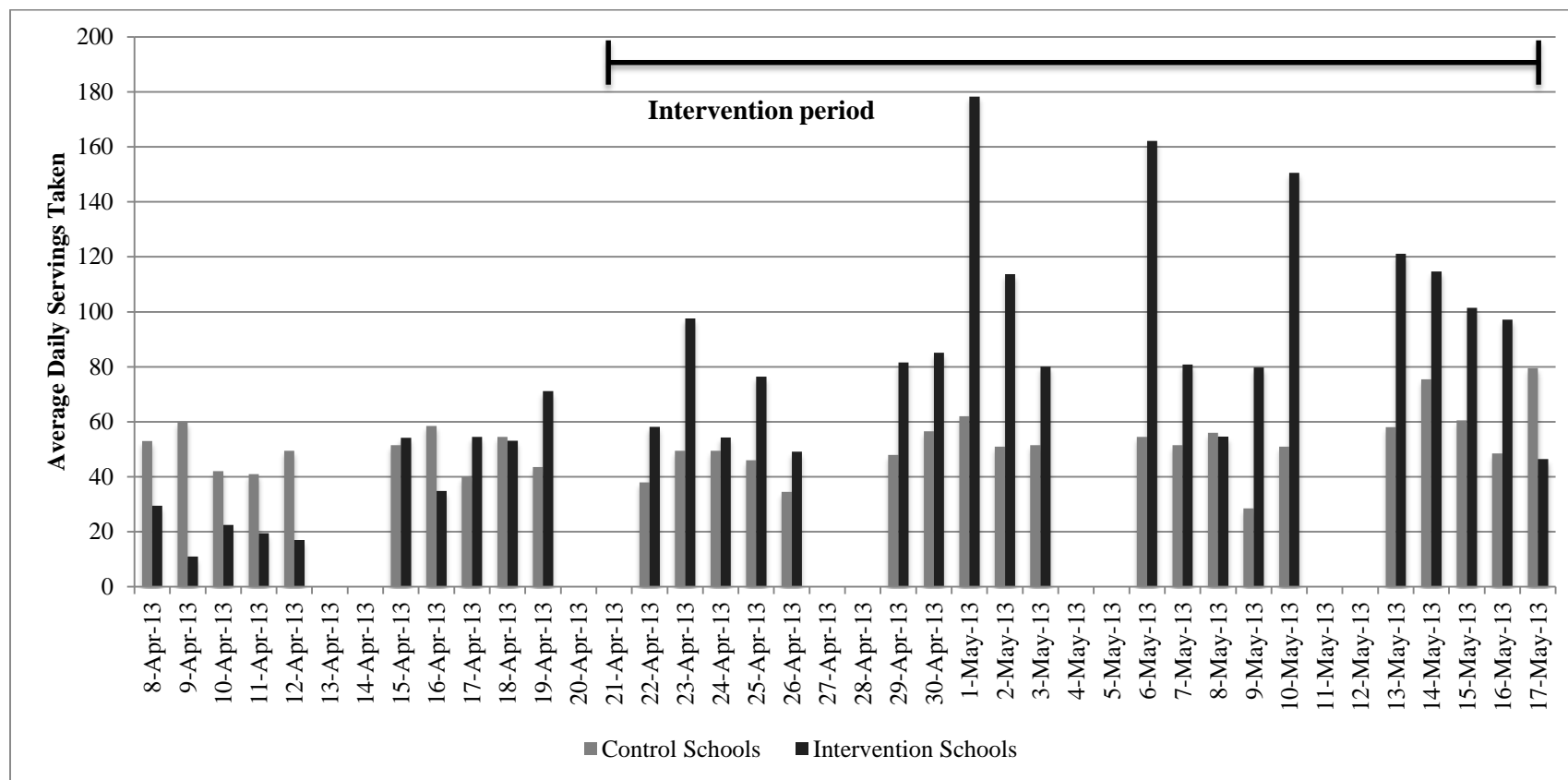
Figure 4: Number of Girls Taking Vegetables from Salad Bar

Figure 5: Number of Boys Taking Vegetables from Salad Bar

Figure 1: Example of Media in Schools

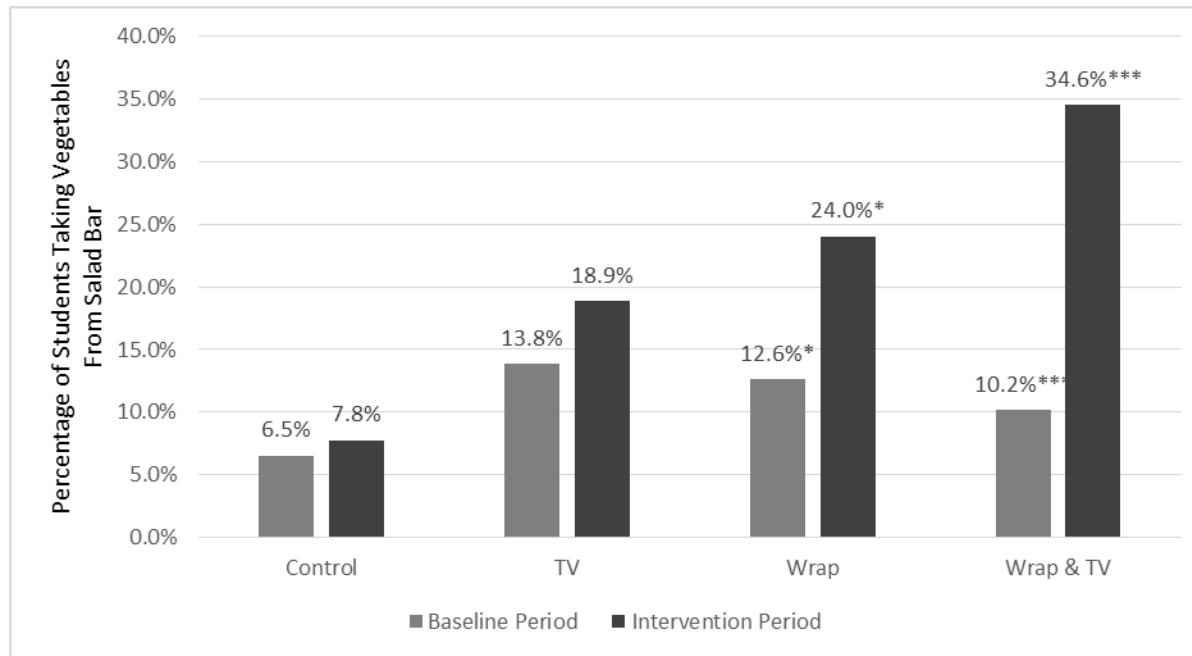


Figure 2: Average Daily Vegetable Servings Taken



The first two sets of 5-day intervals were the baseline period. The third through sixth sets of 5-day intervals were the intervention period. Data used to generate this figure are from daily food preparation records supplied by each school's cafeteria.

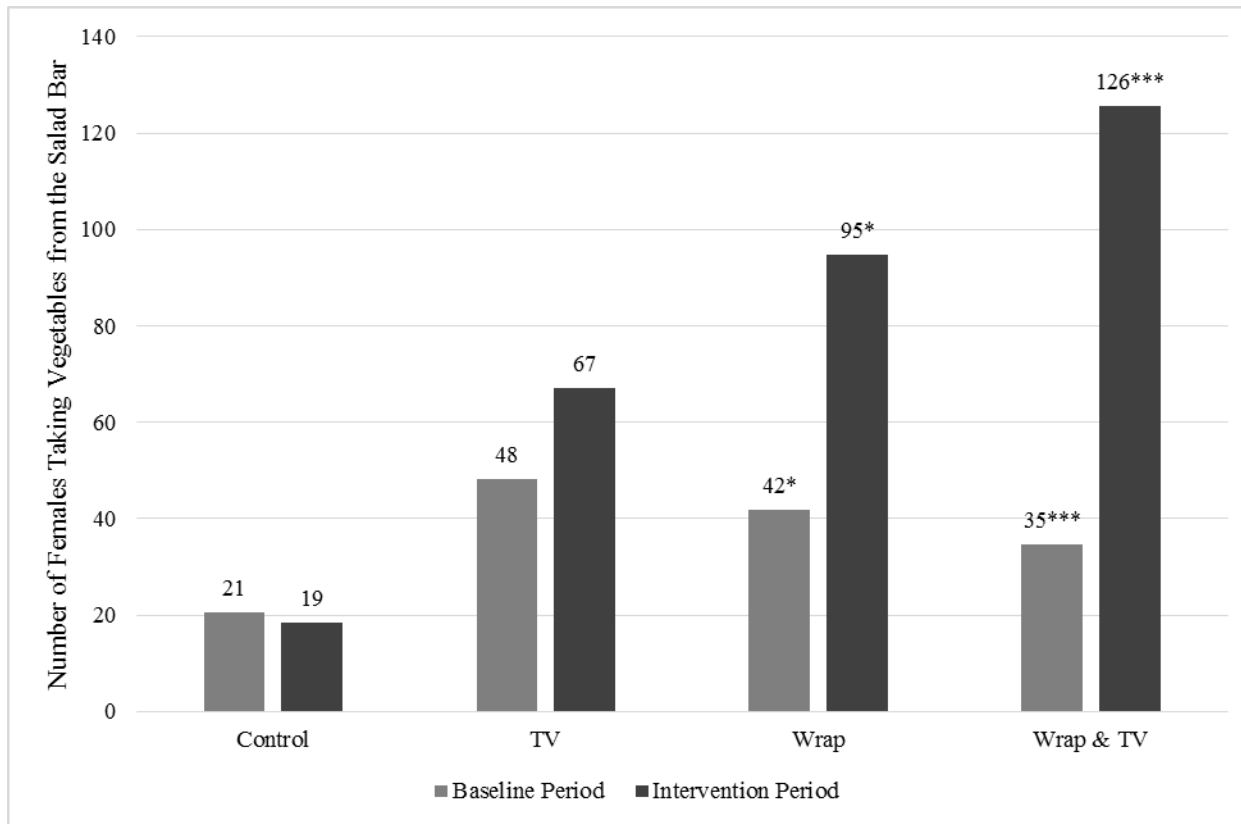
Figure 3: Average Daily Percentage of Students Taking Vegetables from Salad Bar



Count data were collected in each school. Values in this figure are predicted percentages from the random effects regression model.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

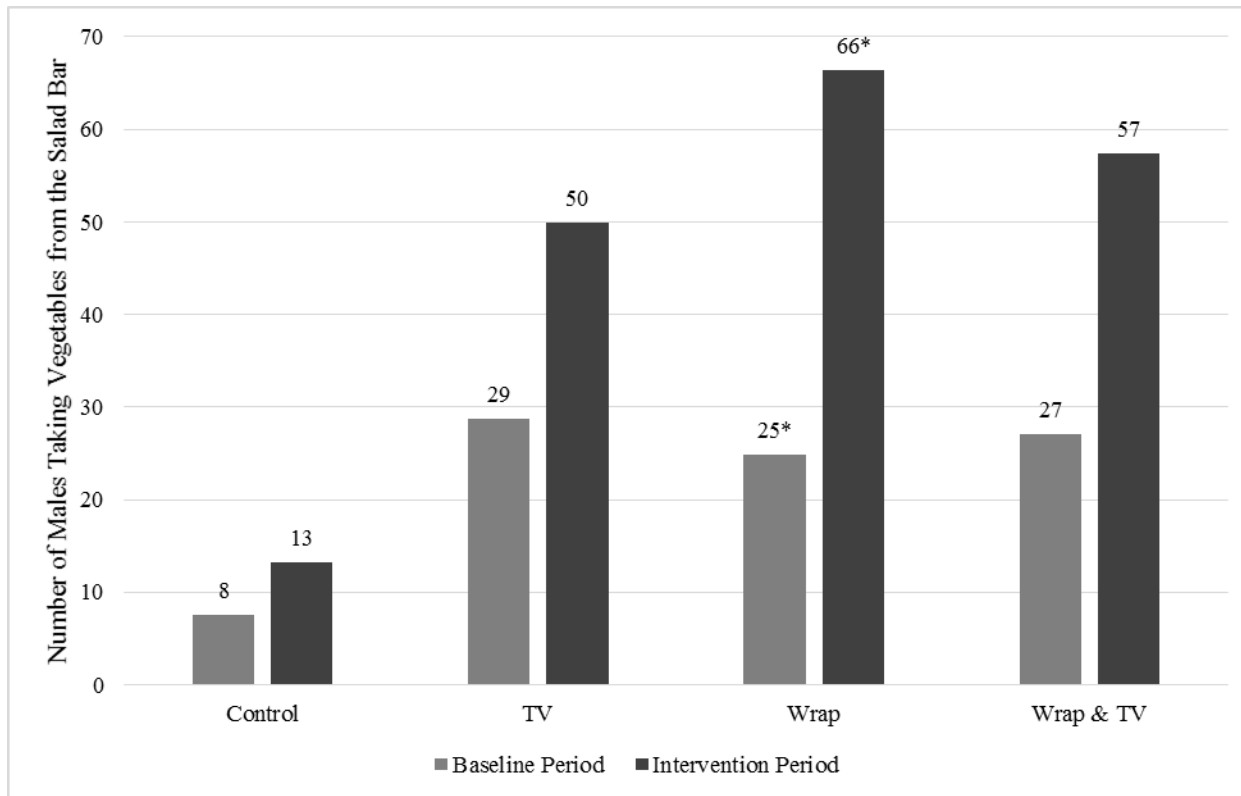
Figure 4: Number of Girls Taking Vegetables from Salad Bar



Researchers tallied the number of females taking vegetables from the salad bar. Data values based on predicted means from random effects regression model.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 5: Number of Boys Taking Vegetables from Salad Bar



Researchers tallied the number of males visiting the salad bar. Data values based on predicted means from random effects regression model.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.