

Social Marketing: Impact on Elementary School Students' Selection and Consumption of Salad Bar Food Items

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Abstract

The purpose of this study was to evaluate the implementation of social marketing campaign (SMC) aimed at increasing selection and consumption of fruit and vegetable (FV) salad bar items among 3rd-5th grade students in an elementary school setting. Specifically, providing a detailed account of the formative, process, and impact evaluation methods used to evaluate the campaign and its impact on desired changes in behavior. Outcome measures were increases in the selection and consumption of FV salad bar items and changes in mean FV eaten, liking, and preference scores from baseline to post-implementation of the SMC. Formative evaluation was used to gather information to test and strengthen the evaluation measurement tools designed for the study prior to administration and to use preliminary salad bar selection data to assist the school in modifying the salad bar to include healthier options. Process evaluation methods collected information as to the extent to which the SMC was implemented by tracking the dissemination of social marketing techniques selected for use in the campaign and assessing students' awareness of the implemented techniques. Feedback was provided as a means of continual improvement of the SMC. Impact evaluation methods included the use of a FV survey and plate waste of salad bar items to evaluate the effect of the SMC on desired behavior change. Improvements to the SMC throughout the study, resulted in full implementation of all techniques except for the use of announcements, which were most recognized by students. Further the SMC had limited impact on the outcome measures. The use of multiple evaluation techniques in SMCs should be used to strengthen the components and increase the likelihood that the campaigns will improve behavioral outcomes.

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Part 1: Literature Review

Literature Review

Childhood Overweight and Obesity

The rates of childhood overweight and obesity in the United States have reached epidemic proportions (1). Data from the 2007-2008 National Health and Nutrition Examination Survey (NHANES) reported that 31.7% of children and adolescents are overweight or obese, with 16.9% of these youth classified as obese and 11.9% classified as $\geq 97^{\text{th}}$ percentile, which represent those with the highest Body Mass Index (BMI) reported (2). As part of a national sample, these data included children and adolescents aged 2 to 19 years whose BMI were calculated and recorded on the BMI for gender- and age-specific Centers for Disease Control and Prevention's (CDC) growth charts (2). Overweight and obesity in children is determined by using these CDC gender-and age-specific charts (3). BMI is calculated by dividing weight in kilograms by height in meters squared (2). Based on the CDC's gender-and age-specific charts, children and adolescents classified as obese are $\geq 95^{\text{th}}$ BMI percentile and children and adolescents classified as overweight are $\geq 85^{\text{th}}$ BMI percentile and $< 95^{\text{th}}$ BMI percentile (3).

Healthy People 2020, which lists health-related objectives for the nation, has identified a nutrition and weight status (NWS) focus area with specific objectives related to reducing the prevalence of obesity for children and adolescents (4). *Healthy People 2020* objective NWS 10.4, which focuses on reducing the rates of obesity among children and adolescents ages 2 to 19 years, sets the target prevalence for 2020 at 14.6% (4). These current obesity prevalence rates exceed the 14.6% target prevalence of the *Healthy People 2020* objective (4).

The rates of overweight and obesity among children, adolescents, and adults in Tennessee reflect national trends. Tennessee is ranked as one of the top 5 states in the nation with the highest adult obesity prevalence, in which 31.9% of the population is obese. Further, Tennessee has been identified among the top 3 states in the nation for its accelerated prevalence of obesity (5). In 2007, it was reported that 36.5% of children and adolescents, ages 10-17 years, were overweight or obese in Tennessee (6). Residing in a low socioeconomic rural area, such as East Tennessee, has been shown to be related to a higher prevalence of overweight and obesity among youth (7). Data collected by the Tennessee Coordinated School Health Program (CSHP) during the 2008-2009 school year reported that 20.1% of students were overweight and 28.2% were obese in the East Tennessee County in which this study took place. These percentages were higher than state percentages, which classified 17.1% of students as overweight and 21.9% of students as obese (8).

Overweight and Obesity in Relation to Type 2 Diabetes

Numerous adverse health outcomes are associated with overweight and obesity (3). Children and adolescents who are overweight or obese are at increased risk for cardiovascular disease, hypertension, dyslipidemia, asthma, sleep apnea, type 2 diabetes, remaining overweight or obese in adulthood, and are at an elevated risk of adult mortality (3). Type 2 diabetes, which was once thought only to affect adults over the age of 40, is now emerging as a disease affecting younger populations mainly due to the increase in prevalence of childhood obesity (9). Information available on the National Diabetes Fact Sheet indicate that over 186,000 children and adolescents in the United States have a form of diabetes; of these 3,700

are diagnosed with type 2 diabetes each year (9). Currently, type 2 diabetes is uncommon in children under the age of 10 years, but greater numbers of children and adolescents are being diagnosed between the ages of 10 and 19 years (9). Type 2 diabetes is often difficult to identify in youth due to the slow development of the condition, symptoms that may resemble those of type 1 diabetes, and occasionally the absence of symptoms. Youth who are at risk for developing type 2 diabetes are typically overweight or obese, have a family history of type 2 diabetes, and show signs of insulin resistance (9).

In 2000, the American Academy of Pediatrics and the American Diabetes Association developed criteria for testing and diagnosing type 2 diabetes in children and adolescents (9-10). The criteria include a child older than 10 years of age who has either been classified as $\geq 85^{\text{th}}$ percentile on the CDC weight for height growth chart or exceeds 120% of a their ideal weight for height and has 2 additional risk factors. These additional risk factors include a family or maternal history of type 2 diabetes and or a race/ethnicity identified as Native, African or Asian American decent, or as Latino or Pacific Islander. Additionally, the child may show signs of insulin resistance or experience conditions related to insulin resistance such as hypertension, dyslipidemia, or acanthosis nigricans. A fasting plasma glucose test is the preferred test for children who present meet the previously described testing criteria and should be administered every 3 years to children ≥ 10 years of age to identify and confirm a type 2 diabetes diagnosis (9-10). The National Diabetes Education Program suggests that children and adolescents may be able to delay or reduce the risk of developing type 2 diabetes by making healthy lifestyle changes, such as increasing daily physical activity to 60 minutes, limiting daily television and video game exposure to 2 hours or less, and making healthy eating choices, such as increasing

fruit and vegetable (FV) consumption to 5 or more servings a day to maintain a healthy weight (9, 11).

Childhood Obesity and Type 2 Diabetes Prevention

Krebs and Jacobson suggested that prevention is a key element in pediatric practice and is beneficial to utilize when combating the recent increase in the prevalence of childhood obesity (12). Sudden drastic changes in a child's BMI or an increase in his/her weight gain compared to height may be an early indicator of risk of overweight or obesity (12). In addition, they suggest that identifying this trend early on in development may help delay or prevent the onset of obesity in children. In 2006, Story and colleagues suggested that health services offered in schools have the potential to play a role in the prevention of obesity, type 2 diabetes, and other related disease complications (13). These school health services should be considered when collecting heights and weights of students, calculating BMIs, and charting those percentiles. Many school systems in the United States have already established, as standard practice, the collection of students' height and weight measurements (13). The charting of these measurements is beneficial for monitoring a child's growth over time and may play a preventive role in childhood obesity and other related complications. These services may be especially useful for families with children who are uninsured and do not receive annual checkups. The practice of collecting and reporting the BMIs of children and youth in schools is supported by the Institute of Medicine, which reinforces the need for parents to have access to their children's anthropometric measures and to have follow-up services available if needed

(13). The monitoring of BMI in children is crucial because of the many lifelong health complications related to overweight and obesity.

An outline for obesity prevention in children and adolescents created by CDC identified that creating a health-promoting environment is an important factor in combating obesity in youth (14). Included in the outline are intermediate goals including, increasing the number of low-income children and adolescents who meet the *Dietary Guidelines for Americans* (15) and increasing the availability of healthy food items such as fruits and vegetables (FVs). These intermediate goals have been identified as areas used to assess progress in achieving the overall goal of creating an “environmental-behavioral synergy” through social change (14). School systems that promote physical activity and the consumption of healthful foods provide an environment for children and adolescents to learn healthy lifestyle behaviors. The use of physical activity and modifying the diet to control caloric intake are ideal ways to aid in maintaining a healthy body weight (16). A collaboration of these lifestyle behaviors are key components in preventing childhood overweight and obesity and type 2 diabetes (16).

Fruit and Vegetable Consumption among Children

FV consumption is vital to promoting good health in individuals of all ages (17). FVs contain numerous vitamins, minerals, fiber, and are generally low in fat and calories (16). Optimal daily FV consumption may play a protective role in the prevention of obesity and other chronic diseases, such as cardiovascular disease and some cancers (16). Daily FV needs depend on an individual’s age, sex, and physical activity level (17). It is generally recommended that FVs constitute half of each meal and snack consumed throughout the day to meet optimal

intake (18). National data show that despite the apparent benefits of consuming FsVs, fewer than half of youth aged 4 to 18 years consume greater than 5 servings of FsVs daily (18). In Tennessee, only 7.9% of youth in grades 9 to 12 reported consuming fruit 2 or more times a day and vegetables 3 or more times a day (19).

In response to the inadequate intake in FV consumption among youth and an increase in the prevalence in overweight and obesity, there is a need for children and adolescents to increase their intake of FsVs. Research has shown success with implementing programs aimed at increasing the availability and consumption of FsVs in schools (18-19).

Role of Schools

School systems interact with the majority, approximately 95%, of youth in the nation (13). As children spend the majority of their time at school, at least 6 hours daily, and consume almost half of their daily calories from foods at school, the opportunity to utilize the school environment to implement behavior-change interventions is vast (20). Therefore, schools have the ability to play a pivotal role in the prevention of childhood obesity through implementation of school initiatives and policies that focus on creating environments that promote consumption of healthy foods and provide opportunities for physical activity (15, 21-24).

Interventions to Increase Fruit and Vegetable Consumption

Over the past 10 years, the addition of salad bars, described as “a self-serve station where students can select 2 or more fruits and/or vegetables,” into school cafeterias has become more common (25). Based on salad bar availability data derived from the School Nutrition Dietary Assessment Study, Part II (SNDA-II), approximately 21% of schools in the

nation offered salad bars on a daily basis, elementary schools constituted 14% of these schools. It was reported that children of lower socio-economic status were less likely to attend a school where a salad bar was offered, compared to more affluent schools (25). In addition, schools with a salad bar tended to offer more fresh FsVs, like green salads and raw vegetables (25). However, evidence supporting the relationship between the varieties of FV items provided on the salad bar and the overall intake of these food groups among elementary school students is lacking (26).

Adams and colleagues conducted a study using plate waste weighing methods to determine if elementary school students with exposure to a self-service salad bar versus pre-portioned servings consumed more FsVs (26). Within 2 districts in San Diego County, California, 294 students in grades 1st-5th were randomly selected to participate in the study. All participants were selected from 4 predominantly nonwhite schools in the districts, in which 2 of the schools used a salad bar in their cafeteria and the remaining 2 schools in the other district sold pre-portioned servings of FsVs. The FV items on the trays of each selected student were weighed prior to and after consumption. The results of the study found that the amount of FV servings chosen from the salad bar (112 ± 70 g) compared to the pre-portioned servings (104 ± 86 g) was not significantly different (26). Therefore, the results did not support the proposed idea that the availability of a salad bar was directly related to an increase in FV selection. When comparing the 2 schools in this study that used a salad bar, the school that offered the largest variety of FV options reported a higher consumption of these items among students, 57% of FV items selected, compared to the other school with a salad bar, which

offered fewer FV items and reported only 31% of items consumed. These results noted a trend towards increased consumption as variety of FV items increased (26).

A study by Perry and colleagues in 1998 looked at incorporating the 5-a-Day Power Plus program in 20 schools in Minnesota (27). Elementary schools located in the St. Paul Public School District were recruited for the study. The 20 schools were pair-matched, the schools were either randomized into the intervention or a delayed condition. The students were followed from spring 1995 until fall 1996. The intervention component included nutrition curriculum, changes in the school foodservice environment, parent and child group activities at home, and involvement of community leaders (27). Food industries, that were members of the 5-a-Day coalition, provided FV produce for taste-tests, additional items to add to school lunch, and snack items to take home. Multiple techniques were used as part of the school foodservice component of the intervention. FSVs were promoted in the cafeteria, additional fruit items were included as an alternative to a baked dessert and a better variety and more appealing FV options were available. Results from student lunchroom observations showed that during lunch consumption of FV servings (mean difference of 0.47; $p=0.00$) and fruit servings (mean difference of 0.30; $p=0.00$) were significantly higher in the intervention school than in the reference school at follow-up. However, when overall dietary intake from 24-hour recalls were analyzed, only the consumption of fruit servings ($p=0.02$) was found to be significantly higher in the intervention compared to the reference schools at follow-up. The proportions of students' daily calories from FV items ($p=0.02$) were found to be significantly higher in the intervention than reference schools. The results of this study showed that a multi-component intervention can be effective in increasing elementary school children's FV consumption during lunch, in

increasing fruit consumption throughout the school day, and in modifying the percent of calories that students consume from FV items (27).

In 2000, Reynolds and colleagues implemented the High 5 Project (28). Twenty-eight elementary schools were selected to participate in the project and of the 2,457 families with children in the 4th grade who were eligible to participate, 1,698 families provided consent. The schools were randomized into an intervention or delayed intervention group. The 3 intervention components included parental, foodservice, and classroom involvement. Parents were asked to complete activities with their children at home; the foodservice staff was rated on a star system based on the number of FV servings they provided weekly and the promotion of those items; and a curriculum with an FV theme was disseminated in the classrooms via bi-weekly lessons. The teachers in the classrooms assisted Curriculum Coordinators in teaching the lessons. Data were collected at baseline, 1-year follow-up, and 2-year follow-up. Results from 24-hour recalls showed a significant increase in the FV consumption ($p < 0.001$) among students in the intervention schools at both the 1-year follow-up (3.96 FV servings) and 2-year follow-up (3.20 FV servings) data collection points. Overall at each follow-up, students consumed more FsVs independently and combined ($p < 0.001$) when compared to control schools. At the 1-year follow-up, FV consumption by parents of students in the intervention schools was found to be significantly higher ($p < 0.03$) than parents of students in the delayed intervention group. The parent data were obtained using a self-reported questionnaire adapted from the Health Habits and History Questionnaire. This study indicated that a school-based intervention that incorporates the school and home environments can be successful in

increasing students and parents overall FV consumption and increasing FsVs independently in students (28).

A study by Slusser and colleagues found similar results to the previous study. This study published in 2007 evaluated the addition of a salad bar to school lunch and its effect on FV consumption among elementary school children (29). Three elementary schools in the Los Angeles Unified School District, which participated in providing reimbursable lunches, were selected for the study. The 3 schools were selected as part of a pilot study for the School Lunch Program to introduce salad bar food items as an alternative to purchasing a hot lunch. The students in these schools were enrolled in grades 2 through 5. A variety of FsVs were offered on the salad bar accompanied by items that met grain, protein, and dairy requirements. When choosing the salad bar, students were required to select 4 different food groups to ensure that the meal met lunch guidelines established by the United States Department of Agriculture (USDA). If a student chose the salad bar over a hot lunch, they were permitted to return for a second serving (29). Prior to the introduction of the salad bar to school lunch, the students in the schools completed 24-hour-recalls in 1998 as part of a larger study and then were asked to complete them again in 2000 after the inclusion of the salad bar option. Results from the 24-hour recall data in 2000, showed that 43.7% of students chose the salad bar option at least 3 days a week and 31.6% of children chose the salad bar daily. There was a significant increase in the number of FV (2.97 vs. 4.09, $p<0.001$) servings consumed between the years of 1998 and 2000. The average number of FV servings consumed increased from 2.97 in 1998 to 4.09 in 2000 ($p<0.001$). With an increase in FV consumption, there was a significant decrease in the mean intake of calories (1803kcal vs. 1607kcal, $p=0.03$), saturated fats (26g vs. 19g, $p=0.02$) and

cholesterol (251mg vs. 202mg, $p<0.0001$) between the 2 data collection periods. The authors of this study concluded that the inclusion of a salad bar option at school lunch was effective in increasing both FV consumption and reducing saturated fat and cholesterol intake among elementary school children (29).

Modifying the School Food Environment

Many studies have highlighted the importance of the school environment in influencing changes in dietary patterns of elementary school children, especially when discussing FsVs. A study by Fox and colleagues in 2009 evaluated the association between elementary school students' weight status and their school environment (30). They hypothesized that students would have a higher BMI score if their school food environment encouraged the availability of foods with lower nutrient value and higher energy density. Data from the School Nutrition Dietary Assessment (SNDA III) were used in this study. The BMI information was collected from the SNDA III data set, while direct observations and interviews were used for collection of information regarding the school food environment and practices. School foodservice managers recorded data obtained concerning the types of foods offered during school lunches. When assessing the school food environment, promotional or educational items were identified along with the types of competitive food available including a la carte and vending machine items, which were then recorded or verified through surveys and/or direct observation by food service managers, food service directors, and principals. Demographics for each child were obtained through parent interviews. The information recorded during the interview was intended to identify diet and physical activity measures that could affect BMI. Data for elementary, middle, and high schools were analyzed separately. Results from the study found

that there was a significant increase in the likelihood of obesity in elementary school students when French-fries (OR= 2.70 (CI 1.58-4.62), $p<0.01$) or dessert (OR=1.78 (CI 1.13-2.80), $p<0.05$) were served at lunch more than once a week. These results were not found for the middle and high school students. This study demonstrates the importance of the school environment on student health in an elementary school setting and further verifies the need to utilize these environments to promote healthy eating behaviors (30).

A study by Condon and colleagues in 2009 looked at data from the SNDA III to evaluate various aspects of the meals provided to students as part of the National School Lunch and School Breakfast Programs (20). The 3 research questions addressed in this study focused on the types of foods offered and consumed by children during breakfast and lunch, the types of food available to students receiving reimbursable meals, and if there were differences between the foods consumed depending on whether the students participated in reimbursable school meals. When looking at foods offered to students who participated in reimbursable school meals, approximately 33.3% of elementary schools offered salads with lettuce, and only 29% of these elementary school menus included vegetables of the dark green or orange variety. Fresh fruits were only available in 50% of the schools that offered reimbursable meals with the majority, 94% of schools, offering canned fruit as their main fruit source. Consumption of vegetables among students who participated in school meals was significantly higher compared to non-participants (51% vs. 23%, $p<0.01$). Overall, students, especially those in elementary schools who participated in reimbursable meals, were significantly less likely ($p<0.01$) to consume dessert and snack items than non-participants. Results from this study indicated that although healthful food items were available in schools, children that were non-participants of

the National School Lunch Program and School Breakfast Program were more likely to choose items that were not as healthy. In addition, this study looked at a comparison of the SNDA II and the SNDA III and found that despite the effort of schools to increase offerings of FSVs, there was room for improving the variety and types of foods offered during the school day. The results implied that efforts to increase the consumption of healthier foods need to extend beyond providing better access and availability of these items within school meals and move towards strategies that provide additional encouragement or promotion of these items, potentially through the integration of nutrition education or implementation of social marketing initiative that focus on the benefits of making healthier choices (20).

In 2004, Perry and colleagues conducted a 5-A-Day Cafeteria Power Plus program aimed at increasing FV consumption after the implementation of a school-based intervention in a cafeteria setting (31). Located in the Twin Cities Metropolitan area of Minnesota, 26 schools were recruited to participate in the study. The Cafeteria Power Plus program was implemented in 13 of the schools and the remaining 13 schools received the intervention at the end of the study as part of the delayed-control group. The intention of the intervention was to provide more opportunities for FV consumption in the cafeteria, to increase the number of role models that practice healthful behaviors such as consuming FSVs during lunch, and to provide social support to encourage children to consume those more readily available FV items. The intervention used various marketing techniques that promoted FSVs in the school. Components of the intervention included the use of daily activities and events, displaying posters of themed characters, and taste testing of FV items, all of which were aimed at encouraging and promoting the consumption of FV items during school. At the beginning of the study, a kick-off

week was used to introduce the students to all the marketing techniques they planned to use throughout the study period. In addition, a challenge week was used at mid-intervention to challenge the students to consume at least 3 servings of the FV groups daily. Throughout the study, the food service staff in the intervention schools worked daily to improve the availability, quality, quantity, and appeal of FV items served in the cafeteria and to encourage the children to select those foods. In addition, the foodservice staff was responsible for providing at least 1 additional FV item to the menu daily as part of 1 study objective. To measure the consumption of FV items, trained researchers who determined what items were consumed as well as the portion size of that item conducted observations. Results of the study showed that the consumption of vegetables without potatoes ($p=0.03$), FSVs without potatoes and juice ($p=0.02$), fruits with juice ($p=0.01$) and fruits without juice ($p=0.00$) were significantly higher among the intervention group compared to the delayed-control group. However, there were no significant differences noted with the total FSVs with potatoes, juice and vegetable categories. The encouragement to select the FV items, which was determined based on observation of food service staff, had a positive impact on the selection of these choices in the intervention group with an increase in the consumption of FV without potatoes and juice from baseline to follow-up ($r=0.34$, $p=0.001$). In addition, the intervention schools were more likely to have a better variety (4.37 vs. 3.89, $p=0.00$) and quantity of the FV items available in the lunch line on the food cart (2.01 vs. 1.21, $p=0.001$). Overall, this study showed that implementing an intervention focused on environmental changes had a positive impact on increasing consumption of FV items in an elementary school setting. In addition, a positive finding from the study relates to evidence that suggests that the encouragement of the food

service staff to choose the FSVs did play a role in increasing the consumption of these food items (31).

Social Marketing to Increase Fruit and Vegetable Consumption

Social marketing is focused on modifying either social or personal behaviors and is unlike business marketing, which looks to satisfy the wants and needs of the intended audience (32). The ultimate goal of any social marketing initiative is to create a campaign that is effective in impacting behavior change among the target audience. Social marketing has been defined in terms of the creation and maintenance of programs that are intended to influence the acceptance of socially based ideas. The development and success of these programs are often dependent on factors such as researching the market to determine need in the community, investigating how to communicate and distribute the message of the program, brainstorming the concept of the product, and finally determining the cost of the product or program. In order for a social marketing nutrition program to reach optimal effectiveness, the plan should follow a series of steps. These steps include 1) conducting market research to identify the needs of the target population; 2) identifying the “P’s” of marketing, which include product, price, place, and promotion, and the “C’s” of marketing which include customer value, cost to the customer, convenience, and communication; 3) implementing the program, and 4) perfecting the plan by obtaining feedback, interpreting the results, and using the information to better revise and improve the “P’s” and “C’s” of marketing as well as better define the target population. There are additional “P’s” specific to social marketing, which include public, or the people that are involved in the program, partnerships, policy, and purse string, which are the outside funding resources such as grants and donations that may be considered separately

from the price to the target audience. Kaufman notes that nutrition professionals who understand the components of social marketing are able to use them to design and put into action successful plans for nutrition programs (32).

The American Academy of Pediatrics recommends supporting the use of social marketing as a possible prevention method for obesity. Incorporating healthy lifestyle behaviors into everyday life are key components of this prevention technique (12). Kaufman states that social marketing can take the form of many different approaches and techniques to convey messages on how to participate in a healthy lifestyle. Price and promotion are examples of components of social marketing designed to promote healthful nutrition messages. Market incentives can be used to encourage the target audience to purchase or accept an item that may not have been previously appealing. Using tools such as advertising, public service announcement (PSA), demonstrations or taste-tests of foods, and allowing individuals to participate in fun hands-on activities are all social marketing techniques available for use in nutrition programs to catch the interest of a target population (32).

Folta and colleagues in 2006 utilized the public address (PA) systems in elementary schools to promote healthy food messages relating to changes in the lunch menus to introduce legume-based items (33). Six-pair matched elementary schools were chosen to participate in the study. One school from each pair received an intervention PA system messages and control school would continue to receive daily announcements without the addition of the health messages. The 2 new legumes entrees, a taco and chili item, were served at lunch in the schools once per month for 3 consecutive months, then twice per month for the remaining 4 months in a calendar school year. The desired outcome of the study was described as an

increase in the selection of the new menu items as a result of the additional health messages. The messages that were played in the 3 intervention schools were approximately 30 to 60 seconds in length and used a superhero character, “Bean Man,” to convey tidbits of nutrition information focused on the benefits of consuming legumes. The development of the nutrition messages was informed by focus groups conducted in the community with children of the same target age as the elementary school children. Children of the same target age group were chosen to taste-test the 2 new legume items before they were incorporated into the school lunch. Data collection occurred each day that the legume items were served. The results of the data collection showed that for all of the 6-pair matched schools, there were no significant differences ($p=0.31$) between the selections of the legume entrée items by students that received the nutrition messages compared to students in the control schools who did not receive the intervention. However, further data analysis of each individual school pairing indicated that each intervention school provided a different number of PA system nutrition message announcements. Students in the intervention school who received the highest dose of messages chose the legume entrees 2.5 more times ($p<0.001$) than those children in the control school. This study indicated that the use of PA systems to deliver nutrition messages, if used on a daily basis, could be effective in influencing children to select a specified food item (33).

A study by Blom-Hoffman in 2008 provided preliminary results of the acceptance of lunchroom aides and teachers when implementing a social marketing component with a physical activity program in elementary schools (11). Four urban elementary schools were chosen for the study and included kindergarten through 3rd grade students. These schools were previously participating in the Athletes in Service program, which promotes structured time for

recess as an effort to increase physical activity. The 4 schools were randomly assigned to either the AIS program or AIS program with an additional FV component. The FV component included multiple social marketing strategies, such as displaying posters and utilizing daily announcements to highlight the FV of the day, FV based books and CD-ROM activities, activity books to take home and the distribution of stickers to students that purchased FSVs to encourage students to increase consumption of these items. Teachers were accountable for collecting data on students' awareness of morning announcements and their interest in the interactive CD-ROM. Lunchroom aides distributed stickers to the students who purchased a FV item. Results of the study showed that on a Likert scale from 1-6 (1=strongly disagree, 6=strongly agree), the 12-lunchroom aides reported that they thought distributing stickers to the students resulted in an increase consumption of FV at lunch with a mean Likert score of 6.0 (SD=0.00). The lunch aides reported that it was not difficult to hand out the stickers and complete other tasks ($x=5.73$, $SD= 0.65$) and that giving out stickers was a good way to encourage students to increase FV intake ($x=5.75$, $SD=0.62$). Teachers perceived that using the CD-ROM was an acceptable way to encourage the consumption of these food groups ($x=5.92$, $SD=0.29$). Although the complete results of the study have not been provided, the evaluation of the 1st year of the study showed that overall teachers and lunch aides were willing to help encourage the use of social marketing techniques if available (11).

Fulkerson and colleagues looked at implementing a number of promotional activities to encourage secondary school students to select lower-fat food items in the school setting (34). Twenty schools in Minnesota were recruited to participate in the Trying Alternative Cafeteria Options in Schools (TACOS) program. The schools were randomized into either an intervention

group that would be participating in the TACOS program or a control group to serve as a comparison. The promotional component of the intervention included incorporating various social marketing techniques throughout the schools and hosting contests and events to keep the students and faculty interested in the program. The types of promotional activities that were utilized throughout the 2-year study period included: 1) student involvement in school-wide media campaigns; 2) the opportunity for students to design their own promotional materials; 3) school newsletters that highlighted the events taking place related to the program; 4) poster contests; 5) the use of a PSA to distribute nutrition messages; and 6) taste-tests to allow students to sample low-fat foods. The promotion of FV items were a key component of the program, a few taste-tests and PSAs were utilized with the intention of better educating students to make these low-fat food choices and to encourage their consumption of these items. Student surveys were administered to the students to allow them to express their opinion of the TACOS program and discuss what they thought were key aspects that influenced whether they consumed lower-fat foods (34).

Trained research personnel recorded information on the promotional activities, such as what day the activities were used, where they were located or took place, and how long the activities lasted. The sales of lower-fat food items were recorded to evaluate whether the number of these items increased because of the program. Results of the study showed that as the number of promotional activities increased there was a significant increase in the sales of lower-fat food items ($p=0.033$) in the 1st year of the study. However, the same result was not present at the end of the 2nd year. In addition, the length of time in which the activities were utilized had a significantly positive impact on the percentage of sales from lower-fat items in

year 2 ($p=0.029$) of the study, even though this result was not noted in year 1 of the program (34).

In 2002, O'Neil and colleagues introduced the Gimme 5 Program. This initiative aimed to establish and reinforce positive attitudes among high school students to consume the recommended 5 servings of FSVs daily (35). Freshman students from 12 high schools in New Orleans, Louisiana were chosen to participate in this 4-year cohort study. One school in each group was randomized to either the Gimme 5 intervention or a control school. The intervention was comprised of 4 components including media marketing in the school, student workshops, a "Fresh Choices" educational piece, and involvement of parents. The media-marketing campaign included monthly themes focused on healthy items such as fruits, vegetable, legumes, and salads. Each monthly theme was promoted using display exhibits in the cafeteria, nutritional messages, table tents, posters, PSAs and student contests. The workshop component of the intervention encouraged students to design their own marketing strategy with a focus on how they would promote FSVs. In addition, they were involved in various other activities aimed at encouraging the students to think about ways to help increase the consumption of FV items among their peers. Foodservice personnel were provided with "Fresh Choices" educational materials to help them provide lunch items to encourage students to consume the recommended 5 servings of FV items. The parental involvement component focused on encouraging parents to purchase FV items for students and family members to consume at home. The program was evaluated by students' quarterly, using a "thumbs-up" and "thumbs-down" system. The purpose of the student evaluation was to better determine whether they noticed the media-marketing items and if they felt they were acceptable

materials to use. Results from the student evaluations show that the majority of students were aware of the marketing materials being used in the schools. Marketing stations and posters were recognized by 86.8% and 83.1% of the students. The PSA's were noticed the least with only 42.2% of students being aware of their existence. Marketing stations (93.8%) and contests (87.4%) among other media-marketing materials received a "thumbs-up" rating for acceptability. Daily FV consumption increased 14% ($p < 0.001$) as reported by the students in the intervention group, which resulted in a significant change over the 4-years of the study. This study shows that the use of a media-marketing campaign in the teenage population can increase the reported daily consumption of FV items (35).

Evaluation of social marketing campaigns (SMCs) are beneficial for multiple reasons, including to better understand what components of a campaign are effective in behavior change as well as determining if the intended audience has been reached (36). There are 3 common types of evaluation used, formative, process, and impact. Formative evaluation mainly focuses on gathering information to aid in the development of appropriate materials to be used as part of a social marketing campaign (SMC). The development of materials are based on identified needs of the target audience and take into consideration what tools will be most appropriate to determine whether the SMC was effective in changing the target behaviors. This form of evaluation often involves testing campaign materials to determine appropriateness before implementation of a campaign. Process evaluation measures the extent to which a campaign is implemented, and then uses that data to provide suggestions on ways to improve the campaign to increase effectiveness. This form of evaluation often examines what social marketing techniques are used during a campaign and further track how often and/or the

length of time they are available. The information gathered through process evaluation can be used to inform future campaigns by assisting in determining what techniques were most and least successful. Lastly, impact evaluation looks to measure how the target audience was affected by the campaign, looking mainly to identify if the campaign was successful in behavior change (36). This form of evaluation can be useful in determining whether the measurement tools selected prior to the start of the campaign were appropriate. Further this type of evaluation looks to eliminate any concerns that the findings resulted from other plausible explanations or that any positive findings are a true reflection of the impact of the campaigns implementation and not the result of an external source. The use of these evaluation components further strengthen SMCs by seeking to identify the most appropriate materials to use based on the needs of the target audience, monitoring the dissemination of those materials to further provide insight to what was successful, and evaluate the overall impact of the campaign on behavior change. Studies that lack an evaluation component are unable to accurately determine what techniques are most influential to eliciting changes in target behaviors (36).

Summary

With the increase in the prevalence of overweight and obese children and adolescents in the last 3 decades, it is vital to tap into resources that have the ability to reach the majority of youth and implement behavior-changing interventions. This can be accomplished by utilizing the school environment to promote healthful eating and physical activity. Multiple studies have implemented interventions or programs that focused their efforts on increasing FV intake

(20, 16, 28-29, 31). Studies that used the school environment to promote FV selection and consumption using social marketing techniques proved to be effective in increasing the consumption and selection of these items (11,33-35). The various marketing techniques utilized included items such as displaying FV related posters, providing character based nutrition messages via PSA, holding student contests, FV based events and activities, newsletters, and the inclusion of parental and foodservice staff to encourage students' to select FV items at school lunch. However, few studies have objectively evaluated the use of social marketing techniques to improve choice and consumption of fresh FsVs (34-35). Research shows that studies have been successful in increasing FV consumption among students participating in their studies and have further used some form of formative, process, or impact evaluation methods to evaluate SMCs in the middle and high school populations. Although the use of social marketing as a means to increase FV consumption has been successful in middle and high schools, there is a lack of research on the evaluation of SMC implementation in an elementary school setting. Further, there are few studies available that describe in detail the evaluation methods used and results from those efforts to evaluate SMCs to promote the consumption and selection of FV items in a school setting.

Part II: Manuscript

Introduction

The rates of childhood overweight and obesity in the United States have reached epidemic proportions (1). Tennessee was identified as 1 of the top 3 states in the nation for its accelerated rate of obesity over the past 15 years; currently 30% or more of the adult population is obese. Furthermore, Tennessee ranked number 6 in the nation for prevalence of childhood obesity, with approximately 21% of children and adolescents, ages 10-17 years, classified as obese in 2007 (2). Children and adolescents who are overweight or obese are at increased risk for numerous adverse health effects including cardiovascular disease, hypertension, dyslipidemia, type 2 diabetes, and remaining at an unhealthy weight in adulthood (3-5). Once thought to be a disease mainly identified in adulthood, type 2 diabetes is becoming more prevalent in youth with approximately 3,600 children and adolescents, 20 years of age or younger, diagnosed as new cases each year (6). Research suggests that making healthy lifestyle changes, such as increasing fruit and vegetable (FV) consumption to 5 or more servings a day, may delay or reduce the risk of a youth becoming overweight or obese and developing type 2 diabetes (4,7-8).

The consumption of fruits and vegetables (FVs) is vital to promoting good health in individuals of all ages (9). Optimal FV consumption may play a protective role in the prevention of obesity and other chronic diseases (10). The 2009 Youth Risk Behavior Surveillance System survey results showed that only 22% of youth in grades 9 to 12 years who were surveyed consumed FVs 5 or more times per day (11). This means that the vast majority of youth are at high-risk of not meeting dietary recommendations for FV intake.

School systems interact with the majority, approximately 95%, of youth in the nation (12-13). Therefore, schools have the ability to play a pivotal role in the prevention of childhood obesity through implementation of school initiatives and policies that focus on creating environments that promote consumption of healthy foods and provide opportunities for physical activity (3,5,7,12,14). As a means to include a better variety of FV items and to encourage youth to increase consumption of these foods, the addition of salad bars in school cafeterias has become increasingly more common (15). One of the most current initiatives to bring salad bars to schools to promote the consumption of FV items is the Let's Move Salad Bars to Schools national initiative. The intent of this initiative is to provide schools with salad bars to be used as a component of reimbursable meals (16). Ideally, the salad bars would be used either as a side item that would provide the fruit and or vegetable component of a reimbursable meal or as a stand alone entrée item as an alternative to the hot lunch option. Data collected as part of this initiative found that the cost of using the salad bar on a daily basis averages out to 16 to 26 cents per reimbursable meal sold (16). Therefore, according to these data, the cost of incorporating a salad bar as a method to encourage the selection and consumption of FSVs is relatively inexpensive.

Overall, incorporation of salad bars into the school environment has yielded positive results (15,17-18). Adams and colleagues in 2005 found that as FV variety on salad bars increased, consumption of the FSVs students selected increased (17). In 2007, Slusser and colleagues found that the use of a salad bar as an alternative to a hot lunch was effective in increasing both FV consumption and simultaneously decreasing consumption of foods high in saturated fat and cholesterol among elementary school children (18).

Schools participating in the National School Lunch Program (NSLP) have the option to utilize a salad bar as a reimbursable meal, if the items available and selected from the bar meet the reimbursable school meal requirements (15). Findings from the School Nutrition Dietary Assessment Study, Part II, noted that salad bars were most often located in affluent school districts, thus excluding many schools with a higher percentage of students eligible for free or reduced lunch. Positive results from the analysis indicated that the schools with a salad bar were more likely to offer a greater variety of FV options (15).

In 2009, Condon and colleagues looked at the availability of FV items included in reimbursable schools meals. They found that students who participated in the NSLP were more likely to consume FV than non-participants. However, this study also revealed that although FV items were offered to all students, the mere availability of these items did not increase consumption for non-participants (19). Likewise, the study by Adams and others in 2005 showed that the use of a salad bar versus proportioned servings of FsVs was not directly related to an increase in students' FV selection (17). Thus, additional encouragement to consume or promotion of FsVs from salad bars may be necessary to increase selection and consumption. The addition of nutrition curriculum in classrooms, taste-tests, the addition of FV items in the cafeteria, contests challenging students to consume more FsVs, and the use of various marketing techniques are all strategies that have been used in past years to encourage students to consume more FsVs in school settings (20-24).

The use of social marketing techniques to encourage or promote the intake of healthier foods has been effective in increasing FV consumption, consumption of vegetable-based entrees, and increasing the purchase of lower-fat food items in schools (20-22). Perry and

colleagues found success with implementing a school intervention focused on environmental change that used various marketing techniques to promote FV consumption (20).

Encouragement of students to select FV items by the school foodservice staff, displaying posters, and FV taste-tests were some of the intervention components. Results from the study showed that environmental change had a positive impact on increasing FV consumption in the intervention schools when compared to the control schools (20). Fulkerson and colleagues in 2003 looked at implementing a number of promotional activities to encourage secondary school students to select lower-fat food items in the school setting (21). Throughout the implementation of the program, trained researchers kept a record of promotional activities, such as what day the activities were used, where they were located or took place, how long the activities lasted, and overall sales of lower fat items during lunch. Process evaluation results showed that sales of lower-fat items did increase and were mainly affected by the number of promotional activities utilized and the length of time they were available (21).

Similar to Fulkerson's study, O'Neil and colleagues implemented a study in 2002 aimed to encourage high school students to consume the recommended 5 servings of FSVs daily (22). A media marketing campaign was used to promote healthy items at school, with a different theme available monthly. Students participated in creating marketing tools for the campaign and had access to various other marketing concepts such as posters, nutritional messages, and table tents. Quarterly, students used a "thumbs-up" and "thumbs-down" system to evaluate the program with the purpose of better determining whether they noticed the social-marketing items and if they felt that they were acceptable materials to use. Results of the study found that daily FV consumption did increase. Both the Fulkerson and O'Neil studies used 1 or more

of the various evaluation methods and were successful in increasing FV consumption among students participating in their studies and evaluating social marketing campaigns (SMCs) in the middle and high school populations (21-22). Although the use of social marketing as a means to increase FV consumption has been successful in middle and high schools, there is a lack of research on the evaluation of social marketing campaign (SMC) implementation in elementary school settings.

Although there are numerous evaluation methods, the 3 most commonly used to assess social marketing efforts are formative, process, and impact evaluations (25). Briefly, formative evaluation consists of a variety of assessment measures to strengthen the SMC before implementation. Process evaluation intensely examines the dissemination of social marketing techniques to better identify the extent of implementation and further inform ways to improve dissemination of those techniques. Impact evaluation measures the overall effect that the SMC had on the outcome measure(s), specifically focused on whether the target market was reached and further identify what was successful (25). Social marketing uses a unique continuous process that works towards enhancing the impact of programs to maximize behavior change. Data collected through the continuous monitoring and evaluation of programs are used to identify areas of least and greatest success (25). Although literature is available on the evaluation of SMCs with nutrition program based examples, few studies describe in detail the evaluation methods used to determine the impact of these campaigns on behavior change. Therefore, this study provides detailed accounts of the formative, process, and impact evaluation methods used to evaluate a SMC implemented in an elementary school setting. A description of the SMC follows.

Social Marketing Campaign

A rural elementary school in Tennessee was awarded 1 of 10 national grants for the 2009-2010 school year to increase FV consumption and to help the rural county address the issue of obesity in elementary school children and work toward the long-term goal of reducing type 2 diabetes among youth in the community. In 2009, with the use of grant funding, the Coordinated School Health Program (CSHP) in the county implemented a SMC aimed at increasing selection and consumption of healthy food items, particularly FsVs, at school through the use of a salad bar.

The social marketing techniques used as part of the campaign included the display of FV-related posters throughout the school, highlighting a different fruit or vegetable on the salad bar each week throughout the school year, providing taste-tests of the highlighted FV items, announcing fun facts about the highlighted FV via the schools PA system, and sending home monthly newsletters that included information on the highlighted FV items.

The purpose of this study was to describe the formative, process, and impact evaluations of a SMC to increase 3rd-5th grade students' selection and consumption of FV items from a school salad bar. The objectives for this study were 1) to describe findings from formative evaluations associated with the SMC, 2) to describe the process evaluation methods and outcomes used to evaluate the implementation of the SMC, 3) to evaluate the impact of the SMC on 3rd-5th grade students' selection and consumption of FV items from the school salad bar and self-reported mean FV eaten, liking, and preferences scores compared to 3rd-5th grade students in a control school. Approvals by the Director of Schools in the district and The

University of Tennessee Institutional Review Board were received for all components of this research. Descriptions of formative, process, and impact evaluation methods used in this study follow.

Formative Evaluation

Multiple components were involved in collecting data as part of formative evaluation. Meetings with school stakeholders were used to gather information on what the desired outcome measures were for the SMC and the plan for implementation. In addition, a review of digital photographs of students' salad bar selections from a preliminary study was key to make decisions about what items to include on the salad bar. Further, the administration of a FV pilot survey was paramount in ensuring that the final survey was an appropriate measurement tool for completion by 3rd-5th grade students.

Meetings with School Stakeholders

Methods

The primary researchers attended a meeting with the county Diabetes Prevention Coalition that took place during the summer 2009. This meeting addressed the purpose of the grant and the need for a SMC to encourage students to consume healthier items at school, specifically looking to increase consumption and selection of FsVs. The researchers presented the findings from a preliminary study that used digital photography of students' salad bar selections to suggest ways to increase healthful option on the salad bar.

Following this meeting another one was scheduled with the school foodservice personnel and CSHP stakeholders prior to the start of the 2009-2010 school year to continue

discussion on the results of the preliminary study and the digital photographs of students' salad bar selections. Results of this study allowed the researchers to provide suggestions to the school stakeholders on potential ways to modify the food items available on the salad bar to provide healthier options for students. In addition, the purpose of the grant received by the school and plans for implementation of a SMC to promote the selection and consumption of FV items from the salad bar were discussed at that time. A review of the planned social marketing techniques and dissemination plan were essential to determining what the school stakeholders thought would be feasible given the time constraints of the school schedule.

Following that meeting, a SMC audit and student awareness survey (Appendix B) were developed as a means to evaluate the extent to which the SMC techniques were being implemented and to collect data on students' awareness of the techniques being used. Prior to implementation of the SMC by the school stakeholders, a meeting with the CSHP director was convened to review the student awareness survey for readability, feasibility of administration, and methods for parental consent, child assent, and randomizing students for completion of awareness surveys. In addition, a list of the SMC techniques to be used during the campaign was reviewed.

Results

Based on the review of the digital photographs of students' salad bar selections from the preliminary study, the researchers suggested the removal or modification of high-calorie, low-nutrient-dense and high-sodium foods. As a result it was agreed by all school personnel in attendance that the best plan of action to provide healthier options, would be the removal of bacon bits, a change from full-fat to reduced-fat cheese and ranch dressing, and the addition of

pre-cut fruits and a spring lettuce mix to the salad bar. In addition, 1 school foodservice employee was designated to remain with the salad bar throughout school lunch period to maintain and replenish the salad bar items as well as assist students when needed and to monitor the amounts of croutons selected and salad dressing used by students.

This meeting resulted in an opportunity for school personnel to brainstorm ideas for the development and decide on a plan for implementation of the SMC for the upcoming school year. In conjunction with materials received by the school as part of the grant funding, the school was expected to use these funds for the marketing of and purchase of FV items for use throughout the year to promote the selection and consumption of these items. A listing of various techniques discussed, selected, and the responsible agents are outlined in Table 1, Appendix A. Briefly, the salad bar was selected as a means to highlight a different fruit or vegetable weekly throughout the school year. In addition, it was decided that taste-tests of the highlighted items would be used to encourage students to try new items. In terms of marketing, the use of posters, announcements of fun facts related to highlighted FSVs, a kick-off event, and the inclusion of information about the highlighted FSVs into the monthly school newsletter were all selected for use in the campaign based on discussions about the feasibility and time allotted for focus on the campaign.

Based on the review of the of the student awareness survey by the CSHP director modifications were made to include the terms fruit or veggie, as these were to be the focus of the campaign. In addition, the original survey was simplified to include only 5, yes or no, questions. Revisions to the SMC audit included the addition of a space for the primary researcher to indicate either the number of items available for display or the frequency of

events that took place by each of the techniques used as part of the campaign. An optimal frequency was determined based on what the CSHP director thought would be feasible and these were set as standards to define whether each technique was fully implemented.

Preliminary Study: Digital Photography of Students' Salad Bar Selections

Methods

Prior to the start of the 2008-2009 school year, a salad bar was added to the school cafeteria for use at lunch as a side item option. The salad bar was not intended for use as an alternative to hot lunch or as a reimbursable meal option. As part of a preliminary study to help food service personnel determine the amounts of FSVs to purchase for the salad bar, digital photographs of students' salads were taken as they exited the lunch line. Subsequently, these photographs were used to determine students' selection (types and frequencies) from the salad bar.

Results

Results from the preliminary study showed that on average 170 students, 34% of those enrolled, from kindergarten-5th grade, selected a salad from the salad bar during lunch. Further, digital photographs demonstrated that the majority of students' salads consisted of croutons, cheese, bacon bits and ranch dressing with no selection of any of the vegetable items available (Figure 1). As a result of this study, the research team suggested the use of social marketing to promote consumption of healthier items from the salad bar (FSVs). Items such as bacon bits, high-fat cheese, and high-fat salad dressings were eliminated from the salad bar. Further, the inclusion of a wider variety of vegetable options and the addition of fruits to the

salad bar were suggested as strategies to increase consumption and selection of salad bar items and to promote overall use of the salad bar by elementary school students.

Fruit and Vegetable Pilot

Methods

A FV survey created by Domel and colleagues (26-27) was selected to collect impact data from 3rd-5th grade students, with the intended purpose of determining if the SMC was effective in increasing the number of FV items students had ever eaten, their liking of these items, and their preferences to select FV snack items. Results from the survey were to be compared to those of students in a control school and used as a component of impact evaluation. This survey was administered as a pilot prior to the start of process evaluation methods to gather insight to the feasibility of using the tool with the target population. Prior to the administration of the pilot surveys, a meeting with the CSHP director confirmed that 33 different FV items were to be highlighted on the salad bar throughout the school year, as a result all 33 items were included in the FV survey.

Surveys were piloted with 3rd-5th grade students in both the school with the implemented SMC and control school. Parental consent and student assent were obtained prior to the distribution and collection of surveys. The CSHP director recruited participants from both schools. A parental consent form was sent home attached to a letter describing the study that was to take place in their child's school. The students had 1 week to return the consent forms, if not returned within a 2-week period, another packet was sent home, with 1 final week to return the form. An assent form for the students was included at the beginning of

the FV survey. Only those students with returned parental consent and student assent were eligible to participate.

The CSHP director and primary researcher administered the pilot survey in fall 2009 at the intervention school, additional trained researcher assisted with data collection at the control school. Students were given direction about how to complete the survey and the assent statement was read prior to survey start. The CSHP director, primary researcher, or trained research assistants were available at all times to answer students' questions.

Results

Findings from the pilot study indicated that overall students were not familiar with many of the FsVs included in the survey and asked to see pictures of the items. In addition, difficulties were noted with completing the rating scale portion of the survey, where students were asked to indicate how much they liked the items. These findings were consistent across both schools. Following the completion of the pilot data collection, modifications were made to the FV survey to include a picture of each FV item listed and cartoon faces were added to assist students with completing the rating scale portion of the survey. No demographic data were collected at this time point. The final survey methods and results are described in further detail as part of impact evaluation.

Process Evaluation

The SMC audit and student awareness survey (Appendix B) were designed and used in this study to collect information on the extent to which each social marketing technique was implemented and whether or not the students were aware of the techniques being used.

Feedback regarding the audit and survey was provided to the CSHP director monthly as a means of continual improvement of the SMC.

Social Marketing Campaign Audit

Methods

The primary researcher completed the first SMC audit at baseline the first week in February 2010 to collect information regarding the implementation of the campaign for the month of January 2010. This process continued monthly until the last data collection time point the first week in May 2010. To collect information to complete the audits, the primary researcher used visual observation to identify the number and location of FV related posters in the school. Food production records and discussions with the food service manager were used to collect information on the number and types of highlighted FSVs on the salad bar and the number of taste-tests completed each month, the type of FV items used, and the number of all 3rd-5th grade classrooms that participated. The number of FV related announcements made throughout the month was obtained from the school's office secretary. Copies of the school newsletters distributed each month were set-aside in the school office to determine whether a newsletter was sent home and if it included information on any of the fruits or vegetables that were highlighted during the month.

Results

As seen in Table 2, Appendix A, SMC audit findings indicated that in January taste-tests and announcements were not implemented at all. A fruit or vegetable was highlighted each week school was in session and information regarding these items was included in the January

newsletter. Following the completion of the first SMC audit for January, feedback was provided to the CSHP director. As a result, to some extent all 5 techniques used in the campaign were implemented at varying degrees for the months of February through April. The only technique that was not fully implemented at any time point was the use of the school's PA system to provide fun facts about each of the highlighted FsVs. Feedback from the primary researcher to the CSHP director in February resulted in an increase in the number of posters displayed and announcements made. Results from the March audit showed an increase number in FV-related printed materials available, specifically the inclusion of a display highlighting the fruit or vegetable of the week, which was placed on top of the school salad bar cart. The display included a picture of the fruit or vegetable with brief fun facts about the item. In addition, the number of FV-related announcements made increased from 0 to 3 throughout the month of March. A review of the school newsletters sent home monthly showed that, they included a brief listing of what fruit or vegetable items were to be highlighted each week throughout the month.

Student Awareness Survey

Methods

The CSHP director was supplied with copies of the student awareness survey by the primary researcher. The surveys were intended to provide anonymous feedback from a sample of 3rd-5th grade students about their awareness of the social marketing techniques. Five students from each of these grades who had prior parental consent to participate in the study were selected by the CSHP director to complete the student awareness survey. Student

participation in the surveys was determined by selecting every 5th student from a list of all students in each grade with consent to participate. This process was continued until 5 students were selected from each of the 3rd-5th grades for each of the intended survey administration time points. These surveys were to be completed on a bi-monthly rather than monthly basis. Although surveys were typically distributed every other week, students were only asked to answer the questions based on the week the survey was taken. The CSHP director organized the administration of the surveys by placing the list of students and blank surveys in the teachers' mailboxes in the school office. Teachers were instructed to obtain child assent prior to survey administration. Teachers had 1 week to distribute and collect the surveys and leave them in the school office for the CSHP director to retrieve. The primary researcher collected the student awareness surveys each month when the SMC audit was completed.

Results

Based on discussions during the formative evaluation process, it was determined that student awareness surveys would be completed bimonthly from January through April. However, due to time restraints, school scheduling, the process of selecting participants, and organizing the administration of the surveys in addition to daily tasks, the surveys were not administered as planned. As a result, the surveys were only distributed bi-monthly for the months of March and April with 4 survey sets returned. A total of 60 surveys were distributed during this time period, of these 72% (n=43) student surveys were completed and returned to the CSHP director. The results of the survey are outlined in Table 3, Appendix A. Briefly, the techniques students' reported they were most aware of were hearing the announcements and

being able to identify the highlighted fruit or vegetable of the week. Further, they were least likely to recall taste-testing a new fruit or vegetable item in their classroom.

Impact Evaluation

To evaluate the effect of the campaign on the number of FV items 3rd-5th grade students had ever eaten, the extent that they reported liking FsVs, and their preferences for FV snacks, a quasi-experimental research design was used to survey students in a control school and the school in which the SMC was implemented. Further, to determine the overall impact of the SMC on 3rd-5th grade students' selection and consumption of FV salad bar items, plate waste measurements accompanied by digital photographs were used in the school where the SMC was implemented. The following sections describe the methods and results of both these impact evaluation components.

Fruit and Vegetable Survey

Methods

The FV survey was administered at baseline in January 2010 and post-implementation in May 2010. All students who returned a parental consent at the beginning of the 2009-2010 school year in both the study and control school and the school in which the SMC was implemented were asked to complete the surveys at both time points. A total of 741 students in 3rd-5th grades were eligible to participate in the study, of these 32% (n=238) returned consent forms and provided student assent (Figure 2), of these surveys completed 77% (n=183) had complete data for analysis at baseline and 79% (n=187) at post-implementation.

The CSHP director, primary researcher, and trained research assistants administered the survey and were available to answer student questions about the survey. Students were instructed on how to complete the survey at each time point and were asked to complete the survey on their own without the help of peers. The FV survey was adapted from an instrument created by Domel and colleagues (26-27) and modified as described previously as a result of the formative evaluation (Appendix B). Three sections were utilized from Domel and colleague's original FV survey, these sections constituted the eaten, liking, and preference sections. Additionally, the survey collected demographic data for grade and gender. The first section included a listing of 33 FSVs (16 fruits and 17 vegetables). Students were asked to indicate whether or not they had ever eaten the FV items listed, by circling yes or no. Eaten scores were determined by denoting 1 point for a yes and 0 points for a no response. Total points were summed for each student and a mean eaten score was reported. Section 2 of the survey asked students to indicate how they would rate the 33 FSVs on a 5-point scale. Available responses were 1=I really do not like it, 2=I do not like it, 3=it is ok, 4=I like it a little, and 5=I really like it a lot. Each student's responses for the FV items were summed individually to determine their overall liking score. A score of 165 was the highest number that could be recorded, which represented that a student selected a 5 for all 33 FV items included in the survey. A mean liking score for all students was calculated. The final section of the survey, asked students to select the snack item they would prefer to eat when they arrive home from school, when given 2 snack options, a fruit or vegetable and a typical snack food, such as cookies or chips. Preference scores were determined by denoting 1 point for a fruit or

vegetable snack and 0 points for a typical snack. Total scores were summed for each student and a mean preference score calculated.

FsVs were analyzed separately and combined for both the eaten and liking scores to further gain insight into possible differences by food group (mean fruit eaten, vegetable eaten, and combined FV eaten scores and fruit liking, vegetable liking, and combined FV liking scores). Mean differences for each of the 3 survey sections were used to determine significant changes from baseline to post implementation and were compared by school, using multivariate analysis of variance. Data were analyzed using SPSS 19.0. Significance was set at p-value 0.05.

Results

Results indicated that no significant differences in mean eaten, liking, or preference scores were noted between schools or across time points (Table 4, Appendix A).

Plate Waste

Methods

Plate waste data and digital photographs were collected at baseline in January 2010 and post-implementation of the SMC in May 2010 to determine the impact of the SMC on students' selection and consumption of FV salad bar items. At each data collection time point, the salad bar did not contain a highlighted fruit or vegetable, as a means to minimize the likelihood that the data obtained were influenced by the inclusion of 1 of these additional items. Salad bar plates for students' in 3rd-5th grade were analyzed for this study. Sample size calculations revealed that data needed to be collected from 85 3rd-5th graders to provide an adequate stratified sample size. At baseline, only 42 students in 3rd-5th grades selected a salad as a side

bar option, which greatly increased at post-implementation, as 69 3rd- 5th graders selected a salad. For the purpose of this study, standard plate waste measurement methods were used (28). The research team photographed, using a digital camera, and weighed, using a digital precision scale, randomly selected salad bar plates as they were charged at the cash register in the cafeteria lunch line. Students were directed to an area immediately adjacent to the tray line where 2 stations, which included a scale and a mounted tripod with a camera, were set up. The LCD readout on the scales was directed away from the students. A green (girl) or yellow (boy) card, based on the researchers' determination of gender, was placed in the photograph with an assigned identification number. The number was recorded on a sticker using a non-toxic pencil and placed on the bottom of the salad plate. If the researcher could not determine the students' gender, the identification number was recorded on a white card. Each student's salad plates were placed on the digital precision scale with the LCD readout visible along with the gender specific identification colored paper and a photograph was taken. The identification numbers and salad weights were recorded as the plates were weighed and photographed (Appendix B). Following the completion of school lunch, research assistants retrieved all students' salad plates. Those plates with an identification number were photographed and weighed again. The gram amount of salad remaining in correspondence to the identification number was recorded. These before and after weights were used to determine the gram amount of salad selected by all students, the gram amount of waste, and the gram amount of consumption. SPSS software was used for data analysis. Plate waste data were analyzed using univariate analysis of variance with a fixed factor of grade and time point. Significance was set at p-value 0.05.

Digital photographs were used as a visual aid to determine the number of students who selected each item on the salad bar. In addition, the photographs were used to determine the number of vegetable items selected as part of each student's salad. Each photograph was viewed and a tally was recorded for each of the salad bar items the student selected. After all photograph data were entered, a total of the number of students who selected each item and number of vegetable items selected by each student were determined.

Results

Results show that at baseline all 3rd-5th grades combined selected an average of 148.7 grams of salad from the salad bar and consumed an average of 96.1 grams. Therefore, the students consumed an average of 66% of their salads. At post-implementation, the combined 3rd-5th grade students' selected an average of 111.2 grams of salad and consumed an average of 76.2 grams, which is 73% of their salad bar selections. There were no significant differences found by grade or time point (Table 5, Appendix A).

Digital photographs revealed that the items available on the salad bar at both time points did not contain any fruit options and the items offered differed. At post-implementation, it was noted that the number of vegetable options selected by students decreased with the availability of turkey and ham to the salad bar (Table 6, Appendix A).

At baseline, of the 41 students whose digital photographs were analyzed, 30 (73%) selected at least 1 vegetable item from the 4 vegetable options available on the salad bar. At post-implementation, 43 of 70 (61%) students selected at least 1 vegetable, of the 6 vegetable items offered (Table 6, Appendix A). At both timepoints, lettuce, tomato, broccoli, cucumber, and pickles were offered on the salad bar, with the addition of onion and carrots at post-

implementation. Pickles were not considered a vegetable due to the high sodium content and lack of nutrients. The addition of 2 vegetable items in May did not increase the number of vegetable items selected by students. The highest number of vegetable items selected to make a salad by students at baseline were 4 vegetables and 3 vegetables at post-implementation (Table 7, Appendix A).

Discussion

The importance of evaluating SMCs is well documented (25,29). The use of formative, process, and impact evaluation methods collectively strengthen the data obtained and provide better insight to the strengths and weaknesses of these campaigns (25). Social marketing is a continuous process that not only looks to identify areas for improvement prior to the start of a SMC, but during the implementation. Completing formative, process, and impact evaluations throughout the social marketing process allows researchers to provide continuous feedback and opportunities to strengthen the implementation of the campaign in hopes of having a greater impact on changes in identified target behaviors (29).

This study described the formative evaluation processes used to provide insight for the planning, development, and implementation of the SMC by the study school. As part of the formative research, results of the digital photographic selection study allowed the primary researchers to provide feedback on ways to modify the school salad bar. The changes made may or may not have had a direct impact on students increasing their FV selection and consumption from the salad bar. However, modifications made prior to the start of this study ensured that the items other than vegetables, such as dressings and cheese were healthier

options than those available the year prior. Typically, formative research involves the testing of marketing materials prior to the start of a campaign to determine if the materials developed or selected are appropriate to elicit behavior change of the target audience (25). A national industry partner, who likely had previously tested the materials, provided many of the marketing materials available for the school to use in this study. Piloting the FV survey prior to baseline data collection provided invaluable feedback and allowed for changes to be made to better meet the needs of students by modifying the survey tool so that it was more easily understood and elicited more reliable student responses. Testing of the survey prior to start of the study allowed the researcher to increase the validity and reliability of the measurement tool, which is another way formative evaluation can be used to strengthen study results (25).

There are multiple strategies available for use as a means of process evaluation for SMCs (25). The description of process evaluation methods outlined in this study focus on monitoring the dissemination of social marketing techniques by tracking the number and or frequency of events that were implemented on a monthly basis. This type of evaluation tool has been used in previous studies (30-31). Two of the most important reasons for conducting process evaluations are to identify what techniques were successfully implemented and to use that information to provide feedback as to which items were the most effective approaches in reaching the target audience thus potentially impact behavior change (25). Findings from this study show that all the social marketing techniques selected for use at part of the SMC to promote the selection and consumption of FV salad bar items were implemented to some extent during the campaign. Many of the techniques used in this study were similar to those in other campaigns intended to increase consumption of healthier items as part of school lunch

(20-22, 32). However, few of these studies included an evaluation component to identify the extent of implementation. The use of the schools PA system to provide fun facts about each of the highlighted fruit or vegetable items was the only technique that was not fully implemented at any time point throughout the campaign. Although, the CSHP director provided the school with the information on each FV item, the intended goal of making 3 announcements weekly was never reached. Announcements, when used, were made each Monday at the start of the school week briefly mentioning the highlighted fruit or vegetable item for that week. A study by Folta and colleagues in 2006, found that the use of the schools PA system to provide nutritional messages promoting new legume-based entrees at school lunch was effective in increasing the likelihood that a student would select the new items. Further, students in schools that received the highest dose of nutritional messages selected the new legume items 2.5 times more than students in schools with a lower number of messages (32). This indicates that although in this study the announcements were not fully implemented, 63% of students who completed the student awareness survey reported hearing FV related announcements, further supporting Folta and colleagues by indicating that the use of this technique should not be discounted as it has shown an impact on increasing the selection of a targeted food item.

Further the use of surveys to assess awareness of the implemented SMC techniques has been used in previous studies (22, 30-31,33). Although the type of social marketing techniques differs by study, findings obtained from the student awareness survey in this study were not supported by those of O'Neil and colleagues in 2002, who found that students noticed the PA announcements the least. Both studies did find that a higher majority of students were aware of the displayed posters throughout the school (22). Results of the student awareness surveys

indicated that over half the students who participated in the survey could identify the fruit or vegetable item highlighted during that week and to some extent each of the 5 techniques used in the campaign were noticed to some extent by the students who completed the survey.

During the months of survey administration, 4 of the 5 social marketing techniques were fully implemented and the 1 technique that was not fully implemented was still recognized by the majority of the students. This suggests that even though not all the techniques were fully implemented, that did not deter students from recognizing those elements. If the SMC had been implemented to its full extent, thus increasing the number of items displayed or occurrence of events, significant results may have resulted, as seen by Fulkerson and Colleagues in 2003, who found that as the number of promotional items increased so did the sale of lower-fat a la carte items (21). Overall, based on process evaluation results, the SMC audits indicate that the majority of the techniques used during the campaign were fully implemented and that students were aware of the materials used throughout the campaign.

The primary goal of any SMC is to elicit behavior change among the target audience. The purposes of impact or outcome evaluation methods are to identify if the SMC was effective in influencing a change in behavior (25). In this study, to determine the impact of the campaign on the desired behavior change, plate waste methods and the administration of a FV survey were used. The results of the plate waste were intended to demonstrate whether the campaign was effective in increasing the selection and consumption of FV salad bar items. If an increase in selection and consumption was noted, the FV survey with the use of a control school would be used to verify that behavior changes seen within study school across time points was truly a result of the campaigns implementation. It is often the intent of impact

evaluations not only to determine whether the SMC was effective in behavior change among the target audience, but also to ensure that any changes noted are truly the result of the campaigns presence (25).

Results of the FV survey indicated that no changes in students eaten, liking, or preference scores occurred across time points. Post-implementation FV survey data collection took place less than 4 months after the initial baseline measurements were taken. The time frame between measurement points may not have been long enough for changes to take place. It has been suggested that it may take up to 6 months between data collection points to detect any significant changes in behavior (25). Therefore, measuring the impact of the SMC on behavior change across a 4-month span may not have allowed enough time for changes to take place. The use of taste-test opportunities may have shown a positive impact on overall preference scores if measurements had been taken further apart as the use of this technique has been thought to play a role in increasing preferences for FV items (33).

The popularity of salad bar use in schools to increase FV consumption and selection continues to flourish (15-18,33-34). Based on National School Lunch Program guidelines, the salad bar in this elementary school was intended for use as a side item at school lunch. At lunch, students could select a salad in addition to a main entrée with a milk to create a reimbursable meal, but a salad could not be used as a complete reimbursable meal option or an alternative to hot lunch as in this setting it did not contain a meat/or meat alternative or bread/grain item (15). However, at post-implementation, students purchasing the salad with milk had the opportunity to count it as their reimbursable meal. At this time point, strips of turkey and ham were added to the salad bar for the purpose of using commodity items at the

end of the school year to reduce waste. If a student selected the salad bar as their reimbursable meal, they were required to choose at least 2 servings of vegetables, meat, milk, and a grain/or bread item. Typically across the nation, salad bars available in schools contain an average of 4.6 vegetable items for students to select to create a salad (15). The salad bar available in this study is similar in that it contained at least 4 vegetable items at each data collection time point. In addition, 2 dressing options, cheese and croutons were available. The salad bar items offered at this school were similar to variety of items offered on cafeteria salad bars throughout the nation (15). The most common items offered include lettuce and tomatoes, with the most selected raw vegetables being cucumbers, carrots, and broccoli. All of these items were available for students to choose from as part of the salad bar at some point in this study (15). Although this salad bar did not include a fruit option at either data collection time point, this is not uncommon. A report on school lunch salad bars in 2002, released by the United States Department of Agriculture indicated that a little over half of salad bars include at least 1 fruit item (15).

The number of students in the 3rd-5th grades who selected a salad from the salad bar at lunch increased at post-implementation. If the increase in the number of students, from 42 at baseline to 64 at the last data collection time point, who selected a salad was a result of the bar being used as an entrée item and an alternative to hot lunch this would be a positive finding for the school. This would demonstrate that the availability of the salad bar as an alternative to hot lunch may encourage students to select the bar as their meal which has been shown to increase vegetable consumption (19). In 2009, Condon and colleagues reported that students who participated in the NSLP consumed significantly more servings of vegetables than non-

participants and were less likely to choose dessert and snack items (19). These findings are further supported by the California Children's 5 a Day—Power Play! Campaign, that suggested the consumption of FV items were most positively correlated with students who participated in the NSLP (33).

Students' consumption of salad bar items increased from 66% to 73% from baseline to post-implementation of the SMC. This indicates that although students selected a higher gram amount of salad at baseline they consumed more of the items they selected at post-implementation. Although, this study did not weigh vegetables separately from other salad bar components, it is possible that as students' consumption of salad bar items increased so did the consumption of vegetable items. If not, it is reassuring to know that the items available on the salad bar during this study were healthier options as a result of the preliminary data and formative evaluation processes conducted prior to baseline data collection.

At post-implementation, the number of vegetable items available on the salad bar increased. In addition to the slices of deli ham and turkey added to the bar, onions and carrots were included. Results of the study found that although the number of vegetable items available increased the selection of these items did not. However, the mean percent of salad bar consumption did increase from baseline to post-implementation with the increased variety of vegetable items offered on the salad bar. These findings are supported by those of Adams and colleagues, who found that as the variety of FV items increased, so did consumption (17). Results from the plate waste suggest that if the salad bar was used as a reimbursable meal option on a daily basis as an alternative to hot lunch more students may participate in selecting salads. Slusser and colleagues found that the use of a salad bar as an alternative to hot lunch

resulted in increased consumption of FsVs (18). In addition, involving students in determining what items are available on the salad bar may spark interest in purchasing a salad during school lunch and may potentially lead to an increase in selection and consumption of FV salad bar items (34).

This study used a novel approach for determining selection of salad bar items. Digital photographs were used as a visual aid to determine the number of students who selected each item available on the salad bar unlike previous studies that have used the photographs for the purpose of measuring consumption (35). Therefore, this study contributed to future research by demonstrating that the use of photographs to determine selection of salad bar items is an appropriate method.

Limitations

As with most evaluation research, limitations existed in this study. The FV survey used in this study relied on self-reported responses by students. Self-reported data is subject to potential recall bias and in this age group may be influenced by social desirability (29). In an attempt to minimize these effects on FV survey results, researchers remained in attendance during survey administration, encouraged students to complete the survey without the input of peers, and mainly provided assistance to students when they needed clarification on how to complete a section or help with identifying a fruit or vegetable by providing additional item descriptives.

The sample size of students needed to reach an adequate power for the plate waste study was not reached at either time point. Had a larger sample size of students been available for data collection significant differences may have been seen.

Conclusions

The description of each of the formative, process, and impact evaluation methods was effective in providing insight to the implementation of a SMC in an elementary school setting aimed at increasing the selection and consumption of FV salad bar items at school lunch. Although, the extent to which the SMC was implemented appeared to be sufficient to garner the attention of students in the school, the campaign had limited impact on behavior change among students based on findings from the impact evaluation. This suggests that either the exposure of the campaign was not enough to effect behavior change or the tools selected for use to determine behavior change were not appropriate for this study. Future studies may benefit from results noted in this study especially in regards to what social marketing techniques were fully implemented in the school as part of the campaign and take note of what techniques were most identified by 3rd-5th grade students. In addition, the use of alternative measurement tools may be effective in identifying behavior changes in a campaign implemented in the short-term. Further, testing the measurement tools used in this study with a campaign to promote FV consumption at school that is longer in duration may be beneficial in determining whether the tools are appropriate.

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Appendices

Appendix A: Tables and Figures

Table 1. Selection of Social Marketing Campaign Components

Techniques Discussed	Techniques Selected	Responsible Agent
Highlight FsVs	X	School Foodservice Personnel
FV taste-tests	X	School Foodservice Personnel
FV-related posters	X	CSHP Director
FV-related PA announcements	X	CSHP Director/Office Personnel
FV-related newsletter	X	School Principal
Kick-off event	X	CSHP Director
FV poster contest		Art Teacher
FV classroom component		CSHP Director/Teachers
FV-related handouts		CSHP Director

Table 2. Social Marketing Campaign Monthly Audit Results

Data Collection Date	Posters (5/mo)	Highlighted FV on Salad Bar (4/mo)	FV Taste-test (2/mo)	FV Announcements (12/mo)	FV Newsletter (1/mo)	# SMC Techniques Fully Implemented per Month
January (2/5/10)	2	3	0	0	1	2/5
February (3/5/10)	5	4	2	0	1	4/5
March (4/5/10)	6	4	2	3	1	4/5
April (5/5/10)	5	4	2	3	1	4/5

Table 3. Student Awareness Survey Results

Students Selected n=60	
Survey Question	Student Response n=43 (72%)
"Do you know what the fruit or veggie of the week was?"	25 (58%)
"What was the fruit or veggie of the week?"	23 (53%)
"Did you see any new fruit or veggie posters at your school this week?"	19 (44%)
"Did you try any new fruits or veggies in your classroom this week?"	8 (19%)
"Did you hear any announcements about the fruit or veggie of the week this week?"	27 (63%)

Table 4. Mean Changes in Eaten, Liking, and Preference Score from Baseline to Post-Implementation by School and Time Point (Mean±SD)

FV Survey Component ¹	School			
	Intervention		Control	
	Baseline n=91	Post n=96	Baseline n=102	Post n=108
Eaten Score				
FV	20.1±7.4	22.5±7.4	22.1±6.8	22.3±6.6
Fruit	11.8±3.5	12.3±3.5	11.5±2.9	11.7±2.7
Vegetable	8.9±4.6	10.2±4.7	10.5±4.5	10.5±4.4
Liking Score				
FV	82.9±31.7	89.7±33.7	85.4±31.2	83.2±29.0
Fruit	51.4±17.2	53.6±18.4	48.7±15.0	48.3±15.0
Vegetable	31.6±18.5	36.1±19.6	36.7±18.8	34.9±16.7
Preference Score				
	4.2±2.5	4.2±2.5	4.5±2.3	4.7±2.3
¹ No Significant differences by school or time point for mean eaten, liking, and preference scores.				

Table 5. Changes in Mean Percent Salad Bar Consumption by Grade and Time Point¹

Time Point	Grade	Number Participants	Mean Gram Amount Selected (g)	Mean Gram Amount Consumed (g)	Mean Percent Consumed Mean±SD
1	3	13	169.5	115.2	0.66±0.3
	4	15	138	65.1	0.55±0.4
	5	14	140.8	111.7	0.77±0.1
	Total	42	148.9	96.1	0.66±0.3
2	3	23	77.1	59.3	0.77±0.3
	4	11	149.7	88.6	0.68±0.3
	5	30	123.3	84.7	0.71±0.3
	Total	64	111.2	76.2	0.73±0.3
¹ No significance found by grade (F [1,100]= 1.6;p=0.196) or time point (F [1,100]=1.2;p=0.269).					

Table 6. Salad Bar Item Selection

	Time Point			
	Baseline		Post	
Salad Bar Items	Item Offered	Student Selection by Item n=41	Item Offered	Student Selection by Item n=70
Lettuce	X	20 (49%)	X	25 (36%)
Tomato	X	11 (27%)	X	4 (6%)
Cucumber	X	20 (49%)	X	15 (21%)
Broccoli	X	8 (20%)	X	4 (6%)
Pickles	X	11(27%)	X	20 (29%)
Carrots	---	---	X	10 (14%)
Onion	---	---	X	0 (0%)
Cheese	X	14 (34%)	X	15 (21%)
Croutons	X	28 (68%)	X	20 (29%)
Crackers	X	3 (7%)	---	---
Ranch Dressing	X	20 (49%)	X	36 (51%)
Thousand Island Dressing	X	3 (7%)	X	5 (7%)
Ham	---	---	X	21 (30%)
Turkey	---	---	X	23 (33%)

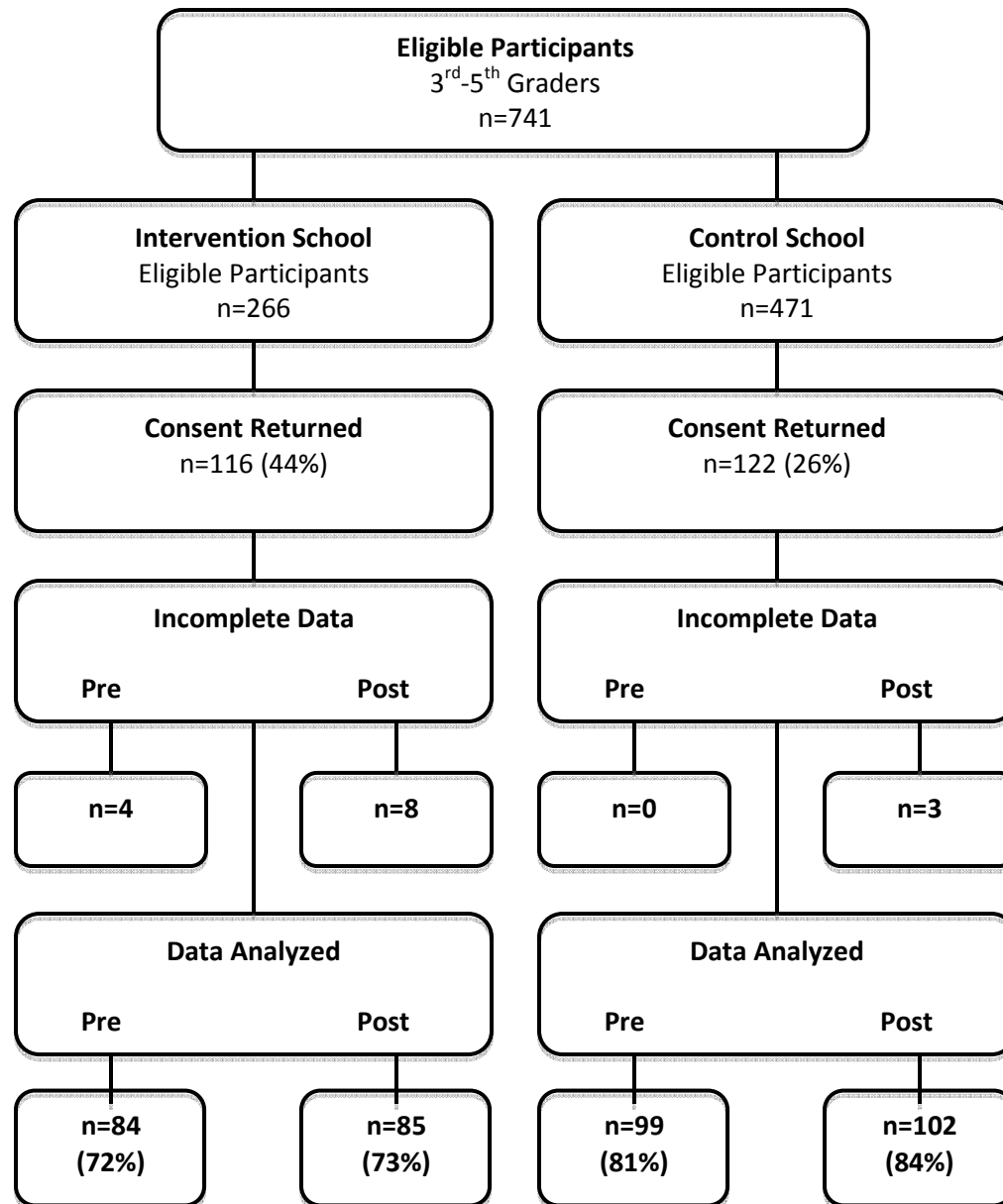
Table 7. Students Vegetable Selection from Salad Bar

Number Vegetables Selected	Time Point	
	Baseline n=30 ¹	Post n=43 ²
1	11 (36%)	31 (72%)
2	10 (33%)	9 (21%)
3	8 (27%)	3 (7%)
4	1 (3%)	0
5	0	0
6	--	0
¹ Number of students who selected ≥ 1 vegetable at baseline ² Number of students who selected ≥ 1 vegetable at post		

Figure 1. Examples of Digital Photographic Selection



Figure 2. Eligibility and Student Participation Flow Diagram



Appendix B: Data Collection Instruments

Social Marketing Campaign Audit

Date _____

Is the school currently displaying or using these social marketing techniques....

- ☐ Love Your Veggies Hidden Valley Banner and Fruit and Vegetable Posters
 - How many posters were displayed in the school? ____ out of 5
 - Where were the posters located?
 - ☐ Hallway
 - ☐ Cafeteria
 - ☐ School Entrance
- ☐ Highlighting a fruit or vegetable item on the salad bar
 - How many fruit or vegetable items were highlighted on the salad bar in the last month?
____ out of 4 ____ out of 5
 - What were the highlighted fruit and vegetable items on the salad bar?
- ☐ Taste testing fruit or vegetable items in the classroom
 - How many foods have been taste tested in the last month? ____ out of 2 (done biweekly)
 - How many 3rd-5th grade classrooms participated in tasting the new food items?
- ☐ Using the PA system to announce the highlighted item on the salad bar
 - How many announcements were made about the highlighted fruit or vegetable items on the salad bar in the last month? ____ out of 12 ____ out of 15 (announced Monday, Wednesday, Friday)
- ☐ Sending home monthly newsletters
 - Was a newsletter sent home in the past month? ____ out of 1
 - Did it include information on any fruits or vegetables highlighted during the month?

Student Awareness Survey

Grade_____

Date_____

Boy Girl

Please circle yes or no...

I. Do you know what the fruit or veggie of the week this week was?

YES

NO

What was the fruit or veggie of the week this week?

II. Did you see any new fruit or veggie posters at your school this week?

YES

NO

III. Did you try any fruits or veggies in your classroom this week?

YES

NO

IV. Did you hear any announcements about the fruit or veggie of the week this week?

YES

NO

Fruit and Vegetable Survey

Assent Form and Survey

Thank you for agreeing to complete
this fruit and vegetable survey!

Your parent or guardian has given permission for you to fill out this survey about the foods you eat. The questions you are about to complete are very important. Please answer these questions as best you can; there are no right or wrong answers. If something does not make sense or you have a question, please ask. If you don't want to finish the survey, just let us know. If you don't want to finish, you don't have to.

Your help with this project is greatly appreciated.

GRADE:_____

AGE:_____

GENDER:

BOY

GIRL

1. Please choose two for each food.

Please choose No or Yes for each food.				If you have eaten the food, then choose 1, 2, 3, 4, or 5.				
Have you ever eaten this food?				What do you think about this food?				
				 I really do not like it.	 I do not like it.	 It is ok.	 I like it a little.	 I really like it a lot.
a	watermelon 	No	Yes	1	2	3	4	5
b	peaches 	No	Yes	1	2	3	4	5
c	spinach 	No	Yes	1	2	3	4	5
d	tomatoes 	No	Yes	1	2	3	4	5
e	plums							

		No	Yes	1	2	3	4	5
f	carrots 	No	Yes	1	2	3	4	5
g	sweet potatoes 	No	Yes	1	2	3	4	5
h	pears 	No	Yes	1	2	3	4	5
i	pumpkin 	No	Yes	1	2	3	4	5
j	apples 	No	Yes	1	2	3	4	5
k	green beans 	No	Yes	1	2	3	4	5
l	squash							

		No	Yes	1	2	3	4	5
m	cranberry 	No	Yes	1	2	3	4	5
n	celery 	No	Yes	1	2	3	4	5
o	cantaloupe 	No	Yes	1	2	3	4	5
p	oranges 	No	Yes	1	2	3	4	5
q	broccoli 	No	Yes	1	2	3	4	5
r	lemons 	No	Yes	1	2	3	4	5
s	green peppers 	No	Yes	1	2	3	4	5

t	avocado 	No	Yes	1	2	3	4	5
u	cauliflower 	No	Yes	1	2	3	4	5
v	bananas 	No	Yes	1	2	3	4	5
w	radishes 	No	Yes	1	2	3	4	5
x	asparagus 	No	Yes	1	2	3	4	5
y	pineapples 	No	Yes	1	2	3	4	5
z	peas 	No	Yes	1	2	3	4	5
aa	grapefruit 	No	Yes	1	2	3	4	5

bb	lima beans 	No	Yes	1	2	3	4	5
cc	mangoes 	No	Yes	1	2	3	4	5
dd	okra 	No	Yes	1	2	3	4	5
ee	cherries 	No	Yes	1	2	3	4	5
ff	zucchini 	No	Yes	1	2	3	4	5
gg	strawberry 	No	Yes	1	2	3	4	5

2. When I get home from school, I prefer to have...

(Circle one food on each line that you would prefer when you get home from school.)

my favorite fruit	OR	my favorite cookie
my favorite fruit	OR	my favorite candy bar
peanut butter on bread	OR	my favorite raw vegetable & dip
peanut butter on bread	OR	my favorite fruit
chips	OR	my favorite raw vegetable & dip
chips	OR	my favorite fruit
my favorite soda/pop	OR	my favorite fruit
my favorite candy bar	OR	my favorite raw vegetable & dip

Weight Sheet

Date: _____ Researcher:_____ Before WT ☐ After WT ☐

Grade	ID Number	Weight (g)	Gender

Vita

Whitney Merola is originally from Cookeville, Tennessee. Following her graduation from Cookeville High School in 2004 she continued her education at Tennessee Technological University, where she received her Bachelor of Science Degree in Human Ecology with a concentration in Food, Nutrition, and Dietetics in 2008.

She furthered her schooling at the University of Tennessee, Knoxville where she pursued her Master of Science Degree in Nutrition, with a concentration in Public Health Nutrition, as well as a minor in Epidemiology. She is scheduled to complete her degree in 2012. She completed the Dietetic Internship in 2011. Following completion of her degree and the Registered Dietitian's Exam she plans to work as a Registered Dietitian.