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Can Student-Driven Changes Increase Salad Bar Usage in Schools?

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ABSTRACT

Increasing student salad bar participation may increase students' consumption of fruits and vegetables while decreasing their risk of chronic disease. This study observed student perception, experience, and participation of the school salad bar in two Mississippi high schools. The subjects were students' age 15-18 years old (n=617 from the control school and 560 from the intervention school). After baseline salad bar participation was collected at the intervention school, students from both schools were surveyed to determine pre-treatmentperception and experience of the salad bar, measuring factors such as salad bar food quality, staff responsiveness and empathy, and program reliability, The information from this data was then used to implement changesto the salad bar at the intervention school. Student perception and experience was evaluated again, after six weeks,with a survey at the intervention school. T-test analysis found that implementing student-driven changes significantly increased participation by 4.43%. Perception and experience of the salad bar increased favorably in 90% of survey factors from pre-intervention to post-intervention. A linear regression found that student selection of the salad bar increased from 6.9% pre-intervention to 11.4% post-intervention. These findings show that incorporating student-driven changes can increase salad bar participation in a short-term intervention.

Keywords: *salad bar usage, fruit and vegetable consumption, USDA school lunch program*

INTRODUCTION

Obesity in childhood is linked to an increase risk of obesity in adulthood (Biro & Wien, 2010), and in Mississippi, 16.5% of adolescents in grades 9-12 are considered overweight, 18.3% are obese, and 25% are slightly overweight (*Mississippi's Response to Obesity*, 2012; *Youth Risk Behavior,* 2014; CDC, 2013; Brener, 2013). Certain strategies have been identified as being effective for reducing childhood obesity rates, and one of these is consuming more fruits and vegetables, as diets containing adequate amounts of fruits and vegetables may help to maintain body weight while reducing the risk of chronic diseases (Boeinget al., 2012; *Fruit and Vegetable Consumption*, 2011). Florence, Asbridge and Veugelers (2008) found that students with high fruit and vegetable intake performed better academically than students with low fruit and vegetable intake. Therefore, the recommended intake of fruits and vegetables can be beneficial for the long-term overall health and learning experience of adolescents (Harris et al., 2012; Florence, Asbridge, &Veugelers, 2008).

The combination of 1.5 cups of fruit and 2.5 cups of vegetables are recommended for girls age 13-18 and 2 cups of fruit and 3 cups of vegetables are recommended for boys age 13-18 (USDA *Dietary Guidelines for Americans*, 2015). Consumption of 2 ½ cups of fruits and vegetables per day is associated with decreased risk of cardiovascular disease, the leading cause of death in the US (Kim, et al. 2011). According to the most recent National Health and Nutrition Examination Survey (NHANES), adolescents are not meeting the requirements of fruits and vegetables recommended by the *Dietary Guidelines for Americans*. High school students reported consuming both fruits and

vegetables 1.2 times per day on average (CDC, 2011). In the High School Youth Risk Behavior Survey of 2011 taken by the Centers for Disease Control (CDC, 2014), approximately 45.7% of Mississippi youth reported not consuming green salad and 17% reported not consuming any fruit for the seven days prior to taking the survey.

The National School Lunch Program (NSLP) serves more than 30 million students in more than 100,000 schools in the US, and provides a nutritionally balanced meal for students in pre-K through 12th grade schools for free or for a reduced price. As of 2013, approximately 80% of Mississippi students consumed lunch provided through the NSLP (USDA National School Lunch Program, 2014). Approximately 72% of students in Mississippi received free or reduced-price lunch in the 2012-2013 school year. Although NSLP participation and free or reduced-price lunch participation rates are high in Mississippi, the students are not meeting the fruit and vegetable recommendations (Mississippi Department of Education, 2014). Targeting healthful practices within the NSLP can assist in providing improvements in the dietary patterns of students (Nihiser, 2013).

Salad bars can be offered as a reimbursable meal for the NSLP by meeting fruit, vegetable, protein, grain, and dairy guidelines. Salad bars can also be offered as a supplement to the traditional hot lunch served. The opportunity to provide a variety of fruits and vegetables may help schools to meet the proper dark green and red/orange fruit and vegetable requirement implemented by the updated NSLP guidelines (Harris et al., 2012). Schmidt & McKinney (2004) found that dark green vegetables and red/orange fruits and vegetables are more readily accessible on salad bars. Slusser, Cumberland, Browdy, Lange, & Neumann (2007) found that the number of fruits and vegetables available on the salad bar increased the amount of fruits and vegetables consumed by students. They also found that energy, saturated fat, total fat, and cholesterol intake was decreased in students offered a salad bar at school.

The *Let's Move Salad Bars to Schools* campaign was implemented in 2010 and evaluated in January 2014. Since being implemented in more than 2,800 schools in the US, salad bars have been shown to increase not only the variety of fruits and vegetables offered to students, but the frequency of fruit and vegetable consumption as well (Gretchen Swanson Center for Nutrition, 2014; Harris, 2012). Having a variety of availability on a self-serve salad bar and no serving limit on fruits and vegetables encourages students to try new fruits and vegetables (Adams, Pelletier, Zive&Sallis, 2005; Wansink, 2004; Ronnei, Shelly, Davis, Harris, & Casteel, 2011;Gretchen Swanson Center for Nutrition, 2014).

Targeted marketing and education can increase the utilization of the salad bar within schools (Harris et al., 2012; Devereaux, 2012). Fruit and vegetable interventions in schools are important to achieve long-term health behavior change (Lock, Pomerleau, Knai, and McKee, 2004), and a variety of approaches have been used to increase fruit and vegetable consumption. Moceviciene & Zaborskis (2013) suggest using multiple methods to achieve an increase in fruit and vegetable consumption including school classroom activities, outreach to parents and the community, creation of fruit and vegetable campaigns, and printed educational materials. NSLP marketing techniques recommended by the USDA include posting the weekly lunch menu, signage in the cafeteria, school newsletters, sampling of menu items, and food related contests within the school or classroom (CDC, 2014). Carmen (2013) encourages the involvement of students in school lunch marketing to encourage student participation and incorporate their opinions and preferences. Engaging students to advocate for healthful eating can produce positive changes in the school food environment (Dabbaghian, 2012).

Salad bars can play an important role in increasing the consumption of fruits and vegetables in schools. Increasing accessibility and availability of fruits and vegetables is an environmental strategy suggested by the CDC to meet the goal of increasing consumption of fruits and vegetables (Slusser et al., 2007). Suleiman, Soleimanpour, & London, (2006) identified the term "community-based participatory research" (CBPR) as an outlet to utilize youth within an educational process to promote health within their environment. The process of involving youth in health initiatives gives them a sense of power and responsibility for their health and others. It can also help build life skills of problem awareness and problem solving in the community. The purpose of this study is to examine a low-cost strategy that involves student-driven changes to determine if the involvement of students in a health initiative for the salad bar can influence the experience,

perception, and usage of the salad bar in a Mississippi high school.

METHODOLOGY

Researchers from the University of Mississippiadministeredthe *School Salad Bar Experience and Perception Survey*, to students at two Mississippi high schools, located in rural towns. Changes were made by school food-service personnel to one school's (the intervention school) salad bar according to suggestions that the students selected on the survey. Salad bar usage data was then collected on both schools to see if the student-driven changed increase salad bar usage. The University of Mississippi Institutional Review Board approved the study, and participating students' assent and their parents/guardians' consent was obtained.

Subjects

Subjects included617 students at the control school and 560 students, 15-18 years old. At the control school, 42 percent of thestudents identified themselves as white, 52 percent identified themselves as black, 4 percent identified themselves as of Hispanic descent, and 2 percent identified themselves as of Asian descent. At the intervention school, 28 percent of the students identified themselves as white, 64 percent identified themselves as black, 6 percent identified themselves as of Hispanic descent, and 2 percent identified themselves as of Asian descent. Students of both genders (68% females and 32% males in the control school and 56% females and 54% males in the control school) years participated in the study.

Instrumentation

A validated research-based survey, developed by Asperin and Carr (2009) was used to measure factors influencing school lunch satisfaction and perception. The survey was tailored for perception of and satisfaction with the high school salad bar and contained a list of questions inquiring about the student's experience and perception of, and satisfaction with the school salad bar. The survey questions measured food quality, staff responsiveness and empathy, and program reliability. These variables were chosen because they are internal factors that are operationally controllable by the school lunch program (Asperin&Carr, 2009). The survey also inquired about the top reasons for eating school salad bar, the grade level of the student, how many times per week they eat the school salad bar (0-5), and gender. The survey was made up of 21 questions with 9 items regarding food quality, 5 items regarding staff responsiveness and empathy, and 7 items regarding the program reliability.

PROCEDURE

Survey Administration

Salad bar participation data (number of students selecting a salad) was collected for three weeks before the survey was given to establish a baseline participation rate. The survey instrument was given at the beginning and end of the eight-week study to all participating students. The survey was given in the fall once the school lunch program had completed three weeks of school to give the students an opportunity to become accustomed to the school menu and cafeteria practices (Asperin &Carr, 2009). Envelopes were disseminated during the school lunch period containing the survey and a consent form. There was a box available in a private space for consent forms to be returned separately to ensure confidentiality. The surveys were returned in the envelopes to the cafeteriasand were collected by the researchers the following day.

Student-Driven Change Implementation

Results of the pre-treatment survey for the intervention school were used to determine student-suggested changes to the salad bar operation. Frequency testing of the survey data indicated the top desired changes. These responses were discussed with the district child nutrition supervisor (DCNS) and three feasible changes were developed for the salad bar: 1) The low response score to the question, "The amount of food I get is enough" led to a larger variety of fruits (n=5) and vegetables (n=7) being available and marketed at the salad bar, as opposed to a the smaller amount (2 fruits and 4 vegetables) being offered before. 2) In response to the students' low scores for "The staff looks like they enjoy their work", a staff member was assigned to the salad bar and asked to engage with the students, which she did. Before, the staff had simply focused on keeping the salad bar stocked and cleaned. 3) In response to low scores on "I know that I can offer suggestions",

a suggestion box was placed at the salad bar. These changes were implemented for six weeks before the post-survey was given to the students. Salad bar participation data was recorded for 6 weeks, at the end of which, the students took the survey again.

Data Analysis

The IBM SPSS statistical software (IBM SPSS Statistics, Version 23 statistical software, 2014, Chicago, IL) was used to calculate descriptive statistics such as means and standard deviations for salad bar participation and perception rates. T-tests were used to test for differences in salad bar participation rates at the beginning and end of the intervention. The data was also analyzed using regression analysis to detect changes in the rate of salad bar participation over time. A chi-square analysis was used to determine if the intervention impacted the students' selection of the salad bar compared to the hot lunch. T-tests were also used to determine differences in perception ratesat the test school compared to the control school and from pre-intervention to post-intervention at the intervention school. Repeated-measure models with post hoc tests were conducted to measure the survey responses: (1) food quality (2) staff responsiveness and empathy and (3) cafeteria and menu. To construct a repeated-measures model for weekly consumption of school lunch, the ordinal scale was converted to an analogous interval scale as follows: I eat school salad bar (1) 0 times per week; (2) one times per week; (3) two times per week; (4) three times per week; (5) four times per week; (6) five times per week. Participation rates from baseline and throughout the intervention were compared. Mean differences were found significant at $p<0.05$.

Results

The control school pre-intervention response rate was 23%. The intervention school had a pre-intervention survey return rate of 35% with 34.2% students in 10th grade, 19.7% students in 11th grade, and 44.1% students in 12th grade bringing back completed surveys. There was a 25.7% male response rate and a 72.4% female response rate. The post-intervention survey had a 15% return rate with response rates of 28.8% for the 10th grade, 20.3% for the 11th grade, and 50.8% for the 12th grade. There was a 30.5% male response rate and a 69.5% female response rate. Both pre- and post-intervention survey data had a higher response rate from senior level students as well as female students.

As seen in Figure 1, salad bar participation rates increased significantly from a pre-intervention average of 6.99% to a post-intervention average of 11.42%. Also, a spike in participation rates at the test school can be seen at week 4,when the survey was given, Weeks 5 through 10 show a consistent increase of salad bar participation rates compared to the pre-intervention participation rates during weeks 1 through 3.

Salad bar participation rates at the test school are compared with those of the control school in Figure 2. School comparisons begin after 4 because the control school did not collect the three-week baseline data, and week 4, when surveys were given, was removed as an outlier in the data from the test school. Correlation analysis that salad bar counts at the test school were fairly steady across the study as shown in Figure 4, whereas the control school salad bar participation rates as shown in Figure 3.

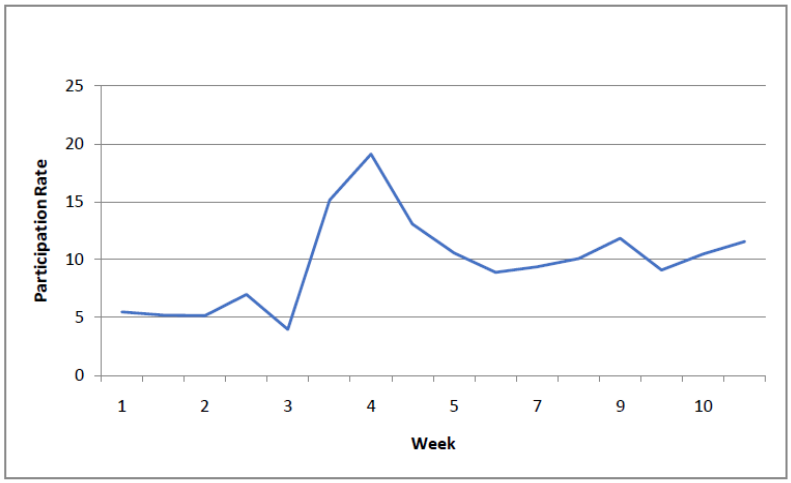

Figure1. *Salad bar participation rates from baseline to post-intervention at the intervention school.**

**Week 6 was not included due to special hot menu items offered and week 8 was excluded due to a special hot menu item offering and the salad bar not being available because of a special event.*

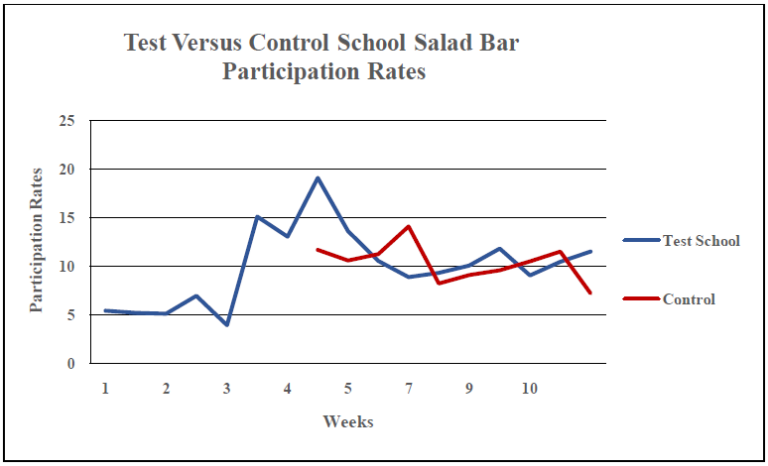

Figure2. *Comparison of test and control school salad bar participation rates throughout study.(The control school did not collect baseline salad bar participation rates.)*

When students at the intervention school were asked how many times per week they chose the salad bar pre-intervention, 19.7% responded 0 times per week, 32.2% responded 1 time per week, 23.7% responded 2 times per week, 15.8% responded 3 times per week, 2.6% responded 4 times per week, and 3.9% responded 5 times per week. When asked how many times per week school salad bar was chosen post-intervention, 18.6% responded 0 times per week, 22.0% responded 1 time per week, 40.7% responded 2 times per week, 11.9% responded 3 times per week, 1.7% responded 4 times per week, and 5.1% responded 5 times per week. Post-survey data found a 13.7% average increase in how many times salad bar was chosen per week compared to pre-survey data.

Results of t-tests to separate means on the intervention school's students' answers regarding food quality, staff responsiveness and empathy, and cafeteria and menu are shown in Table 1, Table 2, and Table 3, respectively. Ratings of students' experiences with and perception of the test school salad bar showed significant ($p<.05$) positive changes from pre-intervention to post-intervention among all survey factors except two. The differences in responses for "The staff looks like they enjoy their work" and "There is enough seating space in the dining area" were not found to be significant. Response scores to two of the survey items "I know that I can offer suggestions" and "The amount of food I get is enough" used to implement student-driven changes significantly increased from 2.70% to 3.18% and from 2.18% to 2.72% respectively. Although the response scores to "The staff looks like they enjoy their work" increased from 2.70% to 3.09%, the difference was not significant at $p<. 05$.

Table1. *Comparison of mean scores from pre- and post-survey questions at the intervention school.*

Variables	Mean (SD) Pre-survey	Mean (SD) Post-survey
Food Quality		
The food served is fresh.	3.00 (1.13)	3.65 (1.06)
The food tastes good.	2.95 (1.19)	3.51 (1.12)
There is a variety of food items that I can choose from.	3.08 (1.32)	3.53 (1.44)
The food smells good.	3.09 (1.09)	3.47 (1.15)
The flavors of the food go well together.	2.77 (1.25)	3.46 (1.09)
There is variety in the menu from day to day.	2.89 (1.28)	3.47 (1.35)
The food looks appealing.	2.66 (1.20)	3.25 (1.27)
The food is cooked to the proper doneness.	2.75 (1.26)	3.33 (1.20)
The food has a homemade quality.	2.54 (1.18)	3.21 (1.36)
Staff Responsiveness and Empathy		
The staff understands my meal time needs.	2.51 (1.27)	3.33 (1.24)
The menu provides healthy menu options.	3.33 (1.20)	3.70 (1.16)
The staff looks like they enjoy their work.	2.70 (1.43)	3.09 (1.48)
The service is friendly.	2.93 (1.44)	3.61 (1.21)

I know that I can offer suggestions.	2.70 (1.43)	3.18 (1.40)
Program Reliability		
The amount of food I get is enough.	2.18 (1.40)	2.72 (1.42)
There is enough seating space in the dining area.	3.26 (1.42)	3.44 (1.41)
The serving portions are consistent.	2.72 (1.18)	3.46 (1.81)
I know what is being served before I get to the cafeteria.	3.00 (1.32)	3.56 (1.28)
I could purchase other items (a la carte) if I don't want the full meal.	3.07 (1.40)	3.89 (1.22)
I have enough time to eat.	2.80 (1.41)	3.32 (1.39)
The quality of the food is consistent.	2.68 (1.12)	3.37 (1.22)

Table2. *T-test results for students' perceptions of food quality at the intervention school.*

Factor *Food was:*	Pre-intervention Mean	SD (n=196)	Post-intervention Mean	SD (n=84)	95% CI for Mean Difference	t	df	Sig.(2-tailed)
Fresh	3.00	1.13	3.65	1.06	-.99, -.31	-3.77	207	.001
Taste	2.95	1.19	3.51	1.12	-.98, -.32	-3.05	207	.001
Variety	3.08	1.32	3.53	1.44	-.86, -.03	-2.12	205	.042
Smell	3.09	1.09	3.47	1.51	-.73, -.05	-2.27	207	.037
Flavor	2.77	1.25	3.46	1.09	-1.05, -.31	-3.63	205	.001
Variety	2.89	1.28	3.47	1.35	-.99, -.19	-2.90	206	.001
Appeal	2.66	1.20	3.25	1.27	-.96, -.20	-3.11	206	.001
Doneness	2.75	1.26	3.33	1.20	-.96, -.20	-3.03	207	.001
Homemade	2.54	1.18	3.21	1.36	-1.05, -.29	-3.51	205	.001

Table3. *T-test results for students' perceptions of staff responsiveness at the intervention school.*

Factor	Pretest Mean	SD (n=196)	Posttest Mean	SD (n=84)	95% CI for Mean Difference	t	df	Sig (2-tailed)
Diet needs	2.51	1.27	3.33	1.24	-1.21, -.43	-4.18	205	001
Healthy	3.33	1.20	3.70	1.16	-.73, -.01	-2.02	207	.050
Enjoy work	2.70	1.43	3.09	1.48	-.83, 0.06	-1.71	207	.096
Friendly	2.93	1.44	3.61	1.21	-1.11, -.26	-3.21	205	.001
Suggestions	2.70	1.43	3.18	1.40	-.91, -.04	-2.16	206	.033

Table4. *T-test results for students' perceptions of cafeteria and menu at the intervention school.*

Factor	Pretest Mean	SD (n=162)	Posttest Mean	SD (n=57)	95% CI for Mean Difference	t	df	Sig (2-tailed)
Enough food	2.18	1.40	2.72	1.42	-.97, -.11	-2.48	206	.01
Enough space	3.26	1.42	3.44	1.41	-.61, .26	-.79	206	.43
Consistent portions	2.72	1.18	3.46	1.18	-1.10, -.37	-4.00	205	.00
Know served	3.00	1.32	3.56	1.28	-.96, -.16	-2.76	205	.01
A la Carte	3.07	1.40	3.89	1.22	-1.23, -.41	-3.91	203	.00
Enough time	2.80	1.41	3.32	1.40	-.95, -.09	-2.36	204	.02
Consistent quality	2.68	1.12	3.37	1.22	-1.04, -.34	-3.87	204	.00

The pre- and post-survey responses for the top reasons for eating school salad barat the intervention school are shown in Table 5. The top pre-intervention reasons for eating school salad bar included "I am hungry", "I like the variety of salad bar items", "It's convenient", "I like the food", and "I know what is being served". The top reasons post-intervention included "It's convenient", "I am hungry", "I like the variety of salad bar items", "I get to try different foods", and "I get a balanced meal".

Table5. *Intervention school students' main reasons for choosing the salad bar, pre- and post-intervention.*

Factor	Percent of responses	
	Pre-Intervention	Post-Intervention

I am hungry	65	74
I like the variety of salad bar items	57	39
It's convenient	49	51
I like the food	47	46
I know what is being served	43	32
I get to try different foods	40	40
I have no choice	32	37
I get a balanced meal	27	23
My friends eat salad bar	24	19
I didn't bring anything to eat	22	35
It prepares me for after school activities	19	19
It fits my schedule	16	16
It's affordable	9	19
My parents/I pay in advance	4	1.8

The chi-square analysis shown in Table 6 shows a significant association between the intervention and lunch selection made by the students ($\chi 2$=41.564, <. 001). Salad bar selection increased from 4% to 11.4% pre-intervention to post-intervention and hot lunch selection decreased from 93.1% to 88.6%.

Table6. *Chi square analysis of lunch selection at the intervention school.*

	Salad Bar	Hot Meal	X2
Pre-Intervention	37 (6.9%)	521 (93.1%)	
Post-Intervention	63 (11.4%)	496 (88.6%)	41.564(p<.001)

DISCUSSION

Implementing student-driven changes to the salad bar increased the participation rates as well as the experience and perception rates of students in this study. Gathering student perception and experience of the salad bar enabled changes to be made that were specific to student preferences. Although it has been found that utilizing student input can help food service programs provide meals that are appealing to students, there are barriers faced when assessing student input. These may occur for several reasons, the first of which being that collection of data may prove burdensome to already busy Child Nutrition Program staff. Low pre-intervention survey return rates made it difficult to gather a large amount of data, and the post-intervention survey response rate at was much even lower. This could be due to the fact that the enthusiasm of administrators, students, and parents was greater for the first survey, and students may not have understood why they needed to fill out the survey a second time. Increased survey participation may be obtained if a web-based survey is offered with a paper-based survey (Sax, Gilmartin, & Bryant, 2003), but this option was not available at this school. A collaborative effort from teachers, administrative staff, food service directors, school lunch staff, parents and the community is needed to effectively influence healthful changes with school lunch interventions (Cho &Nadow, 2004).

As seen in Figure 1, there was a spike in salad bar participation rates when the survey was given at week 4, possibly due to survey distribution increasing the students' awareness of the salad bar. However, the trend stabilized and still, selection of the salad bar increased by 7.4 percentage points. Although this could be due to a normal variance in salad bar selection throughout the school semester, participation in the salad bar at the control school decreased across the course of the study. The increase in salad bar participation at the test school could also have occurred because there was an increased awareness of the salad bar from conducting the study. However, the survey was given at the control school as well, and salad bar participation did not rise. Therefore, the student-suggested changes may have led to increased participation in the salad bar at the test school.

Changes implemented included the provision of a "suggestion box" to allow the students to offer suggestions for the salad bar, allowing and advertising the selection of unlimited fruits and vegetables at the salad bar to meet the desire for more food, and encouraging the staff members to be more engaging with the students at the salad bar because student perception was that staff did not enjoy their job. Two of the factors used to implement student-driven changes significantly increased in perception, "I know that I can offer suggestions" increased from 2.70% to 3.18% and "The amount of food I get

is enough" increased from 2.18% to 2.72%. Although the response "The staff looks like they enjoy their work" increased from 2.70% to 3.09%, it was not found significant at p<. 05.

Both pre- and post-intervention survey data had a higher response rate from senior level students than any other grade and from female students than males. This data may be used to educate lower-grade level students about the salad bar and to engage in them in opportunities for change in school food service because the modifications made will affect them for a longer period of time than students in higher-grade levels who are closer to graduation. This could progressively increase participation and perception rates of lower-grade level students throughout their years in school. There was on average 71% female participation and 28% male participation for the survey. This data could be used to focus research and marketing of the salad bar towards the female population. More research should be done to determine what males would want at a salad bar.

Post-intervention survey data revealed a 13.7% average increase in reporting how many times salad bar was eaten per week compared to pre-survey data. Both pre- and post-intervention data revealed higher consumption of salad bar 1-2 times per week compared to 3-5 times per week. The test school offered salad bar two days per week and offered pre-made salads three days per week. This study only examined salad bar participation rates on the two days that it was offered, but future studies could determine if students are more likely to choose a pre-made salad compared to the salad bar.

The top three reasons chosen for eating school salad bar reported in both the pre and post-surveys were "I am hungry", "It's convenient", and "I like the variety of salad bar items". This data is important to know when developing marketing strategies for the salad bar. Variety, convenience, and the feeling that they get enough food from the salad bar are important factors for student salad bar participation. These factors should be taken into consideration by other schools when introducing salad bars for the first time or by schools that would like to increase salad bar participation rates.

CONCLUSIONS

Incorporating student preferences through the use of student-driven data for the salad bar may be an effective strategy to meet the CDC goal of increasing consumption of fruits and vegetables. Through the use of this method, school food service programs can identify low-cost, effective strategies to improve the experience, perception, and participation of the school salad bar and the school food service program overall. With frequent updates to the NSLP guidelines, schools must meet the challenge of creating a meal that is appealing to students. Identifying barriers and opportunities by student-driven data will allow schools to be more specific in the way that student preferences are met. Collaborating with students in the decision-making progress gives them a sense of responsibility while providing the school food service program information to achieve optimal NSLP participation. Further research is needed to identify long-term effects of implementing student-driven changes to the school lunch program.

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