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CAN STUDENT-DRIVEN CHANGES INCREASE SALAD BAR USAGE IN SCHOOLS?

A Thesis
presented in partial fulfillment of requirements
for the degree of Master of Science
in the Department of Nutrition and Hospitality Management
The University of Mississippi

by

SHANNON R. LEEKE

December 2014

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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 northwest Mississippi high schools. The subjects were students' age 15-18 years old. One school served as the control variable and one served as the intervention variable. A three-week baseline of salad bar participation was collected before surveying students at the intervention school. Surveying student perception and experience of the salad bar provided data to implement changes to the salad bar. Student perception and experience was evaluated again with a post-survey once the intervention to the salad bar continued for six weeks. Salad bar participation data was collected from both schools throughout the study. *T*-test analysis found that implementing student-driven changes significantly ($p < 0.05$) increased participation by 4.43% at the intervention school. Perception and experience of the salad bar increased in 90% of survey factors from pre-intervention to post-intervention. The survey measured salad bar food quality, staff responsiveness and empathy, and program reliability. A correlation analysis found that the salad bar participation at the control school decreased across the course of the study compared to the intervention school. 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.

LIST OF ABBREVIATIONS OR SYMBOLS

NHANES	National Health and Nutrition Examination Survey
CDC	Centers for Disease Control
NSLP	National School Lunch Program
PTA	Parent Teacher Association
CNP	Child Nutrition Program
CBPR	Community-based Participatory Research
NYPANS	National Youth and Physical Activity Nutrition Survey

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CHAPTER I

INTRODUCTION

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”, 2010; *Youth Risk Behavior*, 2014). Obesity in childhood is linked to an increase risk of obesity in adulthood (Biro & Wien, 2010). Certain strategies have been identified as being effective for reducing childhood obesity rates, and one of these is consuming more fruits and vegetables. Diets containing adequate amounts of fruits and vegetables may help to maintain body weight while reducing the risk of chronic diseases (Boeing et al., 2012; *Fruit and Vegetable Consumption*, 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 on average 1.2 times per day (*Fruit and Vegetable Consumption*, 2011). In the High School Youth Risk Behavior Survey of 2011 taken by the Centers for Disease Control (CDC), 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.

In the United States (US), schools play an important role in the prevention of childhood obesity because they have the ability to influence the largest amount of adolescents (Story, Kaphingst & French, 2006). 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 (*Enrollment by Grade, 2013; National Participation, 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 Education, 2014*). Targeting healthful practices within the NSLP can assist in providing improvements in the dietary patterns of students (Nihiser, 2013).

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, Cumberland, Browdy, Lange, & Neumann, 2007). Suleiman, Soleimanpour, and London, (2006) identify 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.

CHAPTER II

REVIEW OF LITERATURE

The Importance of Fruits and Vegetables

Fruits and vegetables protect the body against infection and certain chronic diseases by providing health-promoting vitamins, minerals, and antioxidants to the diet. Fruits and vegetables can aid in the prevention of heart disease, type 2 diabetes, and obesity (Boeing et al., 2012). “Results from the Global Burden of Disease Project for the year 2000 showed that up to 2.7 million deaths worldwide, and 1.8% of the total global disease burden may be attributed to inadequate levels of fruit and vegetable consumption” (Pomerleau, Lock, Knai, & McKee, 2005, p. 3). Consuming the recommended amounts of fruits and vegetables within a balanced diet can help with behavior, improve concentration and increase the ability to learn (Bellisle, 2004). 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 (Florence, Asbridge, & Veugelers, 2008; Harris et al., 2012).

One public health concern in the US is the inadequate intake of potassium, dietary fiber, vitamin C and folate, nutrients provided through fruits and vegetables (“USDA Foods and Nutrients to Increase”, 2010). Potassium plays an important role in the regulation of blood pressure and may reduce the risk of stroke, osteoporosis, and kidney stones while decreasing the prevalence of hypertension (Higdon & Drake, 2012). The dietary fiber in fruits and vegetables

provides a low-energy food while adding bulk to the diet, thus helping to prevention obesity (Slavin & Green, 2007). An adequate amount of fiber may also help prevent heart disease, and type 2 diabetes. Vitamin C aids in proper growth and repair of tissues and folate helps form red blood cells in the body (“Why is it Important to Eat Fruit”, 2014; “Why is it Important to Eat Vegetables”, 2014).

Recommendations and Eating Behaviors among High School Adolescents

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 (*Fruit and Vegetable Consumption*, 2011 & Kim, et al., 2011). This recommendation is based on studies showing a decrease in disease risk of cancer at this level of consumption (*Dietary Guidelines for Americans*, 2010). 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).

In 2009-2010, 18% of US adolescents were classified as obese. The 2009-2010 National Youth Physical Activity and Nutrition Study (NYPANS) evaluated the physical activity and diet quality levels of youth in the US. Of the 11,429 adolescents that participated in the study from 9th to 12th grade, 19% were obese and 18% were overweight. Some 36.9% of youth reported eating breakfast daily, 61.8% reported eating lunch daily, and 76.8% reported eating dinner daily. Of those, 49.9% of youth reported eating lunch from the school cafeteria and 14.8% reported bringing their lunch to school (Brener et al., 2013).

One key consumer message from the United States Department of Agriculture’s (USDA’s) *Choose MyPlate* is to make half of your plate fruits and vegetables. Additional recommendations are to “focus on fruit” and “vary your veggies” (*Food Groups*, 2014).

According to the National Youth Physical Activity and Nutrition Survey (NYPANS), high school students' mean fruit and vegetable intake is 1.2 servings per day. Non-Hispanic black students, on average, consumed 1.0 serving of fruits and vegetables per day, and non-Hispanic white students consumed 1.4 servings per day. Overall, 28.5% of students reported consuming fruits and vegetables less than 1 time per day with 16.8% and 11.2% of students consuming the recommended servings for fruits and vegetables, respectively. These results indicate that 83.2% of high school adolescents are not meeting fruit recommendations and 88.8% are not meeting vegetable recommendations (Kim et al., 2011).

Updated NSLP Guidelines for Fruits and Vegetables

The Healthy Hunger-Free Kids Act updated the NSLP guidelines by aligning them with the recommendations provided by the 2010 Dietary Guidelines for Americans. Fruits and vegetables are now considered two separate components of the NSLP guidelines, whereas before they were one component. This means that a fruit and a vegetable must be offered, when before, either a fruit or a vegetable could be given. Also, a variety of fruits and vegetables are required, emphasizing dark green and red/orange fruits and vegetables (*National School Lunch Program*, 2014). Fruits and vegetables are the only component of the NSLP that is offered to students in unlimited amounts (Carmen et al., 2013).

Federal Programs to Improve School Nutrition

Two government programs instituted to improve healthy school meals for students are the HealthierUS School Challenge and the USDA's Farm to School initiative. The HealthierUS School Challenge provides incentives for schools to meet healthful school lunch goals. These include improving the quality of foods served, providing students with nutrition and physical education, and encouraging more physical activity (*HealthierUS School Challenge*, 2013). The

National Farm to School Program works to bring local foods into schools and provide educational opportunities for students to emphasize healthful eating. These include inviting farmers to schools to promote local foods, implementing school gardens to teach gardening skills, and engaging students in culinary cooking classes to promote self-efficacy of healthful eating (*Farm to School*, 2014). Use of a school salad bar is an opportunity to meet HealthierUS School Challenge goals and use local, farm to school foods, collectively helping schools meet NSLP requirements.

School Salad Bar Implementation

The *Let's Move Salad Bars to Schools* (LMSB2S) campaign was implemented in 2010 by the National Fruit and Vegetable Alliance, United Fresh Produce Association Foundation, the Food Family Farming Foundation, and Whole Foods to promote salad bars in schools across America. *Let's Move Salad Bars to Schools* emphasizes the need to address and improve nutrition in the nation's youth. Under this program, government, nonprofit organizations, and food companies have and will continue to collaborate to provide the nation's youth with a healthier school lunch (*Evaluation of Salad Bars*, 2014).

Any school or school district can apply for funding through the *Let's Move Salad Bars to Schools* website. Schools that have implemented the HealthierUS School Challenge and have met program goals are given priority for salad bar funding. Schools are then prioritized for funding based on the amount of free and reduced-price lunches served at their school. This helps to reduce health disparities in schools with low SES adolescents. Each school district that applies for funding receives an individual web page for the acceptance of donations towards salad bars in their schools (*Evaluation of Salad Bars*, 2014). Although anecdotal evidence suggests that more schools have salad bars, according to their interactive website, only two

school districts in the state of Mississippi have applied for and received funding from *Let's Move Salad Bars to Schools* for salad bars. These include Clarksdale Municipal and Oxford School District (“Salad Bars across America”, 2014).

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 (“Salad Bars in the NSLP”, 2013). Schmidt and McKinney (2004) found that dark green vegetables and red/orange fruits and vegetables are more readily accessible on salad bars. Slusser, Cumberland, Browdy, Lange, and 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 (*Evaluation of Salad Bars*, 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; *Evaluation of Salad Bars*, 2014; Hoffman, Belasco, & Roloso, 2013; Ronnei, Shelly, Davis, Harris, & Casteel, 2011; Wansink, 2004).

Methods to Increase Fruit & Vegetable Consumption

Targeted marketing and education can increase the utilization of the salad bar within schools (Devereaux, 2012; Harris et al., 2012; Hoffman, Belasco, & Roloso, 2013). Fruit and vegetable interventions in schools are important to achieve long-term health behavior change (Pomerleau, Lock, Knai, & McKee, 2005), and a variety of approaches have been used to increase fruit and vegetable consumption (Mocevicene & Zaborskis, 2013). Mocevicene and 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 (“Adopt Marketing Techniques”, 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).

Factors Associated with Student School Lunch Participation

It is important to understand the factors that influence the decision of a student to participate in the NSLP to be able to accurately target a school lunch marketing campaign. High school students are 28% less likely to consume school lunch compared with middle school and elementary school students. High school students’ decision to consume a school lunch is strongly correlated with their perception of the school lunch, particularly taste. Offering alternative options is another factor correlated to school lunch satisfaction (Moore, Hulsey, & Ponza, 2009). Asperin and Carr (2009) found that three broad categories encompass high school

student's perception and satisfaction of the NSLP: food quality, program reliability, and staff responsiveness. Use of these findings can direct strategies for increasing fruit and vegetable consumption in the NSLP.

Hypotheses

1. Student-driven changes increase salad bar participation rates.
2. Student-driven changes increase perception of and satisfaction of the food quality with the school salad bar.
3. Student-driven changes increase perception of and satisfaction of the staff responsiveness and empathy with the school salad bar.
4. Student-driven changes increase perception of and satisfaction of the program reliability with the school salad bar.

CHAPTER III

METHODOLOGY

Participants

Subjects included students, 15-18 years old, from two high schools located in rural northwest Mississippi. The 2013-2014 enrollments for grades 10-12 were 671 for the control school and 560 for the intervention school. The intervention school had 74.6% NSLP participation in the 2013-2014 school year with 91% of students receiving free or reduced lunch. The control school had 44% NSLP participation in the 2013-2014 school year with 38% of students receiving free or reduced lunch. Both schools were the only high school in the school district. The control school was used to compare salad bar participation rates with the intervention school.

Instrumentation

Survey Instrument

A validated research-based survey, developed by Asperin and Carr (2009), was used to measure factors influencing school lunch satisfaction and perception. The survey, titled, The School Salad Bar Experience and Perception Survey, Appendix A, was tailored for experience with and perception of the high school salad bar. The survey questions measured food quality, staff responsiveness and empathy, and program reliability on a 5-point Likert-type scale with 5 being “Strongly Agree” to 1 being “Strongly disagree”. These variables were chosen because they are internal factors that are operationally controllable by the school lunch program (Asperin, 2009). The survey also inquired about the top reasons for eating school salad bar, the grade level

of the student, 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.

Consent to Participate in Research

The survey packet included a consent form, Appendix B, for the student and the parent/guardian to sign prior to completing the survey. The consent forms contained the primary investigator and faculty sponsor's contact information, the purpose of the study, an explanation of participation requirements, the time required to complete the survey, possible risks and benefits from participation, a confidentiality statement ensuring that no responses will be identifiable, the right to withdraw from the study at any time, a statement of IRB approval, and a statement of consent with a signature line for the parent and the student. The consent form can be found in Appendix B.

Procedure

Prior to survey distribution, a 3-week baseline of salad bar participation data was collected from the intervention school in late August and early September 2014. Both schools collected salad bar participation data for 7 continuous weeks mid-September through October 2014.

Survey Delivery Process

All students in the cafeteria at the intervention school were given the opportunity to take the School Salad Bar Experience and Perception Survey the day it was given. During three school lunch periods, students were given a survey packet that included the survey, an envelope in which to place the completed survey upon return, and a consent form for the student and parent/guardian. The principal made an announcement regarding the surveys, the purpose of the

survey, and instructions for completing it. Students were asked to take the surveys home, complete them, and have their parent/guardian sign the consent forms.

The surveys were returned in the envelopes to protect the privacy of student responses and were collected by the in the cafeteria the following day during all three lunch periods. There was a box available for the consent form to be returned separately. This ensured that the survey was not identifiable with the consent form. The researcher collected the surveys from the Child Nutrition Program (CNP) director the day they were collected. On week 5, the student-suggested changes were implemented for duration of 6 weeks in the intervention school. After the student-suggested changes to the school salad bar were implemented for six weeks at the intervention school, the students were given the opportunity to take the survey again. The post-intervention surveys were distributed using the same procedure.

Student-Driven Change Implementation

Results of the pre-intervention survey were used to determine student-suggested changes to the salad bar operation. Frequency testing of the survey data indicated students' top desired changes. These changes were discussed with the CNP director and the three reasonable modifications were implemented to the salad bar at the intervention school. The low response score to the question, "The amount of food I get is enough" led to unlimited fruits and vegetables being available and marketed with signage at the salad bar, as opposed to a select amount of fruits and vegetables being offered before. In response to the students' low scores for "The staff looks like they enjoy their work", the CNP director discussed with the staff member to engage with students at the salad bar. She greeted students and promoted the unlimited fruits and vegetables available at the salad bar. Before, the staff member simply focused on keeping the salad bar stocked and cleaned. Lastly, in response to low scores on "I know that I can offer

suggestions”, a suggestion box was placed at the salad bar and students were encouraged to request changes or submit comments for the salad bar. Suggestions were reviewed, but the suggestions were not conducive to the salad bar. For example, ice cream was requested. These changes were implemented for six weeks before the post-intervention survey was given to the students.

This study was reviewed and approved by the University of Mississippi Institutional Review Board.

Data Analysis

School salad bar participation rates were analyzed to determine if student-driven changes influenced students’ dietary behaviors. Participation data was calculated based on a percentage of students who ate school salad bar compared to the hot lunch served that day. To find a percentage of students who ate salad bar each day, the number of students who ate salad bar was divided by the total number of students who ate school lunch. To control for timing of the school year discrepancies and to gather a baseline for salad bar participation, the survey was given in the fall once the school lunch program had completed three weeks of school. This gave the students an opportunity to become accustomed to the school menu and cafeteria practices (Asperin & Carr, 2009). Following the student-driven changes at the experimental school, mid fall 2014; the salad bar participation rates were analyzed to determine if student-driven changes influenced salad bar participation rates. The pre and post survey results were analyzed to determine if student-driven changes influenced students’ perception and satisfaction of the school salad bar at the intervention school. The salad bar participation data from the intervention school and the control school were analyzed to determine the impact of engaging students in the ability to influence school food service modifications.

The IBM SPSS (version 22) statistical software was used to calculate means, frequencies, and standard deviations for salad bar experience and perception survey responses. T-tests were used to determine differences in perception rates at the intervention school from pre-intervention to post-intervention. Mean differences were found significant at $p=0.05$ level. A chi-square analysis was used to determine the association between the intervention and student food selection, salad bar compared to the hot lunch served at the intervention school. Participation rates from baseline and throughout the intervention were compared at the intervention school. Salad bar percentage rates were found by dividing the number of students who ate salad bar by the total school lunch participation for each day. Salad bar participation data includes the three-week baseline data collected from the intervention school and seven weeks of data collected from both schools throughout the intervention. Frequency tests were conducted to determine percentage rates for descriptive statistics such for top reasons for eating school salad bar, gender, and grade in school.

CHAPTER IV

CAN STUDENT-DRIVEN CHANGES INCREASE SALAD BAR USAGE IN SCHOOLS?

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”, 2010; *Youth Risk Behavior*, 2014). Obesity in childhood is linked to an increase risk of obesity in adulthood (Biro & Wien, 2010). Certain strategies have been identified as being effective for reducing childhood obesity rates, and one of these is consuming more fruits and vegetables. Diets containing adequate amounts of fruits and vegetables may help to maintain body weight while reducing the risk of chronic diseases (Boeing et al., 2012; *Fruit and Vegetable Consumption*, 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 on average 1.2 times per day (*Fruit and Vegetable Consumption*, 2011). In the High School Youth Risk Behavior Survey of 2011 taken by the Centers for Disease Control (CDC), 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.

In the United States (US), schools play an important role in the prevention of childhood obesity because they have the ability to influence the largest amount of adolescents (Story, Kaphingst & French, 2006). 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 (*Enrollment by Grade, 2013; National Participation, 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 Education, 2014*). Targeting healthful practices within the NSLP can assist in providing improvements in the dietary patterns of students (Nihiser, 2013).

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, Cumberland, Browdy, Lange, & Neumann, 2007). Suleiman, Soleimanpour, and London, (2006) identify 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

Participants

Subjects included students, 15-18 years old, from two high schools located in rural North West Mississippi. These schools were the only high schools found in the North West Mississippi area utilizing school salad bar within their NSLP. One school served as the control and one served as the intervention.

Instrumentation

A validated research-based survey adapted from Asperin and Carr (2009), was used to measure factors influencing school salad bar experience and perception at the intervention school. A 5-point Likert-type scale was used with 5 being “Strongly Agree” and 1 being “Strongly Disagree”. These factors measured food quality, staff responsiveness and empathy, and program reliability. Other questions included the top reasons for eating school salad bar, how many times per week salad bar was consumed, gender, and grade level in school.

Procedure

The intervention school collected a 3-week baseline of salad bar participation data before the survey was given. All students in the cafeteria had the opportunity to take the School Salad Bar Experience and Perception Survey on the day it was given. The school principal announced survey information and the CNP director distributed the survey packets as the students left the cafeteria in all three-lunch periods. Students returned the surveys to the CNP director the following day. Consent forms were collected separately to ensure that the surveys were not identifiable. The researcher collected the surveys from the CNP director that day and analyzed the results.

Frequency testing of the pre-intervention data indicated students' top desired changes for the salad bar. These were discussed with the CNP director and three reasonable changes were implemented to the salad bar. The intervention lasted 6 weeks before the post-survey was given. Both schools collected salad bar participation data for 7 continuous weeks.

Data Analysis

Salad bar participation rates were analyzed to determine if student-driven changes influence students' dietary behaviors. Pre- and post-survey results were analyzed to determine if student-driven changes influenced students' perception and experience of the salad bar. IBM SPSS was used to calculate descriptive statistics such as means, standard deviations, and percentages for the salad bar participation and perception rates. Average participation data is calculated based on the three week baseline data collected from the intervention school and the seven weeks of data collected from both schools throughout the intervention. A correlation line was fit to the participation data to express tendencies over the course of the study. A chi-square analysis determined if the intervention impacted student food selection, salad bar compared to the hot lunch, at the intervention school. *T*-tests determine the difference in perception rates at the intervention school from pre-intervention to post-intervention.

RESULTS

Descriptive Statistics

The intervention school had a pre-intervention survey return rate of 35.8% with 34.2% students in 10th grade, 19.7% students in 11th grade, and 44.1% students in 12th grade returning 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-survey data had a higher response rate from senior level students as well as female students.

The top reasons for eating school salad bar pre-intervention included (1) I am hungry, (2) I like the variety of salad bar items, (3) It's convenient, (4) I like the food, and (5) I know what is being served. The top reasons post-intervention included (1) It's convenient, (2) I am hungry, (3) I like the variety of salad bar items, (4) I get to try different foods, and (5) I get a balanced meal. Table 1 shows pre and post-survey responses for the reasons for eating school salad bar.

Table 1. *Top Reasons for Eating School Salad Bar*

Factor	%	
	Pre-Survey	Post-Survey
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

Impact of Intervention on Participation Rates

The chi square analysis, Table 2, shows a significant association between the intervention and selection of the salad bar ($\chi^2=41.564$, $p<.001$). Salad bar selection increased from 6.9% to 11.4% pre-intervention to post-intervention and hot lunch selection decreased from 93.1% to 88.6%.

Table 2. *Chi Square Analysis of Lunch Selection at Intervention School*

	Salad Bar	Hot Meal	χ^2
Pre-Intervention	197 (6.9%)	2676 (93.1%)	41.564 ($p<.001$)
Post-Intervention	514 (11.4%)	3996 (88.6%)	

The intervention school salad bar participation rates from baseline to post-intervention are shown in Figure 1. 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. 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. There was a rise of salad bar participation at the intervention school, when the survey was distributed, before the intervention began.

A comparison of intervention and control school salad bar participation rates throughout the course of the study is shown in Figure 2. School comparisons begin after 4 weeks because the control school did not collect the three-week baseline data.

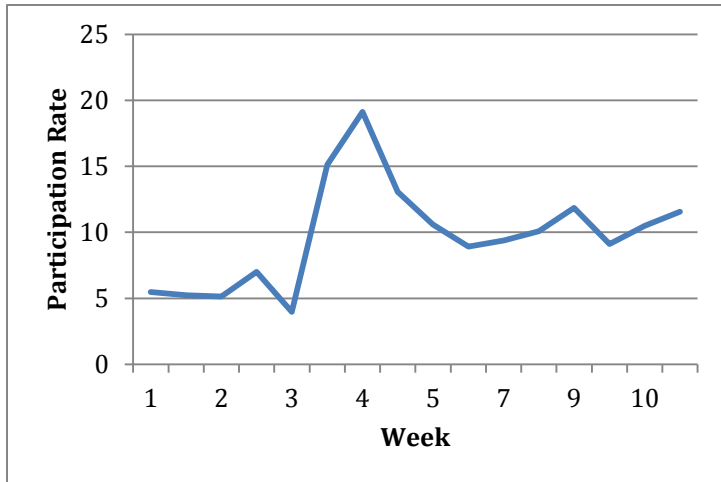


Figure 1. Intervention school salad bar participation rates. Data are shown from week 1 through week 10.

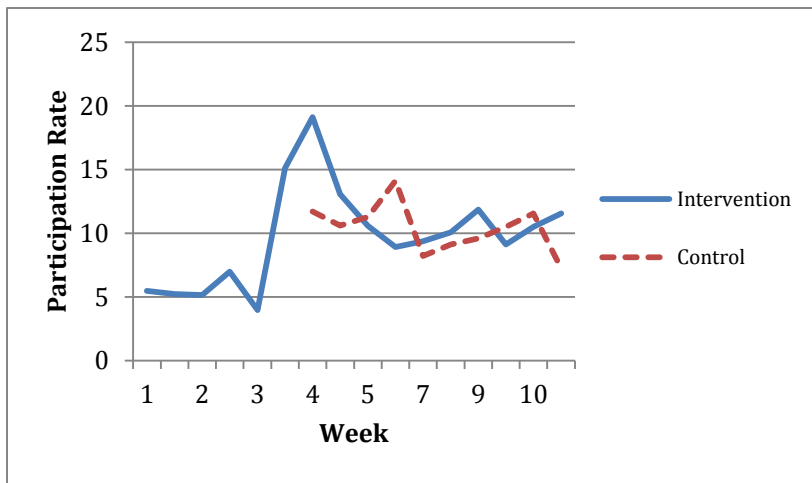


Figure 2. Intervention versus control school salad bar participation rates. Data of the control school and intervention school are compared from week 4 through week 10.

A line was fit to the data in Figure 3 and Figure 4 to express salad bar participation tendencies over time. The line in Figure 4 shows that salad bar participation at the intervention school was fairly steady across the intervention, whereas the control school salad bar participation rates had higher variance as shown in Figure 3. Week 4, when surveys were given, was removed as an outlier in the data from the intervention school. This was to control for the

variance that could have been caused by giving the survey and bringing awareness to the salad bar at the intervention school.

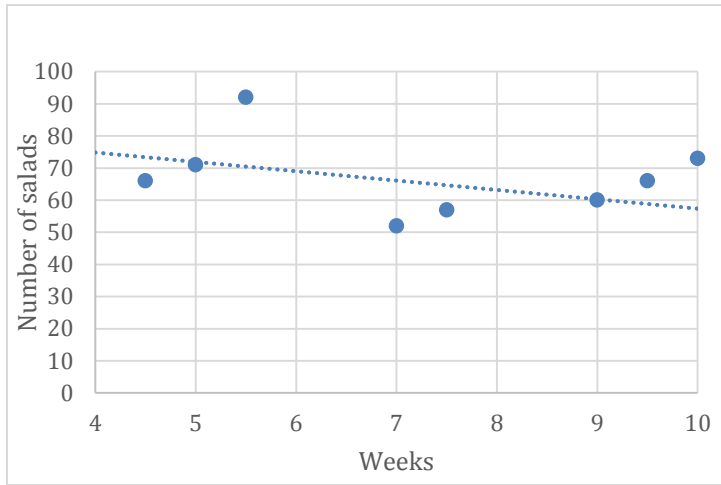


Figure 3. Control school participation over time. Data are shown from week 4 through week 10 to indicate tendencies throughout the study at the control school.

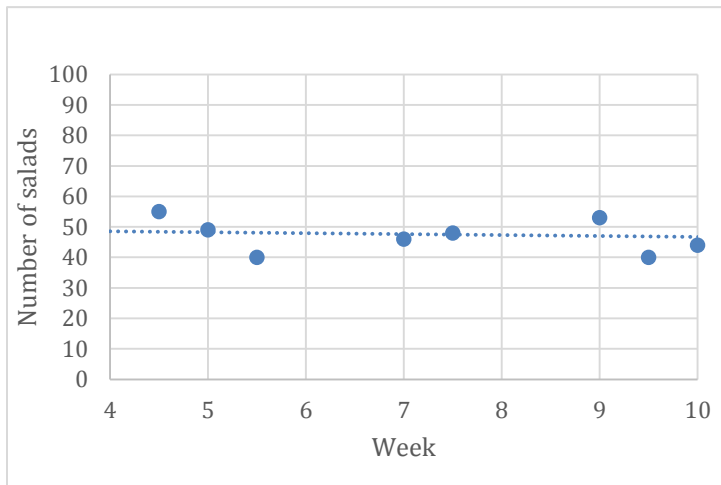


Figure 4. Intervention school participation over time. Data are shown from week 4 through week 10 to indicate tendencies throughout the study at the intervention school.

Impact of Intervention on Students' Perception

Full survey questions and their descriptive statistics for pre- and post-survey data are shown in Table 3. All factors are rated on a 5-point scale, ranging from 5 (strongly agree) to 1 (strongly disagree). Ratings of students' experiences with and perception of the intervention school salad bar showed significant ($p < .05$) positive changes from pre-intervention to post-

intervention among all survey items except two. Response ratings 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,” that was used during the intervention, increased from 2.70 to 3.09, the difference was not found significant at $p < .05$.

Table 3. *Pre- & Post-survey Questions and their Descriptive Statistics*

Variables	Pre-Survey	Post-Survey
<i>Food Quality</i>	Mean (SD)	Mean (SD)
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)
<i>Staff Responsiveness and Empathy</i>		
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)
<i>Program Reliability</i>		
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)

Both pre- and post-survey analysis found that the lowest scores (disagree) for food quality included “The food has a homemade quality (2.54 pre, 3.21 post)”, “The food looks appealing (2.66 pre, 3.25 post)”, and “The food is cooked to the proper doneness (2.75 pre, 3.33 post)”. The highest scores (agree) for food quality pre-survey included “The food served is fresh (3.00)”, “There is a variety of food items that I can choose from (3.08)”, and “The food smells good (3.09)”. The highest scores (agree) for food quality post-survey included “The food served is fresh (3.65)”, “There is a variety of food items that I can choose from (3.53)”, and “The food tastes good (3.51)”. All of these factors were found significant at $p < 0.05$.

Both pre- and post-survey analysis found that the lowest scores (disagree) for staff responsiveness and empathy included “The staff understands my meal time needs (2.51 pre, 3.33 post)”, “The staff looks like they enjoy their work (2.70 pre, 3.09 post)”, and “I know that I can offer suggestions (2.70 pre, 3.18 post)”. The highest scores (agree) for staff responsiveness and empathy included “The menu provides healthy menu options (3.33 pre, 3.70 post)” and “The service is friendly (2.93 pre, 3.61 post)”. All of these factors were found significant at $p < 0.05$ except for the response “The staff looks like they enjoy their work.”

Pre-survey analysis found that the lowest scores (disagree) for program reliability included “The amount of food I get is enough (2.18)”, “The quality of the food is consistent (2.68)”, and “The serving portions are consistent (2.72)”. Post-survey analysis found that the lowest scores (disagree) for program reliability included “The amount of food I get is enough (2.72)”, “I have enough time to eat (3.32)”, and “The quality of the food is consistent (3.37)”. The highest scores (agree) for program reliability pre-survey included “There is enough seating space in the dining area (3.26)”, “I could purchase other items (a la carte) if I don’t want the full meal (3.07)”, and “I know what is being served before I get to the cafeteria (3.00)”. The highest

scores (agree) for program reliability post-survey included “I could purchase other items (a la carte) if I don’t want the full meal (3.89)”, “I know what is being served before I get to the cafeteria (3.56)”, and “The serving portions are consistent (3.46)”. All of these factors were found significant at $p < 0.05$ except for the response “There is enough seating space in the dining area”. Results of a *t*-test for food quality, staff responsiveness and empathy, and food quality are shown in Table 4.

Table 4. Results of a T-test for Pre- and Post-survey Questions

Variables	Pre-Survey Mean (SD)	Post-Survey Mean (SD)	95% CI for Mean Difference	t	df	Sig (2-tailed)
Food Quality						
The food served is fresh.	3.00 (1.13)	3.65 (1.06)	-.99, -.31	-3.77	207	.00
The food tastes good.	2.95 (1.19)	3.51 (1.12)	-.86, -.03	-2.12	205	.04
There is a variety of food items that I can choose from.	3.08 (1.32)	3.53 (1.44)	-.73, -.05	-2.27	207	.03
The food smells good.	3.09 (1.09)	3.47 (1.15)	-1.05, -.31	-3.63	205	.00
The flavors of the food go well together.	2.77 (1.25)	3.46 (1.09)	-.99, -.19	-2.90	206	.00
There is variety in the menu from day to day.	2.89 (1.28)	3.47 (1.35)	-.96, -.20	-3.11	206	.00
The food looks appealing.	2.66 (1.20)	3.25 (1.27)	-.96, -.20	-3.03	207	.00
The food is cooked to the proper doneness.	2.75 (1.26)	3.33 (1.20)	-1.05, -.29	-3.51	205	.00
The food has a homemade quality.	2.54 (1.18)	3.21 (1.36)	-.99, -.31	-3.77	207	.00
Staff Responsiveness and Empathy						
The staff understands my meal time needs.	2.51 (1.27)	3.33 (1.24)	-1.21, -.43	-4.18	205	.00
The menu provides healthy menu options.	3.33 (1.20)	3.70 (1.16)	-.73, -.01	-2.02	207	.05
The staff looks like they enjoy their work.	2.70 (1.43)	3.09 (1.48)	-.83, 0.06	-1.71	207	.09
The service is friendly.	2.93 (1.44)	3.61 (1.21)	-1.11, -.26	-3.21	205	.00
I know that I can offer suggestions.	2.70 (1.43)	3.18 (1.40)	-.91, -.04	-2.16	206	.03
Program Reliability						
The amount of food I get is enough.	2.18 (1.40)	2.72 (1.42)	-.97, -.11	-2.48	206	.01
There is enough seating space in the dining area.	3.26 (1.42)	3.44 (1.41)	-.61, .26	-.79	206	.43
The serving portions are consistent.	2.72 (1.18)	3.46 (1.81)	-1.10, -.37	-4.00	205	.00
I know what is being served before I get to the cafeteria.	3.00 (1.32)	3.56 (1.28)	-.96, -.16	-2.76	205	.01
I could purchase other items (a la carte) if I don't want the full meal.	3.07 (1.40)	3.89 (1.22)	-1.23, -.41	-3.91	203	.00
I have enough time to eat.	2.80 (1.41)	3.32 (1.39)	-.95, -.09	-2.36	204	.02
The quality of the food is consistent.	2.68 (1.12)	3.37 (1.22)	-1.04, -.34	-3.87	204	.00

DISCUSSION AND CONCLUSION

Summary of Findings

Selection of the salad bar increased by 4.5 percentage points at the intervention school from pre-intervention to post-intervention, as shown in Table 2. 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 revealed a negative tendency of salad bar participation across the course of the study, as shown in Figure 3. The intervention school showed a more balanced tendency line of salad bar participation across the course of the study, as shown in Figure 4. Implementing three desired student-driven changes also could have been the reason for salad bar participation, as a correlation has been found between the number of intervention strategies for fruits and vegetables and choosing to consume fruits and vegetables (“Eat your Colors”, 2002). Also, in a study of low-income Hispanic children, Fisher et. al (2012) demonstrated that offering a palatable, familiar salad dressing and repeated exposure to moderately light, raw vegetables increased intake.

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 on the 5-point scale 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 $p < .05$. The foodservice worker was told to greet the

students and inform them of the unlimited offering of fruits and vegetables. This may have addressed the perception that the staff did not enjoy their work, but the lack of significance showed that it did not remedy it. Future projects could outline a protocol for the CNP director to address issues of student engagement for foodservice staff.

Produce invoices showed on average, the intervention school spent approximately \$533 on fruits and vegetables pre-intervention and spent approximately \$448 post-intervention, therefore the offering of unlimited fruits and vegetables at the salad bar did not increase fruit and vegetable costs at the intervention school.

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”. Marketing strategies can be developed that take advantage of the students’ top reasons for choosing the salad bar. For example, marketing the fruits and vegetables available in the school lunch has been found to increase the consumption of fruits and vegetables by students (Hoffman, Franko, Thompson, Power, & Stallings, 2010). This would be a convenient way to advertise the salad bar offerings to students while appealing to their hunger and increasing perception of the variety available on the salad bar.

The fact that the response scores increased from pre- to post-survey for all but two of the questions, even though the intervention only addressed three variables, suggests that factors other than the intervention may have influenced the students. The “Hawthorne effect” was first described by Henry Landsberger in 1950 (Landsberger, 1958) as the phenomenon in which subjects in behavioral studies change their performance in response to being observed. The students may have felt more positively about the salad bar simply because their input was being sought, especially since visible changes were made based on their responses on the first survey.

Also, as seen in Figure 1, a spike in salad bar participation occurred the same week that the survey was given. This may have also been due to the attention given to the students as well as to the attention focused on the salad bar.

The question pertaining to how many times the students consumed salad bar per week on the survey was removed because the CNP director limited the salad bar to two times per week during the course of the study. Therefore, the data was not analyzed.

Empirical Implications

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. Incorporating student preferences for the salad bar may be an effective strategy to meet the CDC goal of increasing consumption of fruits and vegetables (Slusser, Cumberland, Browdy, Lange, & Neumann, 2007). Increasing availability, accessibility, and consumption of the salad bar is a practical health initiative that may assist high school adolescents in meeting fruit and vegetable requirements. Meeting fruit and vegetable requirements may aid in the reduction of childhood obesity as well as the risk of chronic disease (Boeing et al., 2012; *Fruit and Vegetable Consumption*, 2011).

School food service programs can use student-driven data to identify low-cost, effective strategies to improve the experience, perception, and participation of the school salad bar and the school food service program overall. 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 process gives them a sense of responsibility

while providing the school food service program information to achieve optimal NSLP participation.

Limitations

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 the priorities of the schools may not coincide with those of the researchers (Riley and Hawe, 2009). Schools also face pressures from a myriad of outside entities, all of which have their own agendas, so resistance to outside influence may occur.

Low survey return rates at schools make it difficult to gather a large amount of data. The survey response rate at the intervention school was much lower post-survey compared to pre-survey. This could be due to an automated phone call administered to parents for the first survey, which was unable to be administered for the second survey. Also, 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 the intervention 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).

Both pre- and post-survey data had a higher response rate from senior level students than all other grades. This may be due to older students having longer exposure time to the salad bar. There was on average 71% female participation and 28% male participation for the survey. This

could be due to female students consuming the salad bar more than male students. Future research could encourage the male population as well as the lower-level students to engage in participatory research regarding the school lunch program to gain a broader perspective from all students.

A larger amount of baseline participation data could have been gathered if both schools had been collecting salad bar participation data prior to the fall 2014 school semester. Due to the limited amount of schools in north Mississippi with salad bars, only two schools were included in the study. Measurement of school salad bar participation rates is a short-term behavior change study and student health outcomes are therefore not measurable. Measuring long-term behavior change from student-led interventions could be important in future studies.

Future Research

Further research is needed to identify long-term effects of implementing student-driven changes to the school lunch program. Health outcomes were not identifiable in this study, but would be of interest regarding salad bar participation. The accessibility and availability of a salad bar may influence fruit and vegetable preferences and improve adolescents' dietary patterns. Utilizing the NSLP to influence dietary patterns is important because of the availability to reach a large amount of adolescents throughout the school year.

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LIST OF APPENDICES

APPENDIX A: SURVEY INSTRUMENT

The School Salad Bar Experience Survey

Making your opinions known

We want to know what you think! Please take a few minutes to provide feedback on the quality of your salad bar experience at the school lunch cafeteria.

SECTION I: Your Salad Bar Experience

Instructions:

Listed below are several features of school salad bar. As you respond, use the phrase, "When I eat school salad bar..." before each statement and then indicate your level of agreement by using the scale 5 (Strongly Agree) to 1 (Strongly Disagree).

When I eat school salad bar...	Strongly Agree	↔			Strongly Disagree
1. The food served is fresh.	5	4	3	2	1
2. The food tastes good.	5	4	3	2	1
3. There is a variety of food items that I can choose from.	5	4	3	2	1
4. The food smells good.	5	4	3	2	1
5. The flavors of the food go well together.	5	4	3	2	1
6. There is variety in the menu from day to day.	5	4	3	2	1
7. The food looks appealing.	5	4	3	2	1
8. The food is cooked to the proper doneness.	5	4	3	2	1
9. The food has a homemade quality.	5	4	3	2	1
10. The staff understands my meal time needs.	5	4	3	2	1
11. The menu provides healthy meal options.	5	4	3	2	1
12. The staff looks like they enjoy their work.	5	4	3	2	1
13. The service is friendly.	5	4	3	2	1
14. I know that I can offer suggestions.	5	4	3	2	1
15. The amount of food I get is enough.	5	4	3	2	1
16. There is enough seating space in the dining area.	5	4	3	2	1

16. There is enough seating space in the dining area.	5	4	3	2	1
17. The serving portions are consistent.	5	4	3	2	1
18. I know what is being served before I get to the cafeteria.	5	4	3	2	1
19. I could purchase other items (a la carte) if I don't want the full meal.	5	4	3	2	1
20. I have enough time to eat.	5	4	3	2	1
21. The quality of the food is consistent.	5	4	3	2	1

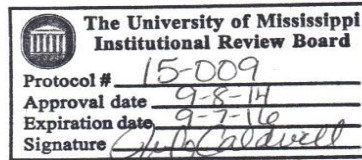
SECTION II: Top reasons for eating school salad bar

Instructions:	
Read the statements below. Please choose the TOP FIVE REASONS why you eat the salad bar.	
<input type="radio"/> It's convenient	<input type="radio"/> I like the variety of salad bar items
<input type="radio"/> I like the food	<input type="radio"/> My friends eat salad bar
<input type="radio"/> I am hungry	<input type="radio"/> My parents/I pay in advance
<input type="radio"/> I get a balanced meal	<input type="radio"/> I know what is being served
<input type="radio"/> I didn't bring anything to eat	<input type="radio"/> It fits my schedule
<input type="radio"/> I get to try different foods	<input type="radio"/> It prepares me for after school activities
<input type="radio"/> I have no choice	<input type="radio"/> It's affordable

SECTION III: Tell us about you

Instructions:	
Please answer the following questions.	
1. What is your grade in school?	
<input type="radio"/> 9th Grade	<input type="radio"/> 10th Grade
<input type="radio"/> 11th Grade	<input type="radio"/> 12th Grade
2. On average, how many times PER WEEK do you eat school salad bar?	
<input type="radio"/> 0	<input type="radio"/> 1
<input type="radio"/> 2	<input type="radio"/> 3
<input type="radio"/> 4	<input type="radio"/> 5
3. What is your gender?	
<input type="radio"/> Male	<input type="radio"/> Female

APPENDIX B: CONSENT TO PARTICIPATE IN RESEARCH



Consent to Participate in Research

Study Title: *Can Student-Driven Changes Increase Salad Bar Participation?*

Investigator

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By checking this box I certify that I am 18 years of age or older.

The purpose of this study

We want to know whether student-driven changes will increase salad bar participation at schools.

What your child will do for this study

Your child will be given the opportunity to take the School Salad Bar Experience and Perception Survey. The survey packets will be sent home with your child during their school lunch period. The survey packet contains the survey and the consent form that must be signed by you and your child. The survey should be returned in the envelopes to protect students responses and they will be collected in the cafeteria the following day. There will be a box for your child to turn in the consent form separately. Your child will be given the same opportunity to take the survey again six weeks later once student-driven changes are implemented to the school salad bar. The survey process will be the exact same.

Time required for this study

The survey will take approximately 5-10 minutes to take both times it is given.

Possible risks from your participation

There are no anticipated risks to your child from participating in the study.

Benefits from your participation

Your child's participation and input will help improve their school's salad bar and the foodservice program overall.

SHANNON R LEEKE

VITA

Education

University of Mississippi, Bachelor of Science, Dietetics and Nutrition May 2012
(Business Administration Minor)

Professional Experience

Graduate Assistant August 2013-December 2014
National Food Service Management Institute (NFSMI), Oxford, MS

Education Intern May 2014-August 2014
Washington Youth Garden (WYG), Washington, D.C.

Health & Nutrition Policy Intern June 2013-August 2013
Grocery Manufacturers Association (GMA), Washington, D.C.

Research

Geographic Disparity in Availability of Funding to Support School Nutrition Environments:
Evidence from Mississippi Schools (With Y. Chang, T. Carithers, and F. Chin. Under review.)