

Cooking and Gardening Classes in Fifth Grade Classrooms and their Effect on Food Choice, Preference, and Recognition

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Abstract Elementary schools in the Berkeley Unified School District (BUSD) that have 50% or more of their students qualified for free or reduced lunch are eligible to receive funding from the Network for a Healthy California (Network). Funding from the Network is used to hire cooking and gardening teachers for the schools. Teachers provide a nutrition-based curriculum that is aimed towards educating children about nutrition as well as encouraging healthier eating habits. Both cooking and gardening classes are taught twice a month to students. The purpose of this study is to evaluate a combination cooking and gardening program (funded by the Network) by asking: Do cooking and gardening classes in schools increase student's chosen variety, recognition, and preference of fruits and vegetables? This study found that the number of different fruits and vegetables chosen at lunch by Network students (1.85 ± 0.73 , $n=71$) was significantly higher than the number of different fruits and vegetables chosen by non-Network students (1.36 ± 0.78 , $n=67$) ($p=0.001$). This study also found that students participating in cooking and gardening activities recognized a wider variety of fruits and vegetables, including: asparagus, broccoli, butternut squash, and persimmons. Furthermore, these students indicated a greater preference to carrots, kiwis, mandarins, persimmons, and tomatoes more than their non-participating peers. To our knowledge this is the first evaluation of a combination cooking and gardening program.

Introduction

Many studies have shown the importance of childhood nutrition; because of this many strides have been taken to improve nutritional knowledge and dietary behaviors. Since its release in 1992, the Food Guide Pyramid has become one of the most recognized nutrition education tools used in U.S. history (Goldbert *et al.* 2004). Studies have also shown that the school environment has a powerful influence on students' eating behaviors (CDCP 1996 and Collins *et al.* 2000). Despite the recommended two to four servings per day of fruits and three to five servings per day of vegetables by the Food Guide Pyramid (U.S. Department of Agriculture and U.S. Department of Health and Human Services 1992), children are largely under-consuming fruits and vegetables. One study has found that out of 110 children aged 7 to 14 years, only 5% met the daily-recommended fruit intake and only 20% met the daily recommended vegetable intake values (Brady *et al.* 2000). Moreover, evidence suggests that dietary intake patterns during childhood and adolescents may predict the occurrence of obesity (Lichtenstein *et al.* 1998), cardiovascular diseases, and diet-related cancers in adulthood (Block *et al.* 1992). Evidence of these studies has led to a number of actions to increase the health of children through an improved diet (Knai *et al.* 2005). Previously conducted research has also shown that combining classroom and food service programs in school have a positive impact on healthier eating habits in children (Perry *et al.* 1998).

Two types of programs that have been implemented in separate studies are cooking classes and gardening classes. The addition of a school garden has many potential benefits, which include providing students with an opportunity to increase their knowledge and skills related to healthy eating and their awareness of the environment (Morris *et al.* 2000). In addition, because of the visual reinforcement that a school garden provides, students are reminded of the nutrition lessons that they are taught in school or in the garden even when classes are not being taught that day (Morris *et al.* 2000). Lastly, it increases the availability and accessibility of fresh fruits and vegetables (Morris *et al.* 2000). One study showed that combining gardening activities and nutrition lessons is a more effective strategy than providing only nutrition lessons when attempting to increase a child's willingness to try new vegetables (Morris *et al.* 2001). Along with school gardens, cooking classes are another way to improve nutrition. One study conducted by Brown *et al.* (2005) investigated the impact of cooking classes on fruit and vegetable intake in youths and adults. The classes were offered once a week

and aimed to teach basic food safety and nutrition education. The study found that youths increased their fruit consumption from 1.1 to 2.3 servings per day and increased their vegetable consumption from 1.4 to 2.4 servings per day (Brown et al. 2005). There have yet to be studies that examine the possible benefits of simultaneously offering both programs (cooking classes and gardening classes) to children and evaluating their impact on food selection, liking, and recognition of fruits and vegetables.

Despite the need to eat a wide variety of fruits and vegetables, there has been no previous research examining the effects of cooking or gardening classes on the variety of fruits and vegetables students choose to consume. There are many benefits to eating a large variety of fruits and vegetables that go beyond the protective role against cancer (Taylor *et al.*, 1995). For example, the micro-constituents found in vegetables and fruits are likely to protect against cardiovascular disease, stroke, and cataracts (Guenther *et al.* 2006). A review conducted by Guenther *et al.* (2006) supported the need to increase consumption of a larger variety of vegetables, particularly dark-green leafy, cruciferous, yellow-orange vegetables, and a wide variety of fruits, particularly citrus and deep-yellow-orange ones. Despite the positive role that fruits and vegetables play, Guenther *et al.* (2006) showed that the variety of vegetables currently consumed by Americans does not reflect the variety specified in the United States Department of Agriculture's recently updated food guide pyramid, MyPyramid. Furthermore, the mean intake of starchy vegetables is above recommended levels for most age groups, whereas consumption of dark green vegetables, orange vegetables, and legumes are less than one third of recommended amounts (Guenther *et al.* 2006).

Food preferences are learned through experiences with food and eating (Birch 1999). Food preferences have often been thought to be an innate representation of the body's need for nutrients (Birch 1999). In actuality, it is a combination of genetic predispositions as well as early experiences with food that help determine future food preferences (Birch 1999). Furthermore, research has consistently shown that a child's food preferences predict their food consumption patterns (Birch and Fischer 1998) and that food preferences increase with repeated exposure to the food item (Pliner 1982 and Sullivan and Birch 1994).

In the school setting, the presence or absence of funding for nutrition-based classes has not been considered in studies that investigate food choices. For example, schools in California that have 50% or more of their students qualified for free or reduced lunch are eligible to receive

funding from the Network for a Healthy California (Network) to provide paid teachers for cooking and gardening classes for its students (NHC 2006). No study has yet been conducted to determine the effectiveness for this type funding on children's fruit and vegetable preference, recognition, and choice.

Network-funded schools in the BUSD provide their students with two cooking classes and two gardening classes each month. Each month, one cooking classes is devoted to learning about a special fruit or vegetable that is selected from the Network's Harvest of the Month (HOM) program. The HOM food item is chosen based on several criteria, including: seasonal availability, familiarity to children, affordability, ease of use in classroom taste testing, and whether or not it is California grown (Harvest of the Month 2007).

This research intends to determine the effect that food education programs in schools have on children's dietary behaviors. All students in the Berkeley Unified School District (BUSD) have the opportunity to self-select more fruits and vegetables from the salad bar if they purchase lunch from school. Each salad bar consists of the same food items, including some non-produce items like tuna. Because of this opportunity to self-select a larger variety of fruits and vegetables, this study hopes to determine if students who attend cooking and gardening classes choose a larger variety (number of different types) of fruits and vegetables during their lunch period than those who do not have such classes. This study also seeks to understand the possible effects cooking and gardening classes have on fruit and vegetable preference and recognition. I hypothesize that the schools that receive funding for cooking and gardening classes will choose a greater variety of fruits and vegetables during lunch. I also hypothesize that students who attend cooking and gardening classes have a greater recognition and preference for a larger variety of fruits and vegetables than those students who are unable to participate in such classes.

Research for this study will be conducted with the University of California, Berkeley's Center for Weight and Health. It is important to understand the effects of this dual-component school intervention program in order to determine whether or not funding should continue and if it should be expanded to more schools in order to promote healthy eating in children.

Methods

This study has three main objectives that will be used to answer the research question. The objectives are:

1. Determine the number (variety) of different fruits and vegetables chosen at lunch.
2. Determine students' preference for a variety of different fruits and vegetables.
3. Determine students' recognition for a variety of different fruits and vegetables.

Achieving these three objectives between the control schools (non-Network funded) and the experimental schools (Network-funded) will help answer the question of whether or not cooking and gardening classes funded by the Network increases students' variety, preference, and recognition of fruits and vegetables.

Study sample and data collection Photographs of 138 school lunches were taken from four elementary schools (two 5th grade classrooms per school) in the Berkeley Unified School District. The two control schools that do not receive Network funding and therefore do not have cooking and gardening classes are Jefferson Elementary and Cragmont Elementary. Both control schools do however, have gardens on site at the school, but there are no gardening teachers or classes held. Each of the schools gardens contains the similar fruits, vegetables, and other plants. The two experimental schools that have Network funded cooking and gardening classes are John Muir Elementary and LeConte Elementary. The ethnic population at each of the four schools is made up primarily of White, African American, and Hispanic students (Table 1).

Table 1. Student enrollment, ethnicity/race, and % of students qualified for free or reduced lunch at the four elementary schools in the study for the 2006-2007 school year. Information provided by the Education Data Partnership.

	Cragmont Elementary	Jefferson Elementary	John Muir Elementary	LeConte Elementary
Type of School	Control	Control	Intervention	Intervention
Student Enrollment	415	284	246	318
White	29.6%	31.7%	24.4%	24.2%
African American	24.1%	25.7%	36.2%	29.9%
Hispanic	22.2%	13.0%	11.8%	21.1%
% Qualified for free/reduced lunch	39.4%	34.9%	50.4%	65.1%

The Committee for the Protection of Human Subjects (CPHS) has approved that opt out letters did not need to be sent home to the parents since no personal information would be collected. Even though opt out letters were not necessary, parents received letters informing

them that their child would be participating in the study and that pictures of their lunches would be taken. Students were able to decline participation in the study at any time.

Students in Network-funded schools have participated in cooking and gardening classes since the beginning of the school year in September 2007. Data for this study was collected in March 2007; students would have attended approximately 10 cooking classes and 10 gardening classes up to this point. There is no pre-intervention data available about the students on their eating habits and nutritional knowledge. Students who were enrolled in the Network-funded schools in previous years would have attended more cooking and gardening classes.

Photographs were taken of both purchased school lunches and lunches brought from home. Students were prompted before lunch that they should not begin eating until a photograph of their lunch was taken. Before lunch service, blue placemats with identification codes were taped to the lunch tables indicating where participating students should sit. Short questionnaires with matching codes were also placed at each placemat. The placemats had marked regions for the placement of their plate to ensure consistency among the photographs. Students who purchase their food at school went through the hot lunch line and the self-serve salad bar. Students who brought their lunch from home were asked to place all food items on the same type of plate provided by the school lunch service. This gave consistency in the photographs between school lunch and bagged lunch. Students were then asked to fill out a questionnaire until one of the researchers was able to take a picture of their lunch.

The Hawthorne Effect is the idea that behavior during the course of an experiment can be altered by a subject's awareness of participating in the experiment (Jones 1992). In this particular study, the Hawthorne Effect may cause students to choose and consume more healthy foods than they normally do. To minimize this effect, students will be told, "We are doing a study to learn more about what kids eat for lunch...We just want to know what you like to eat." This information does not tell them that we are specifically looking at their fruit and vegetable choices and hopefully they will eat as they normally do.

Four researchers took photographs at each school with a Fujifilm Fine Pix 6.3 MP digital camera. Photographers were previously trained to take pictures by zooming in and filling the entire screen with the plate of food to ensure consistency. The photographer asked each student to move slightly to the left or right so that photographs were taken directly above the plate with flash. These methods were created by referring to several studies (Martin *et al.* 2006 and

Williamson *et al.* 2003) that have successfully determined that photo analysis is a precise and cost-effective method to analyze food. However, the methods have been adjusted to better fit the budget and time constraint of this study by not purchasing tripods and instead ensuring that all photographers will take consistent photographs in the same way. Piloting the methods has shown it to be effective. Photographs are optimal because of the consistency it provides, and because it is not overly time consuming, expensive, or disruptive.

Questionnaires (see Appendix) were placed on the table for each participating student to fill out. Students were encouraged to fill out the survey while they were waiting for the photographs of their food to be taken, or at any point during their meal. The questionnaire used was from the Network for a Healthy California validated instruments list. The questionnaire contains a list of thirteen different fruits and vegetables, some of which are more common like apples and broccoli, and some of which were featured in the Harvest of the Month food lessons, including persimmons and butternut squash. The food items that are considered fruits in the questionnaire include: apples, kiwis, mandarins, and persimmons. The food items that are considered vegetables in the questionnaire include: asparagus, broccoli, butternut squash, carrots, green beans, salad greens, spinach, sweet potatoes, and tomatoes. The name of each fruit and vegetable as well as a small picture of the food item was shown with the option to mark “I like this a lot,” “I like this a little,” “I do not like this,” or “I do not know what this is.” The questionnaire measured a variety of factors related to fruit and vegetable consumption at home, asked about preferences to fruits and vegetables, and also contained demographic questions. Students filled out the questionnaires independently. If a student had trouble reading or understanding the questionnaire they were able to ask a researcher for help.

Techniques of analysis After all photographs were taken, photographs were digitally analyzed on the computer to determine the number of different fruits and vegetables present for each school lunch. A T-test was used to assess differences between the Network students and the non-Network students.

Results from the student questionnaires were entered and tallied on Microsoft Excel 2003. Due to the unequal sample sizes, percentages were calculated for questions regarding fruit and vegetable preferences and recognition. Comparisons were made on fruit and vegetable responses regarding preference and recognition. For example, it was found that 35% (n=62) of non-

Network students were unable to identify butternut squash compared to 7% (n=75) of Network students.

Analysis of fruit and vegetable variety were further analyzed with considerations due to gender and racial/ethnic group. These were assessed by doing several Anova analyses comparing: non-Network female students vs. Network female students, non-Network male students vs. Network male students, non-Network female students vs. non-Network male students, Network male students vs. Network female students, non-Network Whites, African Americans, and Hispanic/Latino populations vs. Network Whites, African Americans, and Hispanic/Latino populations. On the questionnaire students were able to “Fill in all that apply to you” on the question regarding race and ethnicity. Those students who chose more than race and/or ethnicity, or chose “other” were not used in this set of analyses in order to simplify the statistical model.

Results

Effect on chosen variety Network-funded students who attended cooking and gardening classes chose a significantly ($p = 0.001$) larger variety of fruits and vegetable during their lunch period (1.85 ± 0.73 , $n=71$) than non-Network funded students (1.36 ± 0.78 , $n=67$) (Figure 1). In Network-funded schools, gender had no relationship in determining the number of different types of fruits and vegetables selected during lunch ($F = <0.001$; $df = 3.991$; $p = 0.980$). The number of fruits and vegetables selected by Network females (1.86 ± 0.74 , $n=30$) was nearly identical to the number of fruits and vegetables selected by Network males (1.86 ± 0.81 , $n=36$).

The two groups that showed the largest differences in fruit and vegetable selection between non-Network students and Network students were females and the Hispanic/Latino population (Table 2). Fruit and vegetable variety in Network female students was significantly greater ($F = 9.093$; $df = 3.998$; $p = 0.004$) than non-Network female students. There were no significant differences between non-Network male students and Network male students (Table 2). Showing a similar trend, fruit and vegetable selection in the Network Hispanic/Latino students was significantly greater ($F = 11.921$; $df = 4.380$; $p = 0.003$) than the non-Network Hispanic/Latino students.

Table 2. Results of Anova analysis when comparing Group 1 vs. Group 2. *Difference between Group 1 and Group 2 significantly different.

Group 1	Group 2	F	F crit	P-value
Network Female*	non-Network Female	9.093	3.998	0.004
Network Male	non-Network Male	0.939	4.012	0.337
non-Network Female	non-Network Male	2.144	4.020	0.149
Network Female	Network Male	<0.001	0.980	3.991
Network White	non-Network white	0.007	4.279	0.943
Network Hispanic/Latino*	non-Network Hispanic/Latino	11.921	4.380	0.003
Network African American	non-Network African American	0.007	4.210	0.934

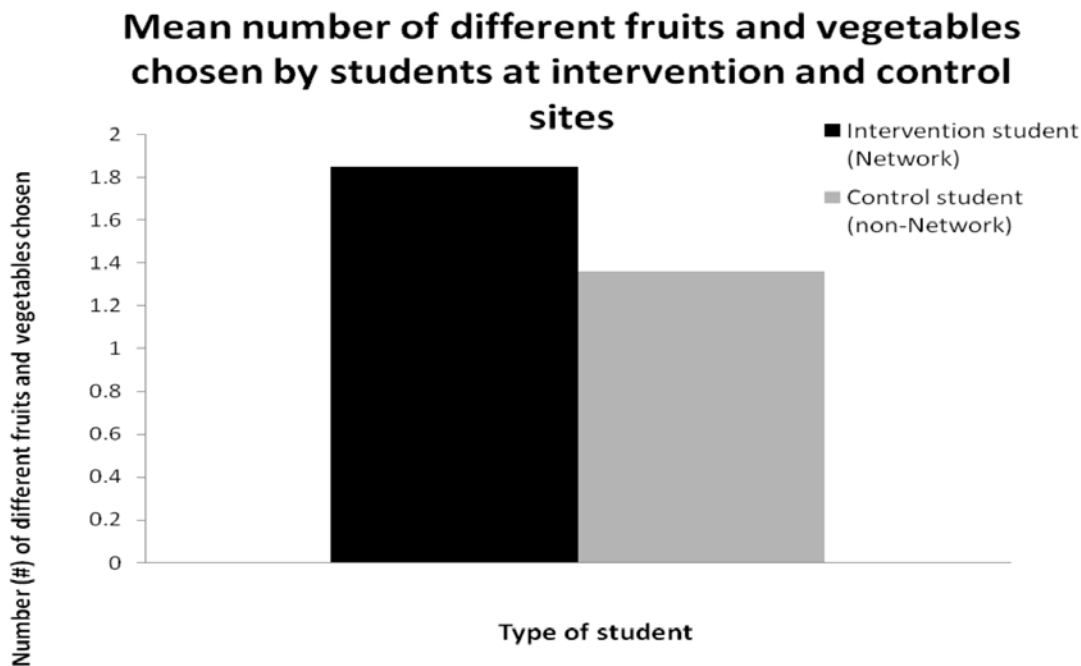


Figure 1. Mean number of different fruits and vegetables chosen during lunch by 5th grade Network students (1.85 ± 0.73 , $n=71$) and non-Network students (1.36 ± 0.78 , $n=67$) ($p = 0.001$).

Fruit and vegetable preference and recognition Food recognition responses were taken from completed questionnaires. The recognition of fruits and vegetables (Figure 2) was high for both fruits and vegetables for the 5th graders at the Network-funded schools. Students at non-

Network schools had greater difficulty in identifying several types of fruits and vegetables, including: asparagus, broccoli, butternut squash, kiwis, persimmons, and sweet potatoes. 35% of non-Network students responded “I don’t know what this is” to butternut squash compared to just 7% of Network-funded students (Figure 2). 21% of Non-network students did not recognize persimmons compared to 4% of Network students (Figure 2). Unexpectedly, more non-Network were able to recognize green beans, salad greens, and spinach than Network students (Figure 2).

Apples received 85% “I like this a lot” responses in both groups, the highest of any fruit or vegetable on the questionnaire (Figure 3). More Network students (68%) than non-Network students (39%) enjoyed eating persimmons. In general, students preferred fruits over vegetables. Although preference for butternut squash was overall low, 33% of Network students responded to “I like this a lot,” compared to just 18% of non-Network students (Figure 3).

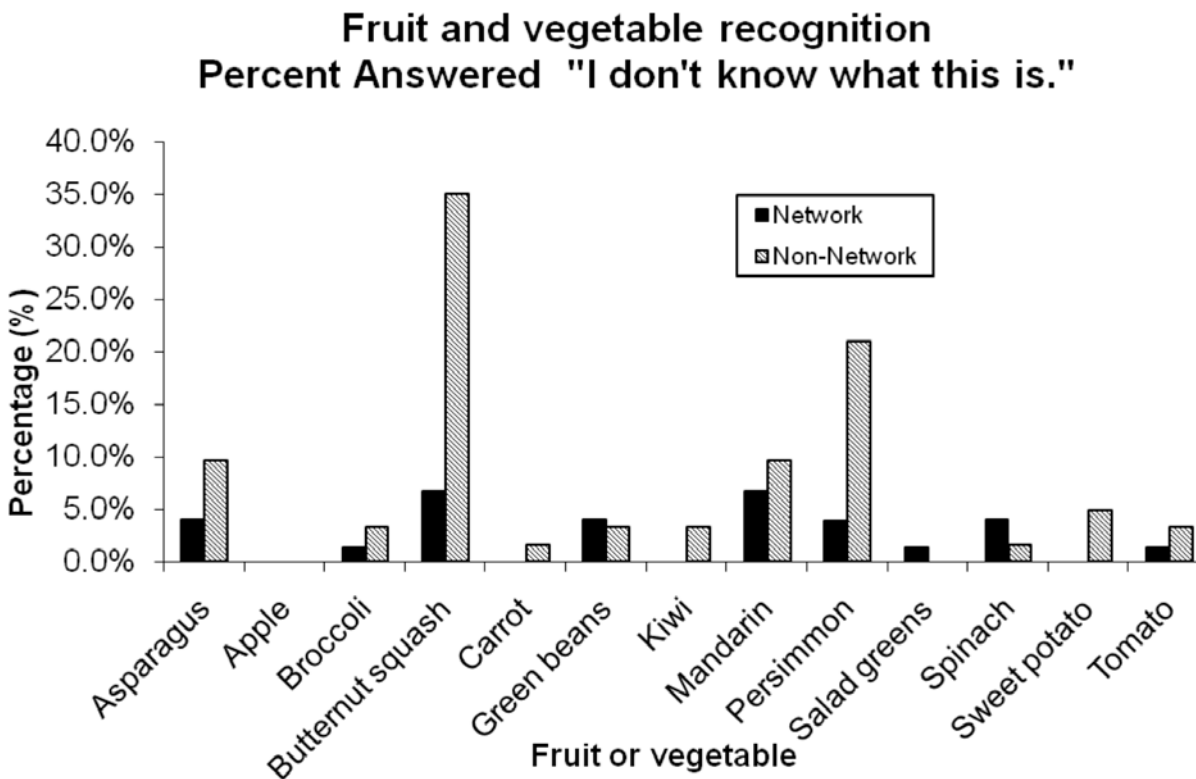


Figure 2. Percentage of response “I do not know what this is” (unable to recognize fruit or vegetable) by 5th grade students to a variety of fruits and vegetables for Network (n=74) and non- Network (n=62) funded schools. No bar indicates that all students knew the fruit or vegetable.

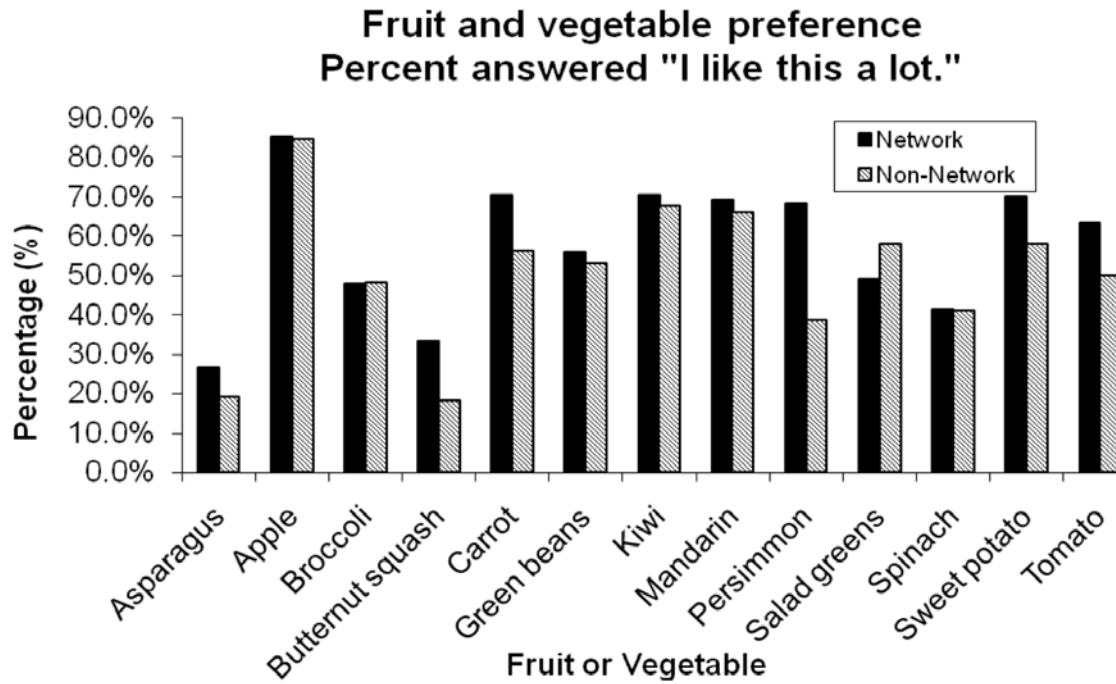


Figure 3. Values in percent of response “I like this a lot” to a variety of fruits and vegetables for Network (n=74) and non- Network (n=62) funded schools.

Discussion

This study found that students who attend Network-funded cooking and gardening classes, on average, choose a significantly larger variety of fruits and vegetables to eat during lunch. Additionally, this study found that, overall, Network-funded students are able to recognize a larger variety of fruits and vegetables than those in non-Network funded schools. Three unexpected results occurred in which more non-Network students were able to recognize green beans, salad greens, and spinach more often than Network students. This study also found that there was a high percentage of both non-Network and Network students who liked several fruits, including apples, kiwis, and mandarins. However, students at Network schools seemed to enjoy a greater variety of vegetables, particularly carrots and butternut squash. Unexpectedly, there were slightly more students at non-Network schools who responded “I like this a lot” when asked about salad greens.

Interpretations One of the main findings of this study is that students who participate in cooking and gardening classes chose a significantly larger variety of different fruits and vegetables for lunch. Network students averaged 1.85 different types of fruits and vegetables as opposed to just 1.36 for non-Network students. To my knowledge, this is the first study that

specifically looked at the effect of cooking and gardening classes on a student's chosen variety of fruits and vegetables during school lunch.

It is possible that the fruits and vegetables chosen by the Network and non-Network students may not be valid because this study did not accurately reflect their own true individual preferences. This is because our study looked at both students who bought lunch at school and students who brought a bagged lunch from home. Students who brought lunch may not necessarily have had a lunch that reflects their own preferences and choices of fruits and vegetables, as it may be more reflective of whoever packed the lunch. For example, a student's parent may have packed many different fruits, vegetables, and snacks, but the student may not have eaten any of the fruits or vegetables. Also, at one Network school, LeConte Elementary food service workers encouraged students to go to the salad bar before eating which may have accounted for the higher variety of fruits and vegetables reported. Perry *et al.* (2004) found that verbal encouragement by food service staff was linked to increased consumption of fruits and vegetables.

This study also found that gender did not play a role on whether or not a student goes to the salad bar. Of those students who bought school lunch, 84% of females and 85% of males went to the salad bar. These results refute a previous finding by Slusser *et al.* (2007) that found a higher percentage of boys (30%) than girls (19%) ate from the salad bar not very often or never.

Further analysis of the results has shown that much of the overall difference in selection of fruits and vegetables between Network and non-Network students could be attributed to differences seen in female students and Hispanic/Latino students. There is a significant difference in the number of different fruits and vegetables chosen between non-Network females (1.26 ± 0.35 , $n=27$) and female Network students (1.86 ± 0.81 , $n=36$). There is an apparent difference between the selection behaviors of fruits and vegetables in non-Network females (1.26 ± 0.35 , $n=27$) and non-Network males (1.62 ± 1.31 , $n=29$), but it is not statistically strong ($CI=85\%$). Thus it seems that the intervention affected female students more than male students. This may be due to the fact that girls are more receptive to health education programs concerning eating patterns (Perry *et al.* 1994) and that dieting is a far more prevalent concern among females than males (Neumark-Sztainer *et al.* 1996). Furthermore, when comparing fruit and vegetable selection between non-Network students and Network students, it was found that the only ethnic group to have a significant difference was the Hispanic/Latino students. This result brings forth

an important question: Why did Hispanic/Latino students respond to the intervention better than other ethnic groups?

The results of this study have shown that cooking and gardening classes coupled with the Harvest of the Month food item does lead to an increase in fruit and vegetable recognition. For example, butternut squash was one of the featured vegetables in November 2007, and when asked about their preference of butternut squash, 35% of non-Network students did not know what it was, compared to just 7% of Network students. Additionally, persimmons were a featured food item during the previous school year in cooking classes in November 2006. This study found that 21% of non-Network students were unable to recognize persimmons compared to just 3% of Network students. There was one unexpected result in which more Network students (4%) than non-Network students (2%) did not recognize spinach. However, these percentages should be considered low for both groups, and the difference is fairly small. The reason for this result may be anecdotal and could include the inability to read and understand the word, or the poor picture quality of the questionnaire.

Similarly, students from Network-funded schools responded, “I like this a lot” more often than non-Network students for the majority of the fruits and vegetables in the questionnaire. This included: asparagus, apples, butternut squash, carrots, green beans, kiwis, mandarins, persimmons, sweet potatoes, and tomatoes. Previous studies have confirmed our findings by noting that preferences for particular food items correlate with having been exposed to the food item and tasting it (Birch and Marlin 1982). Students who partake in gardening classes are often given the opportunity to try the fruits and vegetables that they help grow, thus it was expected that Network students would like a larger variety of fruits and vegetables. These results further support previous findings by Morris and Zidenberg-Cherr (2002) which found that a garden-enhanced nutrition education curriculum is an effective tool for improving vegetable preferences, especially for carrots and broccoli in school-aged children. Furthermore, the food items that had the largest difference (greater than 10%) in preference between Network and non-Network schools were butternut squash, carrots, persimmons, sweet potatoes, and tomatoes. Interestingly, each of these food items except for sweet potatoes have been showcased as a Harvest of the Month food item in the last two school years, which means that at least one cooking lesson has been devoted to learning how to make a dish containing that particular food item.

Network students are lower-income students, and past studies have shown that children from low-income families have less access to fruits and vegetables at home (Chung and Myers 1999). The fact that these results have shown an improved selection, preference, and recognition of many fruits and vegetables featured in the Network's cooking and gardening program is extremely important. The significant differences in the behavior and responses of Network children show that the program is successful.

Implications Despite these results, students are choosing an average of less than two types of different fruits and vegetables at lunch. Many students are not taking advantage of the salad bar and the large variety of fresh fruits and vegetables that it offers. The results of this study are promising in that they do, to an extent, improve the food choices made by some students. Since, significant differences between Network and non-Network schools were seen in females and in Hispanic/Latino students, it will be necessary to implement other interventions that would be more successful in increasing food selection and knowledge in males and in other ethnic groups.

This study recommends that funding for cooking and gardening classes should continue in these schools as well as expand to schools that do not qualify for the program. Since children are expected to consume roughly one-third of their daily calories in school, it is necessary for students to have school-based programs that help increase their nutrition knowledge and healthy food intakes.

Future research There are a number of constraints on this study. If possible, future research should attempt to study only those students who purchase lunch from school and who self-select items from the salad bar to more accurately represent food choices made by the student. Including lunches brought from home adds a difficult dynamic to the study since it is not always clear whose preferences and food choices are represented. Students who buy lunch are still limited by what is offered in the salad bar.

Students who chose more than one race/ethnicity in the questionnaire were not used in the data analysis when comparing race/ethnicity to variety of fruit and vegetables chosen. Future studies may wish to either eliminate the option of choosing more than one race/ethnicity or find a way to use those data points in their analysis.

This study used a very simple and low-cost method to determine food preference and recognition with a questionnaire, which has limited capabilities. The surveys that were given out were in black and white which may have caused some of the pictures of the fruit or vegetable to

be unclear. Future studies may consider either printing the survey in color so that students may more easily recognize the fruit or vegetable, or having real fruits and vegetables present for them when taking the survey. It is also possible that since the students in the study were only in 5th grade, they may not have been able to read the names of all the fruits and vegetables. However, this problem was present for both types of students, and should have caused little or no directionality when affecting the results.

From this study, two important questions emerge: What intervention would increase the variety of fruits and vegetables chosen by male students? Why were Hispanics/Latinos much more responsive to the intervention? Future studies that help answer these questions will aid in implementing new programs that will have more success in targeting these groups of students.

Furthermore, this study did not look at the actual consumption of fruits and vegetables during lunch. Identifying how many different fruits and vegetables chosen during lunch is useful information, but it does not give insight into whether or not any of the fruits or vegetables was actually eaten. A study on the effect of cooking and gardening classes on the actual consumption of fruits and vegetables would be very telling on whether or not such classes are beneficial.

Interestingly, observations have been made that many bagged lunches from home contain a large abundance of junk foods. These “junk foods” mainly consisted of highly processed foods that are of low nutritional quality, including packaged chips, cookies, and candy. There are currently no known studies conducted on whether school lunch may be a healthier option than lunches from home. Future studies could compare the nutritional value and content of school lunches versus bagged home lunches.

Conclusion With the positive results of this study, the continued inclusion of cooking and gardening classes should continue and expand in the school setting. This report should encourage educators to keep cooking and gardening classes in Network-funded schools and also expand such classes to non-Network funded schools in hopes that it will increase students’ food knowledge and healthy food consumption. Also, there have been many positive changes in the school lunch system that should be acknowledged and expanded to all schools in the nation. This includes the presence of a salad bar and the inclusion of a variety of fresh fruits at every lunch (as opposed to canned fruits). It does seem that school lunches, with all their healthy options may be a healthier option than lunches brought from home which often include

Lunchables, chip packages, sugar-filled drinks, and cookies. The next step will be to inform the parents that school lunches are affordable, delicious, and healthy.

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Appendix

ID Number: _____

We would like for you to complete this survey. You may skip questions you do not want to answer but we hope that you will answer all of them. Any information about who you are will be kept secret. We will not share your name or identification number. They will only be used for reports. Do NOT write your name anywhere on this survey.

1. We want to know how much you like some foods. (Please bubble in your answer)

How much do you like these fruits and vegetables?		I like this a lot 	I like this a little 	I do not like this 	I don't know what this is 
Asparagus.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Apples		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Broccoli.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Butternut squash.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Carrots.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Green Beans.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kiwi		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mandarins.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Persimmons.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Salad Greens.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spinach.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sweet Potatoes.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tomatoes.....		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. At your home do you have fruits to eat?

- Never Sometimes Always I don't know

3. At your home do you have vegetables to eat?

- Never Sometimes Always I don't know

4. Yesterday, did you eat any vegetables? Vegetables are all cooked and uncooked vegetables; salads; and boiled, baked and mashed potatoes. **Do not count French fries or chips.**
- No, I didn't eat any vegetables yesterday.
 - Yes, I ate vegetables 1 time yesterday.
 - Yes, I ate vegetables 2 times yesterday.
 - Yes, I ate vegetables 3 or more times yesterday.
5. Yesterday, did you eat fruit? **Do not count fruit juice.**
- No, I didn't eat any fruit yesterday.
 - Yes, I ate fruit 1 time yesterday.
 - Yes, I ate fruit 2 times yesterday.
 - Yes, I ate fruit 3 or more times yesterday.
6. Yesterday, did you drink fruit juice? Fruit juice is a 100% juice drink like orange juice, apple juice, or grape juice. **Do not count punch, Kool-Aid®, sports drinks and other fruit-flavored drinks.**
- No, I didn't drink any fruit juice yesterday.
 - Yes, I drank fruit juice 1 time yesterday.
 - Yes, I drank fruit juice 2 times yesterday.
 - Yes, I drank fruit juice 3 or more times yesterday.

7. Do you have cooking and gardening classes at your school? Yes No

If yes, do you ever see the same recipe or foods you have made in your cooking or gardening class served at school lunch? Yes No

If yes, have you ever eaten something at school lunch that was the same recipe or food you made during cooking or gardening class? Yes No

The last few questions are about you.

8. How old are you? _____ years old
9. Are you a boy or a girl? Boy Girl
10. How would you describe yourself? (Fill in all that apply to you)
- American Indian or Alaska Native
 - Asian
 - Black or African American
 - Hispanic or Latino including Mexican
 - Native Hawaiian or Other Pacific Islander
 - White/Caucasian
 - Other (_____)