

2013

Evaluating the Efficacy of a Nutrition Education Mini Lesson Series

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**EVALUATING THE EFFICACY OF A
NUTRITION EDUCATION MINI LESSON SERIES**

BY

ELIZABETH B. PATNODE

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
IN
NUTRITION AND FOOD SCIENCES**

UNIVERSITY OF RHODE ISLAND

2013

MASTER OF SCIENCE THESIS
OF
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2013

ABSTRACT

Objective: To assess the impact of a nutrition education mini lesson series on children's knowledge and fruit and vegetable consumption.

Design: Quasi-experimental pre-/post-test design with two study conditions (experimental and control).

Setting: Four (4) Boys & Girls Clubs in Providence, Rhode Island.

Participants: Eighty-four (84) children ages 5-11 years.

Intervention: Participants in the experimental group received one, 10-minute fruit and vegetable nutrition education mini lesson each week for 4 weeks. Participants in the control condition received 2 lessons unrelated to fruits and vegetables. The experimental and control groups completed pre- and post-surveys one week before and after the intervention.

Main Outcome Measures: Knowledge of recommended fruit and vegetable intakes and fruit and vegetable consumption.

Results: The experimental group was more likely to answer knowledge items correctly at post-test than the control group ($p < 0.05$). There were no differences between groups for fruit and vegetable consumption. No relation was found between attendance frequency and consumption among participants in the experimental condition.

Conclusion and Implications: This intervention effectively increased fruit and vegetable knowledge of 5-11 year old participants in an afterschool care setting. Future research is needed to determine if adopting additional or alternate intervention techniques can increase fruit and vegetable intakes of children in this setting.

ACKNOWLEDGEMENTS

First, I want to thank my committee for all of their commitments during my entire thesis process. Dr. Greene, thank you for all of your time and direction. Linda, thank you for your support and relentless confidence in me. Continued thanks for giving me the opportunities to fall in love with community nutrition. Kathleen, your dedication and guidance helped to pull this entire work together. Many thanks for your feedback and always making the time to meet with me. Susan, thank you for serving as my committee chairperson and taking the time to attend my defense. Also, countless thanks go to Cathy English. From transitioning me into nutrition to perfecting my DICAS application, your dedication to students does not go unnoticed.

To the SNAP-Ed ladies, thank you for your outstanding support. I look up to you all and want to thank you for the great friendships we've built. To Heidi, thank you so much for making the mini lessons possible. You've given me confidence as a nutrition educator, and I hope to be a supervisor as poised and kindhearted as you some day. Joanna, without your help guiding me through this entire process, I'd still be staring at the graduate school's list of deadlines. Thank you for all of your help. To the nutrition educators that put so much effort into the mini lessons, thank you all for making this research a success. Jess, thank you for always keeping me sane and being the true teacher that you are, always there to help even on top of your workload.

Last, but certainly always first, my fiancé Eric. Thank you for all of your love and support. You cheered me along every step of the way, and I can't wait to cheer you on in your successful career in California. Without you, I would still be stuck in engineering, wishing I switched to nutrition. Thank you for everything. I love you.

PREFACE

This thesis was written to comply with the University of Rhode Island graduate school Manuscript Thesis Format. This thesis contains one manuscript: *Evaluating the Efficacy of a Nutrition Education Mini Lesson Series*. This manuscript has been written in a form suitable for publication in the *Journal of Nutrition Education and Behavior*.

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“Evaluating the Efficacy of a Nutrition Education Mini Lesson Series”

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Prepared for submission to the Journal of Nutrition Education and Behavior.

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INTRODUCTION

Between 80 and 90% of United States children 4-13 years of age do not consume the recommended amounts of fruits and vegetables each day (1). A diet low in fruits and vegetables is associated with an increased risk for coronary heart disease, hypertension, stroke, type 2 diabetes mellitus, and overweight/obesity (2). Although most children are not consuming adequate fruits and vegetables, evidence suggests that children with food insecurity consume even fewer fruits and vegetables than their peers who are food secure (3). There are mixed results about associations between food insecurity and overweight/obesity, although recent results from the National Health and Nutrition Examination Survey (NHANES) suggest that fewer food insecure children are at healthy weights than food secure children (3).

Child nutrition education interventions are designed to increase nutrition knowledge and increase consumption of healthful foods, with a goal of improving the health of children (4). In a recent review of nutrition education interventions, the average increase of fruit and vegetable intakes in children was 0.39 servings per day after participating in a nutrition intervention, demonstrating a small, but significant effect of nutrition interventions at increasing dietary intakes (5). In one study, kindergarten and first grade students in the Northeast participated in a multicomponent, school-based nutrition education intervention. By the end of year 1 of the randomized controlled study, participants in the experimental group consumed 0.28 more servings of fruits and vegetables than the control group ($p < 0.005$) (6). Most nutrition education programming operates in a structured environment, with 30- to 60-minute lessons. For example, one nutrition education intervention had

classroom teachers deliver structured nutrition lessons in the classroom setting to third, fourth, and fifth graders in Los Angeles, California public elementary schools (7).

Standard nutrition education interventions have also proven to be effective at increasing children's fruit and vegetable knowledge. One study evaluated the effectiveness of a school-based nutrition education intervention with students in grades 2-5 over the course of one school year. The intervention resulted in significant knowledge gains for the experimental group from pre- to post-test and in comparison to the control group (8).

Not all settings for children can utilize standard nutrition education interventions. A promising new format in education is the use of mini lessons. Many teachers find that breaking units of study into mini lessons makes relating subject material to real life situations easier. The short 5-10 minute timespan of mini lessons also tends to maintain student interests in the curriculum (9). One study found that science-based mini lessons expanded subject knowledge, improved attendance, and increased class participation in the high school setting (10). Nutrition education interventions have utilized mini lessons. One intervention incorporated lunchroom nutrition mini lessons in conjunction with a standard, school-based curriculum. Elementary students from grades 3-5 participated in the multicomponent intervention, which lasted for one school year. At post-test, participants in the experimental group increased fruit and vegetable consumption by 0.26 servings, in comparison to the control group, which decreased intakes by 0.14 servings ($p < 0.001$) (11).

Since most children do not consume adequate fruits and vegetables and diets low in fruits and vegetables are associated with increased health risks, nutrition education is needed to help improve children's fruit and vegetable intakes. New curricula, such as mini lessons, are especially important for settings that require more flexible nutrition education interventions. Such sites include the Boys & Girls Clubs of America. The Boys & Girls Clubs of America are afterschool educational sites whose participants are primarily children of low-income families facing food insecurity. The nationwide, community-based centers provide a safe and affordable environment to children, adolescents, and teenagers during non-school hours (12).

The Supplemental Nutrition Assistance Program Education (SNAP-Ed) partners with the Boys & Girls Clubs of Providence, Rhode Island. The aim of SNAP-Ed is to provide community nutrition education to Supplemental Nutrition Assistance Program (SNAP) recipients and eligible persons with a goal to educate and encourage low-income individuals to make healthy dietary choices (13). In partnership with the Boys & Girls Clubs of Providence, a SNAP-Ed fruit- and vegetable-based pilot program introduced quick, 10-minute nutrition mini lessons during a 4-week intervention. The flexible nutrition program was designed to promote learning and fun, while providing participants with entertaining nutrition activities within a 10-minute mini lesson.

This study aims to answer the following research questions: a) do children who receive nutrition education mini lessons increase fruit and vegetable knowledge scores and consumption more than children who participate in a control condition? and b) for

children who participate in nutrition mini lessons, is there an association between the number of mini lessons attended and fruit and vegetable consumption?

METHODS

Participants and Recruitment

Participants were drawn from a convenience sample in Providence, Rhode Island, where there is a high rate of children living in poverty and a large percentage of children from families with household incomes below the federal poverty level (14, 15). Participants were between the ages of 5 and 11 years old, attending the Boys & Girls Clubs of Providence between the months of April and May 2012. A total of 84 children participated from four Providence Boys & Girls Clubs. Two sites were selected as the experimental group, with the remaining two afterschool clubs designated as the control group. All children from the experimental sites (n=52) were invited to participate in the optional nutrition intervention each week. The clubs' program managers selected the children at the control sites (n=32) to participate in the assessment for the pre- and post-tests. A total of 30 participants (n=21 experimental group, n=9 control) had complete pre- and post-test data (Figure 1). High attrition was primarily due to absences on the day of post-test evaluations. Mean age \pm standard deviation (SD) of the experimental and control groups were 8.33 ± 1.62 and 7.56 ± 1.94 years, respectively. Complete subject demographic information is detailed in Table 1.

Study Design and Procedures

This study evaluated the data from a 4-week, quasi-experimental design conducted by Rhode Island SNAP-Ed with an intervention group and a control group. The program's staff delivered the nutrition curriculum during the spring of 2012.

Identical pre- and post-tests containing 4 items each were administered one week before and one week after the 4-week intervention to both the experimental and control groups. The pre- and post-tests were provided mid-week, so that participants would report weekday fruit and vegetable intakes. Participants from the experimental group received a small incentive of either a fruit and vegetable bracelet or pencil after completing the pre- and post-surveys. As an incentive for completing the pre- and post-tests at the control sites, participants received an 8-oz milk cup or dairy silly glasses, which depicted foods from the dairy group. SNAP-Ed staff de-identified and linked pre- and post-tests with identification numbers prior to data entry for this research. All de-identified data were stored in secure, electronic and paper files at the SNAP-Ed office at the University of Rhode Island Feinstein Providence Campus. The Institutional Review Board on Human Subjects (IRB) at the University of Rhode Island approved this study.

Intervention

Experimental Condition. Five (5) SNAP-Ed professionals and paraprofessionals were trained according to the program's standards and delivered the nutrition intervention. The educational intervention was offered one day each week for one hour. During the 1-hour timeslot, 10-minute mini lessons were repeated up to 6 times. The repeated lessons allowed for small participation groups, as children attended one of the mini lessons within the hour. Attendance was optional each week for the experimental sites, but the SNAP-Ed nutrition educators and Boys & Girls Clubs' staff encouraged participants to attend a 10-minute mini lesson at their leisure in-between completing

homework or attending other activities (i.e. gym and chorus). Each week, a different fruit and vegetable lesson was discussed. The weekly topics included: MyPlate and recommended daily fruit and vegetable intakes; fruit and vegetable variety; fruits' and vegetables' skins, seeds, and edible portions; and fruit and vegetable agriculture (Table 2). Participants attended each lesson in small groups with their peers (3-6 children at a time), seated together at a table with a SNAP-Ed educator. Each week, participants were introduced to the fruit and vegetable topic within the first 3-5 minutes of the lesson. During the remaining time, the participants either played a nutrition game or completed a nutrition activity related to the weekly topic (e.g. nutrition-focused arts and crafts or show-and-tell). Regardless of the fruit and vegetable topic each week, every nutrition lesson incorporated the messages: "Fill half your plate with fruits and vegetables" and "Eat at least 2 fruits and 2 vegetables every day." Participant attendance was recorded weekly by means of individual 'passports.' To mark participant attendance each week, attending children received passport stickers with corresponding nutrition messages to place on their passports (Appendix B).

Control Condition. The control group received two 30-minute interventions unrelated to fruits and vegetables immediately after the pre- and post-tests at weeks 1 and 6. The nutrition topics included calcium-rich dairy foods and recommended dairy intakes. Between week 1 and week 6, there was no contact with the participants in the control group.

Instruments

Instrumentation used during the intervention was a 4-item pre- and post-test (Appendix D). Two items concentrated on fruit and vegetable knowledge, while the remaining two items focused on fruit and vegetable consumption. These 4 items were based on the validated National Health Interview Survey and adopted by Rhode Island SNAP-Ed (16). Knowledge and consumption answer choices were on a numerical, 6-point scale ranging from 0 to 5+. The multiple-choice answers referred to either pieces of fruit (excluding fruit juice) or number of times for vegetables (not including French fries). Subjects were provided illustrative examples of 1-piece fruit equivalents (representing 1 cup of fruit), as well as examples of eating vegetables 1 time (pictorially representing 1 cup of vegetables). Two (2) fruits and 2 vegetables each day were the correct answers for the recommended intakes for this age group on the pre- and post-surveys (17). Knowledge items were scored as 0 for an incorrect answer and 1 for a correct answer. In addition, participants were also asked to record their age, school, race, and ethnicity.

Data Analysis

All data were analyzed using SPSS 19.0 for Windows (SPSS Inc., Chicago, IL). Demographic variables were compared between groups using chi-square analyses for categorical variables (gender and ethnicity), and an independent *t*-test for age. Chi-square analyses evaluated correct and incorrect responses by group for each of the two knowledge items separately at pre- and post-test. A one-way repeated measures analysis of variance (ANOVA) was conducted to examine if there were significant

differences within and between groups over time for consumption. Intakes are expressed by mean \pm SD. A one-way analysis of covariance (ANCOVA) evaluated consumption and attendance within the experimental group, adjusting for baseline intakes. The independent variable was the total number of times attended (1-4) and the dependent variable consisted of fruit and vegetable intakes. Consumption is expressed as mean \pm standard error (SE). Significance for all analyses was set at $p < 0.05$.

RESULTS

Demographic Characteristics

The demographic distribution of the experimental and control groups are compared in Table 1. There were no differences between the participants that completed the pre- and post-tests and those that did not complete the intervention. A total of 30 participants had complete pre- and post-test data, with 21 subjects (70%) in the experimental group and 9 subjects (30%) in the control group. Overall, mean age \pm SD of the participants was 8.10 ± 1.73 years, which did not differ between groups. There was an unequal distribution by gender, with 42.9% of the experimental group participants female and 88.9% of the control group comprised of females. The majority of participants (57.1%) were Hispanic, with 63.2% of the experimental group and 44.4% of the control group Hispanic.

Fruit and Vegetable Knowledge

Table 3 depicts knowledge assessment of both groups at pre- and post-test. At pre-test, 38.1% of participants (n=8) in the experimental group answered the fruit knowledge item correctly. No subjects from the control group answered correctly regarding fruit knowledge. At pre-test, there was a trend towards a difference for fruit knowledge ($p=0.07$). At post-treatment, 71.4% of experimental participants (n=15) answered the fruit knowledge item correctly, compared to 11.1% of the control group (n=1, $p=0.004$).

Regarding vegetable knowledge, 42.9% of participants from the experimental group (n=9) answered the item correctly at pre-test, compared to 33.3% of subjects in

the control (n=3, p=0.70). At post-test, 61.9% of subjects (n=13) in the experimental group answered the vegetable knowledge item correctly, while no control subjects answered correctly (p=0.003).

Fruit and Vegetable Consumption

Pre- and post-tests assessed self-reported fruit and vegetable consumption regarding the day prior to the surveys. At pre-test, students in both groups reported consuming an average between 2-3 fruits and 2-3 vegetables daily (Table 4). The control group had higher fruit and vegetable consumption at baseline, but there were no statistically significant differences. At post-test, participants in the experimental group decreased fruit intakes from baseline by 0.38 ± 2.09 pieces, while the control group demonstrated no change. Participants in both the experimental and control groups increased the number of times vegetables were consumed from pre- to post-test by 0.24 ± 1.67 and 0.11 ± 1.90 times, respectively. This increase in vegetable consumption was not significantly different between or within groups.

Attendance Rate and Intakes of Experimental Group

A one-way ANCOVA compared subjects' attendance to fruit and vegetable consumption within the experimental group, adjusting for baseline intakes (Table 5). There were no significant differences between attendance frequency and fruit and vegetable intakes.

DISCUSSION

The purpose of this study was to examine the impact of a nutrition education mini lesson program on children's fruit and vegetable knowledge and consumption. Participants in the intervention group were more likely to answer knowledge items correctly at post-test in comparison to the control group. Although there was a difference in knowledge at post-test, the difference in knowledge did not impact fruit and vegetable intakes. Fruit and vegetable consumption of both groups, however, remained at or above the recommended intake amounts of 2 cups of fruit and 2 cups of vegetables at baseline and post-test. Additionally, there was no association between attendance frequency and fruit and vegetable consumption within the experimental group.

The results of this study demonstrate that mini lessons can be effective at delivering short, simple nutrition messages to help improve nutrition knowledge. Nutrition education mini lessons are an effective option for settings that require flexible curricula. Mini lesson instruction in nutrition education may help prevent students from falling behind due to absences, since only brief, straightforward messages are conveyed. There is also reduced instructor burden by only needing to prepare for a 10-minute nutrition lesson, instead of a standard, 1-hour curriculum.

The results of this research pose a number of questions. First, it is possible that the small number of participants and/or the short, 4-week timeframe could explain the lack of significant findings. The intervention may have been too brief to have any significant impact on dietary intakes, since participants received at most 40 minutes of nutrition education over the course of the intervention.

The lack of findings regarding dietary intakes may have been due to the mini lesson curriculum. The mini lessons from this study did not incorporate behavioral theories, such as the social cognitive theory or transtheoretical model. In a recent review of child nutrition education interventions, studies that incorporated behavioral theories into the curricula saw significant differences in dietary intakes of participants. The studies also included large sample sizes and long intervention timelines (5).

Although the mini lesson intervention stressed the importance of consuming at least 2 fruits and 2 vegetables each day, this may have been interpreted as a recommendation to only consume 2 fruits and 2 vegetables a day. At baseline, several participants in the experimental group (n=10 fruit knowledge item, n=9 vegetable knowledge item) answered that children should consume 3 or more fruits and 3 or more vegetables daily. At post-test, these responses decreased (n=4 fruit knowledge item, n=7 vegetable knowledge item), with more answers stating only 2 fruits and 2 vegetables should be eaten each day. Future research should evaluate other nutrition messages, such as, “More matters” or “Eat fruits and vegetables at every meal.” This may better stress that fruit and vegetable recommendations are not meant to limit intakes.

Additionally, the participants might have benefited if the mini lessons were offered in separate areas of the clubs. For the experimental sites, some of the mini lessons were held in areas away from other club members; however, on other occasions, the mini lessons were held at tables that neighbored arts and crafts activities and video games. The close proximity became a distraction. On the other hand, there

was a benefit of being proximal to all of the children at the sites, since it helped increase participant attendance at the mini lessons.

Children have demonstrated the increased likelihood to over-report in order to feel socially accepted and impress peers and teachers (18, 19, 20). Data from this study suggest that participants were not inclined to over-report. Reported consumption would have likely been well above recommended intakes, which was not evident. Also, over-reporting would have likely been especially apparent at post-test, since by that time, rapport had been established with the participants. This did not occur. Participants at post-test continued to consume average intakes between 2-3 fruits and vegetables, which was no different from pre-test consumption.

According to recent validation studies, children's accuracy at completing dietary recalls is minimal, especially as the time of the recall progresses farther from the actual meal (21, 22, 23). Children are also much more likely to report accurately when given a specific meal or snack on which to report (24). Future research that requires participants to recall specific meals instead of an entire day may help to decrease respondent error.

As a possible contributor to the lack of significant findings, the items included in the surveys may have exceeded the cognitive capacities of the participants (25). The surveys first asked subjects to recall dietary intakes of the day before. Secondly, the survey requested that participants classify foods consumed as fruits and vegetables when reporting intakes. Finally, the survey required subjects to provide a "count" of their fruit and vegetable intakes while recalling the day before. Research identifies

these survey tasks as separate processes, each contributing to potential survey respondent error (26).

To complete the pre- and post-surveys, participants were required to comprehend survey questions by attempting to self-categorize fruits and vegetables into their appropriate food groups. Like similar studies, the 5-11 year old participants may have lacked the cognitive abilities to accurately self-report fruit and vegetable intakes (25, 27, 28). A small number of pictures were provided on the survey to represent 1-cup examples of fruits and vegetables, but the illustrations were not extensive. This required participants who consumed different fruits and vegetables to rely on their own classifications and memory, with the assumption that children understood which foods are fruits and vegetables. For instance, a child may have categorized strawberry milk as a fruit or grapes as a vegetable. This would have led to increased survey response error (25, 27, 29). Since participants did not have prior exposure to fruit and vegetable education from SNAP-Ed, it is unknown if children categorized fruits and vegetables correctly.

While recalling intakes and categorizing foods into food groups, the survey requested that participants count their fruit and vegetable intakes and provide a value for total consumption. Studies show that as the number of similar event occurrences increases, the probability of recalling the exact number of events decreases (26). With the help of regulated school breakfast and lunch programs, participants may have had a difficult time recalling the exact number of fruits and vegetables consumed the day before, since consumption of fruits and vegetables may be repetitive and commonplace. Studies have also identified count retrieval of specific events to be

more difficult than recognition (30). In other words, having participants circle the specific fruits or vegetables consumed is more likely to provide an accurate response than having participants recall based on memory. In the context of this study, it may have been beneficial to investigate which fruits and vegetables were offered the day before the surveys were administered at school breakfast and lunch, as well as at dinner at the Boys & Girls Clubs in order to include them on the survey. Future research may also eliminate the task of counting by requesting that participants write down all of the foods they consumed the day before or only for a particular meal (25, 27, 31). Professionals could later review intakes and identify fruits and vegetables consumed and compute the totals. This may help maintain the brief survey format, but form a more accurate recall.

Although no significant consumption changes were noted, participants in the experimental group were more likely to answer knowledge items correctly at post-test than participants in the control group. Increased knowledge is usually considered to be the first step in impacting consumption (8). Previous research has found that children are motivated to eat fruits and vegetables based on their nutritional value and taste (32). Therefore, the knowledge gained from the mini lessons regarding the nutritional benefits of fruits and vegetables may later motivate the participants to increase consumption.

Partnerships with additional programs may have also strengthened this research to help increase fruit and vegetable intakes. Research has identified that a school food environment is vital for the success of a nutrition education program (33, 34, 35). Therefore, working with the Boys and Girls Clubs' food service provider

and/or the food service contract companies in the local school system may have had a successful impact on fruit and vegetable consumption, considering the majority of subjects consumed up to 15 meals per week outside of the home and in a school food environment. In order to ensure that children have the ability to increase fruit and vegetable consumption, future research must confirm that adequate, well-liked fruits and vegetables are being offered at meals and snacks (7). In one study, for example, a salad bar that was offered during lunch to economically disadvantaged elementary students helped to increase fruit and vegetable consumption (36).

There are limitations of this study that must be acknowledged. Due to the hectic nature of the afterschool environment and community nutrition attrition, the small sample size was a limitation of this study. Caution should be taken when interpreting results of the pre- and post-surveys, as they have not been tested for test-retest reliability or validity. Also, the survey only provided a snapshot of participant intakes, not giving a thorough indication of participants' routine consumption. Self-reported intakes are a limitation of this study as well.

IMPLICATIONS FOR RESEARCH AND PRACTICE

This research demonstrates the benefits of utilizing mini lessons in child nutrition education. Mini lessons in nutrition programming are a promising format in the afterschool setting and may be ideally suited for settings that require flexible nutrition curricula. Although there were no significant behavior differences between the experimental and control groups, the study demonstrated a significant difference in correct knowledge items at post-test, which related to the intervention. Future studies should incorporate validated survey materials that are cognitively appropriate for participants. Furthermore, nutrition education interventions may benefit from the support of partnerships. Relationships with food contract companies and local school systems may help to provide children with the resources needed to ensure their success in nutrition interventions. Prospective research should also ensure an adequate intervention timeline is established to promote dietary change. More work is required in the afterschool setting to further establish the benefits of mini lessons in nutrition education interventions.

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Table 1. Demographic Characteristics of Participants

	Participants with completed pre- and post-tests n (%)			Participants with no follow-up n (%)			Total n (%)
	Experimental	Control	Total	Experimental	Control	Total	
n (%)	21 (70.0)	9 (30.0)	30 (35.7)	31 (57.4)	23 (42.6)	54 (64.3)	84
Age							
Mean ± SD	8.33 ± 1.62	7.56 ± 1.94	8.10 ± 1.73	9.10 ± 2.60	8.13 ± 2.82	8.69 ± 2.71	8.48 ± 2.41
Gender¹							
Male	12 (57.1)	1 (11.1)	13 (43.3)	18 (60.0)	1 (4.3)	19 (35.8)	32 (38.6)
Female	9 (42.9)	8 (88.9)	17 (56.7)	12 (40.0)	22 (95.7)	34 (64.2)	51 (61.4)
Ethnicity²							
Hispanic	12 (63.2)	4 (44.4)	16 (57.1)	22 (73.3)	11 (50.0)	33 (63.5)	49 (61.3)
Not Hispanic	7 (36.8)	5 (55.6)	12 (42.9)	8 (26.7)	11 (50.0)	19 (36.5)	31 (38.7)

¹One subject from the experimental group with no follow up did not disclose gender.

²Four subjects did not disclose ethnicity: two subjects from the experimental group with completed pre- and post-tests, one subject from the experimental group with no follow-up, and one subject from the control group with no follow-up.

Table 2. Experimental Group Nutrition Intervention Lesson Topics

Lesson	Topic
Lesson 1	MyPlate Recommendations: Fill half your plate with fruits and vegetables. Eat at least 2 fruits and 2 vegetables every day.
Lesson 2	Fruit and Vegetable Variety: What does a variety of colors, shapes, and sizes do for our bodies?
Lesson 3	Get To Know Your Fruits and Vegetables: Skins and Seeds
Lesson 4	Fruit and Vegetable Agriculture: How do fruits and vegetables grow?

Table 3: Chi-Square Analyses Comparing Knowledge at Baseline and Post-Test

Knowledge	Pre-Test			Post-Test		
	Experimental (n=21)	Control (n=9)	p-value ¹	Experimental (n=21)	Control (n=9)	p-value ¹
Fruit Recommendations						
Correct n (%)	8 (38.1)	0 (0)	0.07	15 (71.4)	1 (11.1)	0.004
Incorrect n (%)	13 (61.9)	9 (100)		6 (28.6)	8 (88.9)	
Vegetable Recommendations						
Correct n (%)	9 (42.9)	3 (33.3)	0.70	13 (61.9)	0 (0)	0.003
Incorrect n (%)	12 (57.1)	6 (66.7)		8 (38.1)	9 (100)	

¹Fisher's Exact Test

Table 4: Changes in Fruit and Vegetable Intakes from Baseline to Post-Test

	Pre-Test	Post-Test	Difference	Within group T-value¹	Between Group F²
	Mean ± SD	Mean ± SD	Mean ± SD		
Fruit					
Experimental	2.38 ± 1.77	2.00 ± 1.90	-0.38 ± 2.09	0.84	0.18
Control	2.89 ± 1.27	2.89 ± 2.21	0.00 ± 2.69	0.00	
Vegetable					
Experimental	2.10 ± 1.87	2.33 ± 1.80	0.24 ± 1.67	-0.65	0.03
Control	2.89 ± 1.76	3.00 ± 1.50	0.11 ± 1.90	-0.18	

¹Paired samples *t*-test

²Repeated measures analysis of variance

*p<0.05

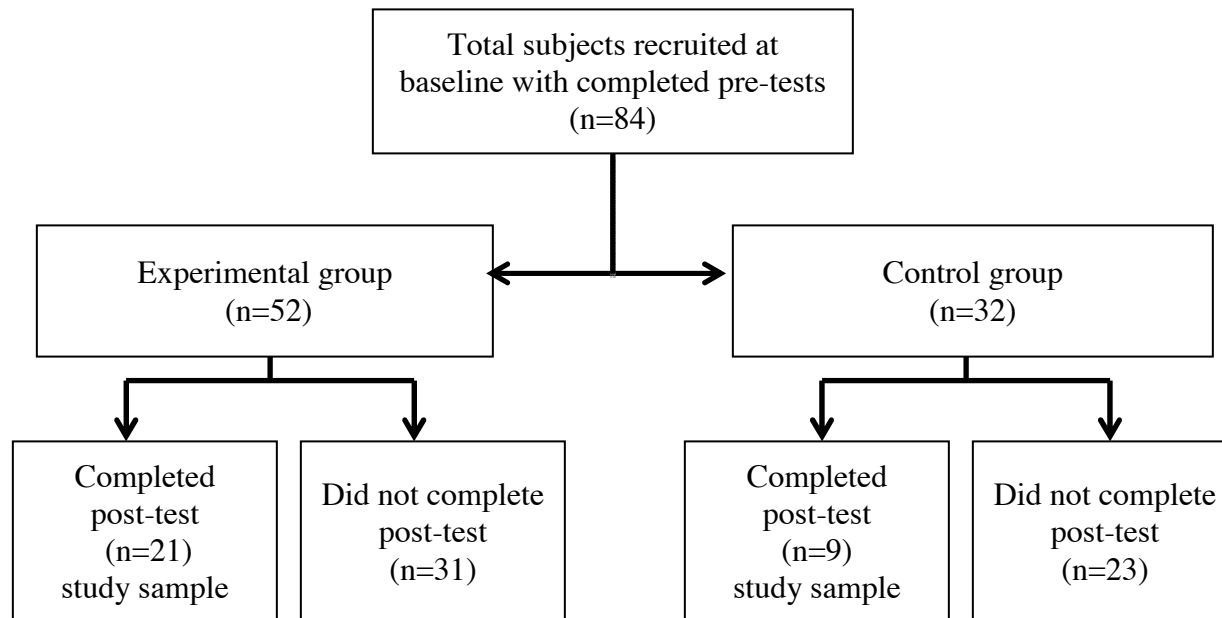
Table 5: Effect of Attendance on Dietary Intakes of Experimental Group at Post-Test Using Baseline Intakes as Covariant

	Fruit Consumption (pieces)	F-value¹	Vegetable Consumption (times)	F-value¹
	Mean ± SE		Mean ± SE	
Total Lessons Attended (n)				
1 (6)	1.79 ± 0.78		2.52 ± 0.65	
2 (5)	2.67 ± 0.85	0.49	1.74 ± 0.70	0.47
3 (4)	1.20 ± 0.95		2.09 ± 0.81	
4 (6)	2.19 ± 0.78		2.80 ± 0.64	

¹Analysis of covariance

*p<0.05

Figure 1. Subject Distribution from Baseline to Post-Test



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APPENDIX A: REVIEW OF LITERATURE

Introduction

Over the past 30 years, obesity alone has more than doubled in children, while adolescent obesity has tripled (1, 2). A diet low in fruits and vegetables is associated with an increased risk for coronary heart disease, hypertension, stroke, type 2 diabetes mellitus, and overweight/obesity (3). Children and adolescents from families of low socioeconomic status tend to consume the least amount of fruits and vegetables (4). Nutrition education interventions are designed to change these dietary deficits by increasing nutrition knowledge and impacting consumption, in hopes to improve the health of children (5). Various lesson formats may be considered when delivering nutrition messages that promote fruits and vegetables to children, including the use of mini lessons. Research has associated increased participant knowledge, improved attendance, and increased class participation in curricula that utilize mini lessons (6). There is limited evidence, however, on the impact of mini lessons in nutrition education with children outside of the classroom setting.

Childhood Obesity

More than one-third of all children and adolescents were overweight or obese in the United States in 2008. Over the past 30 years, obesity alone has more than doubled in children, while adolescent obesity has tripled (1, 2). In 1980, 6.5% of children 6-11 years of age were obese, but in 2010, the proportion increased to 18% (1, 7). Overweight and obese children and adolescents are at risk for developing cardiovascular disease, pre-diabetes, type 2 diabetes, cancer, osteoarthritis, sleep

apnea, and low self-esteem both as youth and during adulthood (8, 9, 10, 11, 12, 13, 14). Furthermore, youth who are obese during childhood are more likely to be obese as adults (15, 16, 17). The Office of the Surgeon General recommends physical activity and healthy eating to help lower the risk of being overweight or obese during childhood (9).

Obesity in Urban and Low-Income Populations

A higher prevalence of obesity and lower rates of physical activity are seen in communities with a high proportion of residents living in poverty (18, 19). Decreased physical activity in urban populations has been attributed to high crime statistics and aging city infrastructure (19). With child populations from urban areas at increased risk for obesity, this population in particular may benefit from nutrition education interventions.

Children's Fruit and Vegetable Consumption

Fruits and vegetables are nutrient-dense, low in calories, and a good source of vitamin C, beta-carotene, potassium, fiber, and folate (20). Between 80 and 90% of United States children 4-13 years of age do not consume the recommended amounts of fruits and vegetables each day (21). A diet low in fruits and vegetables is associated with an increased risk for coronary heart disease, hypertension, stroke, type 2 diabetes mellitus, and overweight/obesity (3). School-age children with low intakes of fruits and vegetables are at risk for consuming nutritionally inadequate diets lacking in potassium, fiber, vitamin E, calcium, and magnesium (22).

Factors of Inadequate Fruit and Vegetable Intake

Despite the concern that all children nationwide are not consuming adequate fruits and vegetables, evidence suggests that children and adolescents from families of low socioeconomic status tend to consume the least amount of servings of fruits and vegetables (4). In addition to low socioeconomic status, children with food insecurity have lower diet qualities compared to their peers who are food secure (23). Averaging intakes of United States children from 1999-2002, children with food insecurity consumed on average 72% of daily fruit recommendations, compared to fully food secure children who consumed 77% of fruit recommendations. Food insecure and food secure children consumed nearly identical proportions of daily vegetable recommendations, consuming 54% and 55% of recommendations, respectively. It is important to note, however, that French fry intakes were greater in food insecure children (average 0.20 cups daily) in comparison to food secure children (0.13 cups daily), accounting for a greater percentage of their vegetable intakes (24). Excluding French fry consumption, children living with food insecurity have lower vegetable intakes, especially nutrient-dense, dark green vegetables than food secure children (25). The decreased dietary quality may be associated with weight. Recent results from the National Health and Nutrition Examination Survey (NHANES) suggest that fewer food insecure children are at healthy weights than food secure children (23).

Nutrition Education Interventions

Nutrition interventions have been effective at improving children's diets. In a recent nutrition education review, authors concluded that the average increase in fruit

and vegetable intakes in children and adolescents was 0.39 servings per day after participating in a nutrition intervention, demonstrating the effectiveness of nutrition interventions at impacting dietary intakes. Over half of the studies evaluated, though, yielded no statistically significant differences in fruit and vegetable consumption, suggesting variations in efficacy (26). Goal setting, large sample sizes, and interventions based on behavioral theories were common characteristics of the programs that showed significant dietary changes (26, 27). Of the seven child and adolescent studies evaluated, four demonstrated an increase in fruit and vegetable intakes, but only three studies displayed significant findings (26). The three studies that demonstrated significance included 473 Boy Scouts (mean age 13 years) in a fruit and vegetable badge intervention, 507 African American adolescents from the Northeast (mean age 12.44 years) in a computer intervention, and 1800 high school students (mean age 15.97 years) from Massachusetts, Rhode Island, New York, and Tennessee in a tailored nutrition feedback study. The Boy Scout program (based out of Houston, Texas) was modeled after the Social Cognitive Theory, while the remaining two studies were based on the Transtheoretical Model. All three of the interventions were randomized controlled trials (RCT) (28, 29, 30).

School-Based Nutrition Education Interventions

In an attempt to improve children's nutrition, a number of school-based nutrition education programs have had an impact on children's fruit and vegetable intakes and knowledge. Various lesson formats may be considered when delivering nutrition messages to children. One study evaluated an intervention focusing on

repeated, unfamiliar vegetable exposure with 96 participants ages 3-6 years within two private preschools. In the modified crossover, RCT, the preschools in the intervention were participants of the United States Department of Agriculture's Child and Adult Care Food Program, in which the schools provided all meals and snacks to the children. As part of the intervention, preschool A introduced three new vegetables at lunch for 6 weeks. Only one of three vegetables was presented at each lunch period and the vegetable offerings followed a repeated presentation (e.g. Monday: cauliflower, Tuesday: snow peas, Wednesday: green peppers, Thursday: cauliflower, Friday: snow peas, Monday: green peppers). Each vegetable was reintroduced on this schedule until each vegetable was presented a total of 10 times during the intervention, while preschool B continued its typical lunch routine. At week 7, the preschools switched conditions. Grams of vegetables consumed by participants and their peers, tablemate seating arrangements, as well as the number of times a child tried a new vegetable were primary outcomes. The instruments assessing outcome, however, had not been validated. Although the study did not find an increase in vegetable intakes associated with repeated exposure, the research concluded that on average, 1 gram of peer intake was associated with 0.2 grams of participant intake (31). The study demonstrates the importance for research to include peers during nutrition interventions in order to help increase fruit and vegetable intakes in a preschool population. This concept of peer inclusion may be applied to other child nutrition interventions of various age groups to help influence intakes.

Besides including peers during an intervention, there is a correlation between time and children's maintenance of dietary behavior change. In a longitudinal,

randomized controlled nutrition intervention conducted in four urban elementary schools in the Northeast, 297 kindergarten and first grade students participated in an evaluation of fruit and vegetable consumption change between the 2005-2009 school years. Mean age \pm standard deviation (SD) of participants for the experimental and control groups was 6.2 ± 0.53 and 6.2 ± 0.60 years, respectively. Hispanic was the primary ethnicity of participants in both groups, with 41% of participants in the experimental and 51% of participants in the control group reported as Hispanic. In this 2.5-year intervention focusing on repetition, daily nutrition messages were announced on the school system loudspeakers, stickers were provided at lunchtime, family take-home activity booklets were provided, and instructional movies focusing on fruits and vegetables were played in the classrooms. Four measures evaluated the intervention at baseline, year 1, year 2, year 3, and at 1-year follow up. Data included plate waste, information from fruit and vegetable knowledge and preference questionnaires, as well as body mass index (BMI). At baseline, intakes between the experimental and control groups only differed for vegetables ($p < 0.05$). Taking into account baseline intakes, participants in the experimental group consumed 0.28 more servings of fruits and vegetables than the control group at the end of year 1 ($p < 0.001$). At the conclusion of year 2, the experimental group's intakes declined, but the group still significantly consumed 0.19 more servings of fruits and vegetables than the control. The experimental group's intakes continued to diminish steadily over time, and by the end of the intervention at year 3, there was no difference between fruit intakes of participants in the experimental and control groups; however, participants in the experimental group continued to significantly consume 0.04 more servings of

vegetables than the control group. By the 1-year follow-up, there were no differences concerning fruit and vegetable intakes between the experimental and control groups. Although intakes did not remain elevated for the experimental group over time, fruit and vegetable knowledge scores remained significantly greater than the control group's knowledge scores from year 1 to follow-up ($p < 0.05$) (32). As shown by the research, a continuous nutrition intervention in a school environment can be positively associated with elementary students' fruit and vegetable knowledge and intakes, although the effect on intakes may not withstand time. The authors note that the decaying behaviors may be due to children's lack of motivation to earn stickers at lunchtime throughout the course of the study. In order to see a significant change in consumption and knowledge, this study incorporated a large sample size, engaged participant families, and provided sufficient training and ongoing support to the schools (32).

In a multicomponent nutrition intervention, six schools from the Los Angeles Unified School District (LAUSD) were recruited for a fruit and vegetable nutrition intervention during the 2009-2010 school year. In the school district, 50% or more of the students qualified to receive free or reduced-price meals from the National School Meal program. Fruit and vegetable consumption and knowledge were assessed at the beginning and end of the quasi-experimental, pre-/post-test nutrition intervention, which involved third, fourth, and fifth grade students. The majority of participants were Hispanic. Students in the two intervention groups ($n=53$ intervention+, $n=185$ intervention-) were involved in at least 10 hours of nutrition education per quarter provided by classroom teachers, with the remaining participants in the comparison

schools (n=161). The classroom teachers followed the standardized Network-LAUSD program curriculum, but the teachers had the freedom to deliver the messages via their own lesson plans. Parents of the participants in one of the intervention groups (labeled intervention+) were also involved by attending parent nutrition education workshops, which helped to support the multicomponent focus of the research. The remaining study groups consisted of a second intervention group with no parent involvement (labeled intervention) and a control group. The study analyzed student consumption of fruits and vegetables based on dietary recalls of the day before. The research also evaluated knowledge of food groups, as well as a number of secondary outcomes at baseline and post-test by means of a validated questionnaire. Participant intakes were measured by the number of times fruits or vegetables were consumed, presented by mean \pm standard error (SE). From pre- to post-test, participants in the intervention+ group with parent involvement demonstrated a -0.04 ± 0.01 mean difference of times fruits were consumed. In the intervention group without parent involvement, participants also decreased mean times fruits were consumed (-0.12 ± 0.01). The comparison group decreased fruit intakes the greatest (-0.29 ± 0.01). Regarding vegetable consumption, the intervention+ group was the only group to demonstrate increased intakes (mean difference of 0.13 ± 0.02). The intervention and comparison groups both decreased mean vegetable intakes across the intervention (mean differences of -0.08 ± 0.01 and -0.20 ± 0.00 , respectively). No significant differences were seen between groups from pre- to post-test for fruit and vegetable consumption. Adjusting for differences between intervention and comparison groups at baseline, knowledge of food groups and the health benefits of fruits and vegetables increased in

both intervention groups and decreased in the control group ($p < 0.01$). The intervention+ and intervention groups demonstrated an increase in knowledge from pre- to post-test: 0.42 ± 0.00 and 0.05 ± 0.01 (mean \pm SE), respectively. Mean fruit and vegetable knowledge decreased for students in the comparison condition (-0.36 ± 0.00) (33). The research adds to the supported evidence that children are more likely to increase fruit and vegetable knowledge than modify intakes after a nutrition intervention. The authors questioned the lack of an evaluation of teacher training and the teachers' subjective delivery of the intervention as influential factors to the non-significant consumption changes. The research also suggested the small number of participants in the intervention+ group and the lack of parent involvement as possible contributors to the results (33). Future interventions may consider adopting nutrition interventions that span longer than one school year in order to allow more time for significant changes in dietary behaviors. For knowledge change, the authors stated that knowledge gains might have been a representation of program effectiveness (33). With such significant gains in knowledge for the intervention groups, it is evident that clear nutrition messages were being delivered during the intervention. Future nutrition curricula should focus on clear, concise messages to promote increased nutrition knowledge (29).

In order to have an impact on fruit and vegetable intakes, it is important to understand what motivates children to eat fruits and vegetables in order to tailor nutrition messages appropriately. In a cross-sectional study in the Midwest of the United States, 218 third and fourth grade students 9-11 years of age from four elementary schools participated in a study that assessed the factors that influence

children to eat fruits and vegetables (20). Using a validated questionnaire, participants ranked 7 factors from “most important” to “least important” as the reasons to why they consume fruits and vegetables (34). Taste preferences were noted as the most important factor for children to consume fruits and vegetables, followed by nutritional content, appearance, and good smell (20). In comparison, research has demonstrated that adults tend to rank taste as the most influential factor to consume fruits and vegetables as well, but unlike children, the next most important factor is cost (35, 36). In addition, factors such as nutrition, convenience, and weight control are all factors that influence adults to eat specific foods, as long as they taste good (36). From the study out of the Midwest, it is evident that third and fourth grade children are aware of taste and nutritional importance as influential reasons to consume fruits and vegetables, indicating a need to include these topics in future nutrition interventions (20). Research concludes that child nutrition education must be tailored to accurately meet children’s preferences and fit their priorities for the best chances of knowledge and behavior change (37, 38).

Not only are children capable of increasing and retaining fruit and vegetable knowledge after a yearlong nutrition intervention, but also after a short-term nutrition education series. In one study implemented in a Supplemental Nutrition Assistance Program Education (SNAP-Ed) setting, a four-lesson, vegetable-focused nutrition intervention was delivered over the course of 4 weeks. The intervention incorporated a large sample size (n=1047 experimental, n=890 control) from 108 fourth grade classrooms throughout Pennsylvania. The classrooms were chosen from schools where at least 50% of students received free or reduced-price meals. The four lessons

included topics such as surprising vegetables, vegetable recommendations and cup equivalents, vegetable subgroups, and vegetable variety. Identical pre- and post-tests were administered at weeks 1 and 4 (39). A validated instrument assessed participants' knowledge of recommended vegetable intakes (40). Knowledge scores were demonstrated by mean \pm SD. From pre- to post-test, students from the intervention group increased their mean knowledge score by 1.42 ± 1.42 , which differed from the control group's mean knowledge score difference of 0.17 ± 1.21 ($p < 0.001$). In order to demonstrate increased knowledge from a nutrition intervention, the study included a 5-item knowledge-based survey, comprised of 4 true/false questions and 1 multiple-choice item. The multiple-choice item concerned knowledge of recommended vegetable intakes. This survey item contributed the greatest to total knowledge score change. Secondly, authors implemented the program under typical SNAP-Ed conditions. These characteristics included student absences, school calendar adjustments, and staffing changes, which makes generalizing the components of this intervention to other SNAP-Ed settings feasible (39). The study affirms the ability of a four-lesson, classroom intervention to increase vegetable knowledge of fourth grade students.

Nutrition interventions must take into account the age groups of children to offer the most personalized education. In one study, 930 students in kindergarten through fifth grade from two elementary schools in Arkansas participated in a multicomponent nutrition intervention during the 1995-1996 school year. One elementary school was designated as the experimental group, and the other as the control. African American was the primary ethnicity of students in both groups (76%

intervention, 96% control) and the majority of students from the intervention and control groups received free or reduced-price school lunches (85% experimental and 95% control). The nutrition intervention lasted for one year and included a structured nutrition curriculum, grocery store tours for children, a newly designed lunch menu, nutrition messages in the cafeteria, and parent attendance at lunch. The structured nutrition curriculum was delivered once each week in the classroom setting. Process evaluations were conducted to evaluate the success of the development and implementation of the curriculum. Among the many outcomes assessed, child nutrition knowledge and behavioral intent concerning dietary intakes were evaluated (41). The same validated instrument was provided to all participants in grades 2-5 to assess outcome measures (42, 43). Kindergarten and first grade students did not participate in the evaluation since it was believed that these children would not understand the pre- and post-test items. The fourth and fifth graders in the experimental group improved their knowledge, behavioral intent, and dietary intakes from pre- to post-test ($p < 0.01$) and compared to the control group at post-test ($p < 0.001$). Second and third graders in the experimental group also demonstrated within- and between-group knowledge change ($p < 0.01$). Second and third grade students, however, did not demonstrate significant differences for behavioral intent or dietary intakes. In order to evaluate knowledge, behavioral intent, and consumption, study authors included a multifactorial nutrition education program. The nutrition intervention worked with foodservice personnel to successfully change the school lunch menu in order to provide an environment that enabled participants to make healthy behavior changes. The inclusion of parents helped to create a stronger

nutrition intervention as well. Since the study reached parents through the Supplemental Nutrition Program for Women, Infants, and Children, the Food Stamp program, and the Expanded Food and Nutrition Education Program, the intervention was more successful at implementing parent nutrition messages and information, although low parent participation remained a barrier to the study. To explain the lack of behavior change and behavioral intent in the younger grades, the research questioned if the instrumentation was too difficult for the younger grades to understand, although the tests were validated in children of the same age (41). The research suggests that evaluations be tailored to children's specific age groups in order to see significant improvements in dietary intakes and behavioral intent, unlike a one-size-fits-all instrumentation approach.

Mini Lesson Education Format

A promising new format in education is the inclusion of mini lessons. Mini lessons are short teaching segments. This teaching format lasts about 5-10 minutes and typically includes small groups of students. All subjects can incorporate mini lessons, and many teachers find that breaking units of study into mini lessons makes relating subject material to real life situations easier. The short timespan of mini lessons also tends to maintain students' interests in the curriculum (44).

One pilot study focusing on mini lesson instruction in a high school population followed 17 students in a New York State Regents living environment course. In the single-group intervention design, mini lessons were defined as working in pairs or small groups with a teacher present to share ideas and study science lessons. With the

integration of mini lesson instruction, the students increased their knowledge of biology on the post-test, improved attendance, and increased class participation (6). The study suggests the usefulness of mini lessons in high school education; however, the intervention did not evaluate if mini lessons can be effective with children of elementary age.

Additionally, nutrition education interventions have utilized mini lessons. A cross-sectional, quasi-experimental study included mini lessons in a multicomponent nutrition education series. The research involved 851 students in grades 3-5 (456 experimental, 395 control) from six public schools in Denver, Colorado during the 1996-1997 school year. Hispanic was the primary ethnicity, with 69% and 65% of participants identified as Hispanic in the treatment and comparison groups, respectively. Of the six schools selected, over 80% of children received free or reduced-price school lunches. The nutrition intervention included 24 weeks of classroom nutrition education, which was provided once each week for 45- to 60-minutes. In addition to the classroom curriculum, trained parent volunteers taught six lunchroom mini lessons to the students. In hopes that the mini lessons would help transfer classroom information into lunchroom behavior, the mini lessons encouraged the consumption of whole wheat, fruits, and vegetables. Some of the outcome measures included nutrition knowledge and self-efficacy through means of completed pre- and post-tests (n=295 experimental, n=248 control) and visually estimated plate waste from the school lunchroom (n=226 experimental, n=218 control). The number of participants in the research results varied because of missing data due to absenteeism and loss of contact with participants. With pre-test scores as a covariate,

at post-test, 90% of third and fourth grade students in the treatment group knew the 5-A-Day recommendation for fruits and vegetables, compared to 60% of the comparison students ($p < 0.001$). According to plate waste data, third-fifth grade participants from the experimental group increased fruit and vegetable intakes by 0.26 ± 0.07 servings (mean \pm SE) from pre- to post-test, while the comparison group decreased fruit and vegetable intakes by -0.14 ± 0.08 servings ($p < 0.001$). The authors contributed the pre-piloted protocol and continued process evaluations to the success of the program. The large sample size and multicomponent curriculum helped to achieve significant findings in the research, while plate waste evaluations verified by inter-observer assessments provided reliable consumption data (45). Further research is needed to explore mini lessons and their direct impact on children's dietary intakes.

Child Nutrition Intervention Assessment

Dietary recalls are an instrument used to assess consumption change in nutrition interventions. According to recent validation studies, children's accuracy at completing dietary recalls is minimal (46, 47, 48). In a study comparing survey results between adolescents and adults concerning health care items, adolescents were more likely to misreport than adults. Specifically, children were more prone to over-report, while adults were more likely to underreport survey responses (49). Previous research has identified social influence on children as a primary factor of over-reporting dietary intakes. Children may report in a socially desirable way by over-reporting foods such as fruits and vegetables to impress peers and adults in order to feel accepted (50).

One study evaluated the accuracy of children's dietary reports using recall methodology. To investigate the accuracy of dietary recalls of fourth graders, 69 participants from 10 elementary schools participated in recalls interviewed either in person or by telephone during the 2001-2002 school year. Of the 799 fourth grade students invited to participate in the study, an average of 59% were eligible for free or reduced-price school meals. Participants completed the recalls the same day as the dietary intakes. Trained research registered dietitians observed the school breakfast and lunch meals and conducted the recall interviews. Only children who ate breakfast and lunch provided by the school were observed. Interviews were conducted after dinner either in-person in the child's home or by telephone. Inter-observer reliability and quality control for interviews were conducted to assess accuracy and ensure the interviews were according to study protocol. Interviews followed a multi-pass format and asked participants to recall intakes from all meals and snacks of the entire day. Only breakfast and lunch recalls were used to evaluate accuracy, since study personnel only observed these intakes. Items reported and/or seen eaten were classified as a match (observed and reported consumed), omission (observed but not reported by the child), or intrusion (reported by the child as eaten but not observed). For in-person and telephone recalls, mean omission rates, intrusion rates, and total inaccuracy were 34%, 19%, 4.6 servings and 32%, 16%, 4.3 servings, respectively. Regardless of recall approach, participants overall were likely to omit more than one-third of intakes from dietary recalls, and on average, 17% of items reported from the interviews were not observed eaten during the meals (51). For children relying on memory, this leaves a great margin of error. Since accuracy of children's dietary recalls decreases

extensively as time passes from the meal, this particular study was effective at minimizing inaccuracy by conducting same-day interviews (51, 52). The study suggests the importance of utilizing observations in research to help validate children's dietary recalls. Future research should also complete dietary recalls shortly after meals and/or snacks for increased recall accuracy in children.

A retrospective analysis further investigated the accuracy of children's dietary recalls, observing the differences in precision between reporting single meals and 24-hour intakes. Recalls from a total of 252 children from two previous studies were analyzed (n=148 single meal recalls, n=104 24-hour recalls). Only the school lunch portions of the 24-hour recalls were analyzed for purposes of the retrospective study. Participants from both studies were observed eating lunch by trained study personnel and all dietary recalls were obtained the morning after school lunch was observed. All interviews were conducted in-person by trained data collectors who followed a written protocol. Matches, omissions, and intrusions were calculated. Participants who completed school lunch recalls alone omitted on average 37% of meal items consumed, with an average 15% intrusion rate. In comparison, participants omitted about 55% of school lunch items when completing 24-hour dietary recalls, with an average intrusion rate of 34%. The study confirms that fourth grade children have increased recall inaccuracy in the context of a 24-hour recall. Children may be more likely to recall accurately if they only report a specific meal or snack (52). Again, the study suggests future research include observations during mealtimes for increased validity.

One study compared the accuracy of a brief food frequency questionnaire

(FFQ) to completed 3-day food records with middle school participants. One hundred thirty-eight (138) students from San Diego, California participated in the study, which evaluated the reliability and validity of a fruit and vegetable screener for adolescents. Mean age \pm SD was 12.1 ± 0.9 years, with 28% and 23% of participants identified as White and Asian/Pacific Islander ethnicities, respectively. Students were requested to complete 3-day food records, as well as a piloted 2-item, self-administered fruit and vegetable FFQ. The mean difference \pm SD between the two measures was 2.3 ± 2.2 servings of fruits and vegetables, with the 2-item FFQ leading to a general over-reporting of intakes (53). Although previous research has identified lengthy FFQs to lead to over-reporting of intakes, the study demonstrates the possibility of brief FFQs to also lead to over-reported dietary intakes (53, 54). The food record is considered the standard for dietary recalls, to which other assessment approaches are compared. Although food records tend to decrease the rate of omissions, food records continue to rely on the accuracy and quality of the respondent's reports (53).

Supplemental Nutrition Assistance Program Education

In 1981, the Food Stamp Program incorporated nutrition education (now formally known as SNAP-Ed) as an optional component to the benefits program (55). By 1992, seven states implemented SNAP-Ed programming, and by 2004, SNAP-Ed was being conducted in all 50 states (56). SNAP-Ed is operated under the Food and Nutrition Services of the United States Department of Agriculture (57). SNAP-Ed's target population includes all persons at or below 185% of the Federal Poverty Guidelines, regardless of enrollment in Supplemental Nutrition Assistance Program

(SNAP) benefits (56). SNAP-Ed nutrition programming may also target additional audiences, such as schools, summer lunch programs, and community centers if more than 50% of the participants come from or have household incomes at or below 185% of the Federal Poverty Guidelines (56, 58). The goal of SNAP-Ed is to provide nutrition education that will improve the likelihood of target audiences to make healthy food choices within a limited budget, while also choosing a physically active lifestyle that is consistent with the current Dietary Guidelines for Americans and the United States Department of Agriculture MyPlate food guidelines (56).

During the 2010 fiscal year, SNAP-Ed reached 4.5 million participants nationwide directly through nutrition education. Additionally, 54.6 million contacts were made throughout the United States through SNAP recipients and nutrition programming and 35.8 million indirect contacts were made through means such as community fairs and public service announcements (58). During the 2012 fiscal year, Rhode Island SNAP-Ed at the University of Rhode Island delivered 697 nutrition education programs, reaching 13,212 direct and indirect contacts alone (59).

Taking into account previous research on lesson format and program evaluation, SNAP-Ed has tailored much of its curriculum to meet the needs of its diverse populations (59). A 2004 report from the United States General Accounting Office stressed the need for further evaluation of nutrition programs to determine if behavior change in targeted populations is due to nutrition education or by external factors (60). For the best opportunity of nutrition knowledge gains and dietary intake change, SNAP-Ed has a variety of educational methods for its interventions. In order

to evaluate the effectiveness of nutrition education, instrumentation must be valid, reliable, audience-specific, and appropriate to the nutrition education objectives (61).

Rhode Island Supplemental Nutrition Assistance Program Education

Since low-income populations at risk for inadequate nutrition are of particular concern for SNAP-Ed, children from Providence, Rhode Island are likely to benefit from a nutrition education program (62). In 2010, 57% of Providence children were receiving SNAP aid, which was greater than twice the percentage of children receiving these benefits in the entire state at the time (28%) (63, 64). Between 2010-2011, Hispanics were the largest demographic living below the poverty level in Rhode Island and in 2010, 56% of Providence children were Hispanic (65, 66).

Rhode Island SNAP-Ed partners with the Boys & Girls Clubs of Providence, Rhode Island. The Boys & Girls Clubs of Providence is a subsidiary of the Boys & Girls Clubs of America. The Boys & Girls Clubs of America are afterschool educational sites whose participants are primarily children of low-income families facing food insecurity. The community-based centers provide a safe and affordable environment to children, adolescents, and teenagers during non-school hours. In an attempt to support an educational and fun environment under adult supervision, nearly 4,000 clubs serve 3.9 million youth each year nationwide (67).

The Boys & Girls Clubs of Providence, Rhode Island, which is comprised of five clubs throughout the city, serve a total of 7,180 children and youth annually, with 71% of participants from economically disadvantaged households. On an average school night, more than 450 children receive warm, nutritious dinners at the

Providence Boys & Girls Clubs, which is funded by the United States Department of Education (68). Given the concern that most children do not consume adequate fruits and vegetables and such diets are associated with increased health risks, nutrition education models to improve children's fruit and vegetable intakes may be ideal for settings such as the Boys & Girls Clubs of Providence.

Conclusion

In conclusion, this body of evidence suggests that inadequate fruit and vegetable intake, poor diet quality, low socioeconomic status, food insecurity, and urban environments can all play a role at increasing a child's risk of obesity. Nutrition education interventions are effective at changing children's nutrition knowledge and dietary intakes. However, not all venues where kids convene are ideal for standard, 60-minute nutrition education interventions. A promising new format in education is the inclusion of mini lessons. Regardless of lesson format, age-appropriate, validated instruments help to adequately evaluate the success of nutrition education interventions. By evaluating a nutrition education series consisting of mini lessons, similar lesson formats may be useful in future child nutrition education programming.

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APPENDIX B: LESSON PLANS

Lesson Plan 1

10-minute mini-lessons

Chad Brown Monday, April 9th 4:30-5:30pm

Manton Heights Wednesday, April 11th 4:30-5:30pm

Objective:

Children will begin to understand the importance of filling their plates half with fruits and vegetables in order to consume 2 fruits and 2 vegetables each day.

Lesson Plan:

Introduction

Hi everyone, my name is _____, and we are from the University of Rhode Island's SNAP-Ed program. Is anyone new this week that didn't fill out a survey last week? We'll get you started.

-(provide demographic sheet, pre-survey, and fill out the child's passport)

-(get names of the children in the group & take out their passports, have passport stickers ready)

Lesson

1. We are going to keep coming back every week for you to join us and learn all about fruits and vegetables. Each of you have a passport with your name on it, and each week, you can put a sticker every time you come and join us to fill up your passport.
2. So, let's start! What are some of your favorite fruits and vegetables?
3. Now that we've started thinking about different fruits and vegetables, this week we're going to learn about just how many fruits and vegetables we need each day to keep us healthy and growing strong!
4. To make sure that we are eating enough fruits and vegetables every day, we want to make sure that we have at least **2 fruits** and **2 vegetables** every day to keep us healthy! This will give us energy to have fun, play games and sports, do well in school, and to keep growing!
5. An easy way to make sure that we are eating at least 2 fruits and 2 vegetables every day is to fill **half of our plate at lunch and dinner with fruits and vegetables**. Having a fruit at breakfast helps you too! So, I have this board here and what is it a picture of? (kids: a plate!) On our board, we already have half of our dinner chosen for us. We have some pasta with chicken on half of our plate, and a glass of low-fat or fat-free milk over here. Now, half of our plate is empty, right? Like we said before, we want to fill half of our plate with fruits and vegetables. *(fruit and vegetable pictures are placed on the table already)* Which vegetable should we put on our plate? *(place chosen*

Lesson Plan 1 (cont.)

vegetable on the board) We're almost done filling half of our plate with fruits and vegetables. Let's choose a fruit to have with our meal.

6. Now, it's okay if we put our apple on the side of the plate, or if we eat a salad on a different plate on the side. It doesn't need to be directly on our plate, but we just want to make sure that we are having a fruit and a vegetable at our meal to help us get to: '**how many fruits and vegetables each day?**' (*kids say: 2 & 2!*)
7. Now, it's your turn! I'm going to give each of you a plate, and you are going to fill half of your own plate with fruits and vegetables (pass out plates, crayons, and scatter food models)
8. Let's make a lunch plate! Quickly draw in your favorite sandwich on the half of your plate without Velcro. Now, I have these food models here, and you are going to choose a fruit and a vegetable that you would eat with your sandwich to complete your meal and we'll share our plates with each other.
9. You all did a great job with your plates and filling them half with fruits and vegetables! Remember, we need at least **2 fruits and 2 vegetables every day** to stay healthy and growing strong.

Handout:

MyPlate handout

Materials:

- Green MyPlate board
- Paper Velcro plates
- Paper Velcro food models
- Crayons
- MyPlate handouts
- Demographic sheets
- Lesson plan
- Passports
- Passport stickers
- Pens
- Golf pencils

My Fruit & Vegetable Passport

Name _____ Age _____

 <p>Choose MyPlate.gov</p>	
	
	
	

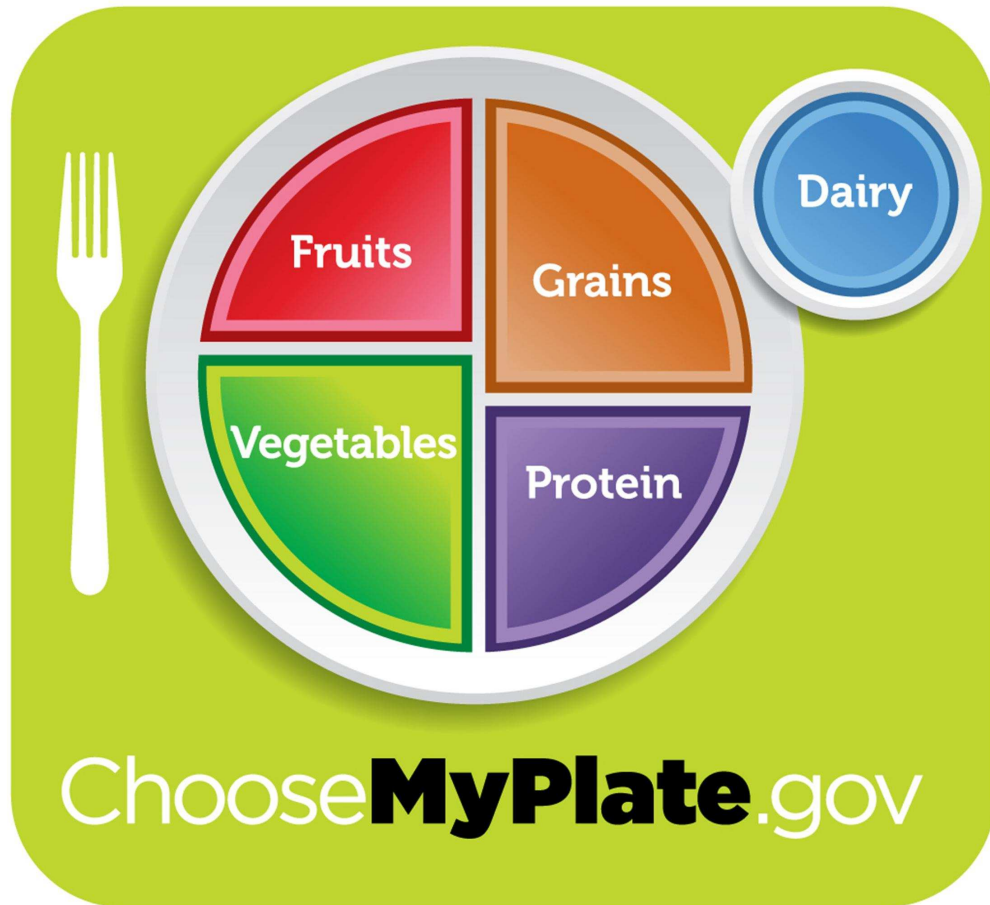
Make MyPlate Your Plate

MyPlate reminds you to include foods from all 5 food groups at dinner.

Add color to your plate! Make half of your plate vegetables and fruit.

Fat-free or low fat milk with dinner will help make your bones and teeth strong.

Remember to be physically active 60 minutes every day!



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This material was funded by USDA's Supplemental Nutrition Assistance Program (SNAP). SNAP provides nutrition assistance to people with low income. It can help you buy nutritious foods for a better diet. To find out more, contact your local DHS office, or call the URI SNAP-Ed Family Nutrition Program at 1-877-Food-URI (1-877-366-3874). In accordance with Federal law and U.S. Department of Agriculture's policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, religion, political beliefs or disability. To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800)795-3272 (voice) or (202)720-6382 (TTY). USDA is an equal opportunity provider and employer.

Lesson Plan 2

10-minute mini-lessons

Chad Brown Monday, April 23th 4:30-5:30pm

Manton Heights Wednesday, April 25th 4:30-5:30pm

Objective:

Children will begin to understand the importance of eating a variety of fruits and vegetables, including those of different colors, shapes, and sizes.

Lesson Plan:

Introduction

Hi everyone, my name is _____, and we are back from the University of Rhode Island's SNAP-Ed program. Is anyone new this week? We'll get you started.

-(provide demographic sheet and fill out the child's passport)

-(get names of the children in the group & take out their passports, have passport stickers ready)

Lesson

1. Last week we learned how many fruits and vegetables we should be eating each day. **Does anyone remember how many fruits we should have minimum every day? (2) And how many vegetables? (2) Does anyone remember the tip we talked about to help us eat those 2 fruits and 2 vegetables every day? (The plate: filling half your plate with fruits and vegetables!)** Has anyone tried to fill half their plate with fruits and vegetables since last week?
2. First we're going to talk about **red** fruits and vegetables. Let's put our hand on our hearts. Red fruits and vegetables help **keep our heart strong and healthy**. What are some red fruits and vegetables? Who has a picture of a red fruit or vegetable? *(Place red fruits and vegetables in the center of the table.)*
3. Now let's talk about **yellow and orange** fruits and vegetables. These colored fruits and vegetables do many things for our body! They keep our **skin glowing, our eyes healthy, and they help to keep us from getting a cold**. Point to your eyes and show us how healthy they are. Can you name some yellow and orange fruits and vegetables? Who has a picture of a yellow or orange fruit or vegetable? *(Place orange and yellow fruits and vegetables in the center of the table.)*
4. Let's talk about **green** fruits and vegetables now. Rub your tummy because green fruits and vegetables **help us go to the bathroom**. What are some green fruits and vegetables? Who has a picture of a green fruit or vegetable? *(Place green fruits and vegetables in the center of the table.)*
5. Next, let's talk about **blue and purple** fruits and vegetables. Can we name some blue and purple fruits and vegetables? These fruits and vegetables **help us learn in school and remember things** better. Touch your head; this is your thinking cap. Who has a picture of a blue or purple fruit or vegetable? *(Place purple and blue fruits and vegetables in the center of the table.)*

Lesson Plan 2 (cont.)

6. Finally, let's talk about **white** fruits and vegetables. Many white fruits and vegetables are not white on the outside, but are white on the inside. White fruits and vegetables help to keep our **body strong and safe against germs**. Can you flex your arm and show me how strong you are? Can we think of white fruits and vegetables together? Lastly, we have the picture of the white fruit or vegetable. (*Place white fruits and vegetables in the center of the table.*)
7. Let's look at all of these fruits and vegetables a little more! What do you notice about the colors? (*they're all different*) What do you notice about the sizes? (*they're different*) How about the shapes? (*they're different*) Different fruits and vegetables help our body in different ways. It's important that we eat different fruits and vegetables with different colors, shapes, and sizes to keep our bodies healthy and growing strong!
8. **At least how many fruits and vegetables should we be having every day?** (*kids say: 2&2!*)

Handout:

Fruit & Vegetable Fortune Teller

Materials:

- F&V picture cards
- Demographic sheets
- Fruit & Vegetable Fortune Teller
- Lesson plan
- Passports
- Passport stickers
- Pens
- Golf pencils

Fruit & Vegetable Review

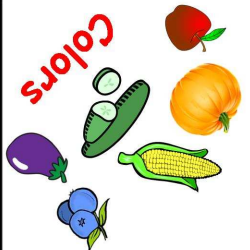


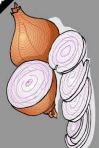
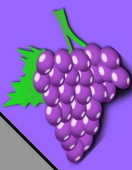







Fortune Teller

To Assemble:

1. Cut around the outside edges to make a square piece of paper.
2. With the print facing up, fold the triangle corners to the back.
3. With the print facing up, take the new corners and fold them into the center.
4. Fold in half in both directions. In the folded position, stick your index fingers and thumbs in the pockets.

To Play:

1. *Player One* holds the fortune teller with their index fingers and thumbs in the pockets. He/she asks *Player Two* one of the four questions on the top.
2. *Player One* spells out *Player Two's* answer, while moving the fortune teller left-to-right and front-to-back.
3. *Player One* chooses one of the questions and asks *Player Two* to answer.
4. After *Player Two* responds the fortune teller is passed to *Player Two* and he/she lifts up the tab and assigns another player to answer the question hidden below.

 <p>Colors</p>	<p>Name your favorite fruit.</p> <p>Blue and purple fruits and vegetables help us to learn in school and remember better.</p>	<p>Name a new fruit that you want to try.</p> 	<p>Variety</p> 
<p>Name a fruit that you ate today.</p> 	<p>White fruits and vegetables keep us strong and safe from germs.</p> 	<p>Green fruits and vegetables are important and help us go to the bathroom.</p> 	<p>Name a fruit that you thought you did not like before, but you eat now.</p> <p>Fill half your plate with fruits and vegetables!</p>
<p>Name a new vegetable that you want to try.</p> <p>Eat 2 fruits and 2 vegetables every day to stay healthy to play!</p> 	<p>Red fruits and vegetables help to keep our heart beating strong.</p> 	<p>Fruits and vegetables can grow below and above the ground, on trees, and on bushes.</p> 	<p>Name your favorite vegetable.</p>
 <p>Choose MyPlate.gov</p>	<p>Name a vegetable that you ate today.</p> 	<p>Orange and yellow fruits and vegetables help keep our eyes and skin healthy, and keep us from getting sick.</p> <p>Orange and yellow fruits and vegetables help keep our eyes and skin healthy, and keep us from getting sick.</p> <p>eat now, but you eat before, that you did not eat before, Name a vegetable</p>	<p>Every Day</p> 

Lesson Plan 3

10-minute mini-lessons

Chad Brown Monday, April 30th 4:30-5:30pm

Manton Heights Wednesday, May 2nd 4:30-5:30pm

Objective:

Children will become familiar with the different skins, shapes, sizes, and seeds of varying fruits and vegetables.

Lesson Plan:

Introduction

Hi everyone, my name is _____, and we are back from the University of Rhode Island's SNAP-Ed program. Is anyone new this week? We'll get you started.

-(provide demographic sheet and fill out the child's passport)

-(get names of the children in the group & take out their passports, have passport stickers ready)

Lesson

1. Last week we talked about the many colors of fruits and vegetables and how different colored fruits and vegetables keep different parts of our body healthy.
2. Before that we learned how many fruits and vegetables we should be eating each day. Does anyone remember at least **how many fruits we should have every day?** (2) At least **how many vegetables?** (2) Does anyone remember the tip we talked about to help us eat those 2 fruits and 2 vegetables every day? *(The plate: filling half your plate with fruits and vegetables!)* Has anyone tried to have 2 fruits and 2 vegetables every day?
3. This week we are going to learn about different fruit and vegetable skins and seeds. We're also going to play a fun guessing game.
4. So, let's start with skins. Some fruits and vegetables have **skins we can eat**, right? Like this apple or cucumber, we can eat the skin. *(show pictures of apple/cucumber)* What other fruits and vegetables have a skin that we can eat? (potatoes, grapes, pears) Some fruits and vegetables have **skins that we cannot eat** though. Like this watermelon, can we eat the skin of this fruit? *(no)* We can eat the insides of these fruits and vegetables, but not the outsides. What are some other examples of fruits and vegetables that we have to peel or cut off the skin before we can eat them? *(bananas, oranges, mangoes, squash)*
5. The other thing about skins is how different they are. **Some skins are thick** like an orange's peel. *(show orange picture)* **Other skins are soft** like grapes and berries. *(show grapes picture)* **Some skins are fuzzy** like a peach's skin *(show picture of a peach)*, and some **skins are thin and peel easily** like a corn husk. *(show corn picture)*

Lesson Plan 3 (cont.)

6. Let's talk about seeds now. Some fruits and vegetables **have seeds that we can eat**, like this strawberry. (*show picture of strawberry*) Many fruits and vegetables have **seeds that we cannot eat** though, like this red pepper. (*show picture of bell pepper*) We can't eat the seeds inside of the pepper, so we take them out. Some fruits and vegetables **only have 1 seed** inside like this plum, while **others have many seeds** like papayas (*show picture of plum & papaya*).
7. Now we're going to see how well you know your fruits and vegetables.
8. We're going to play this fruit and vegetable game. I have 3 bags each with a fruit or vegetable inside. One at a time, we are going to put our hand in each bag and feel the fruit or vegetable inside. After everyone gets a turn reaching into the bags, we're going to try and guess the fruit or vegetable and then we can see just how well we know our fruits and vegetables. (*show a picture that shows the inside of the fruit when revealing each answer*)

*You can choose to do more or less brown bags depending on the amount of time you have (at maximum, you have 5 bags with foods to choose from for the different groups)

→ Quick talking points when revealing answers:

- Who has eaten this fruit or vegetable before?
 - Look at the different skins. Do we eat the skin?
 - If it has a seed(s), do we eat the seed(s)?
9. Now that we talked about so many fruits and vegetables with different shapes, sizes, and colors and we know they do different things for our bodies, we want to remember to eat all different types of fruits and vegetables to stay healthy. At least **how many fruits and vegetable should we have every day?** (2&2!)

Handout:

Double-sided: fruit and vegetable coloring activity & word search

Materials:

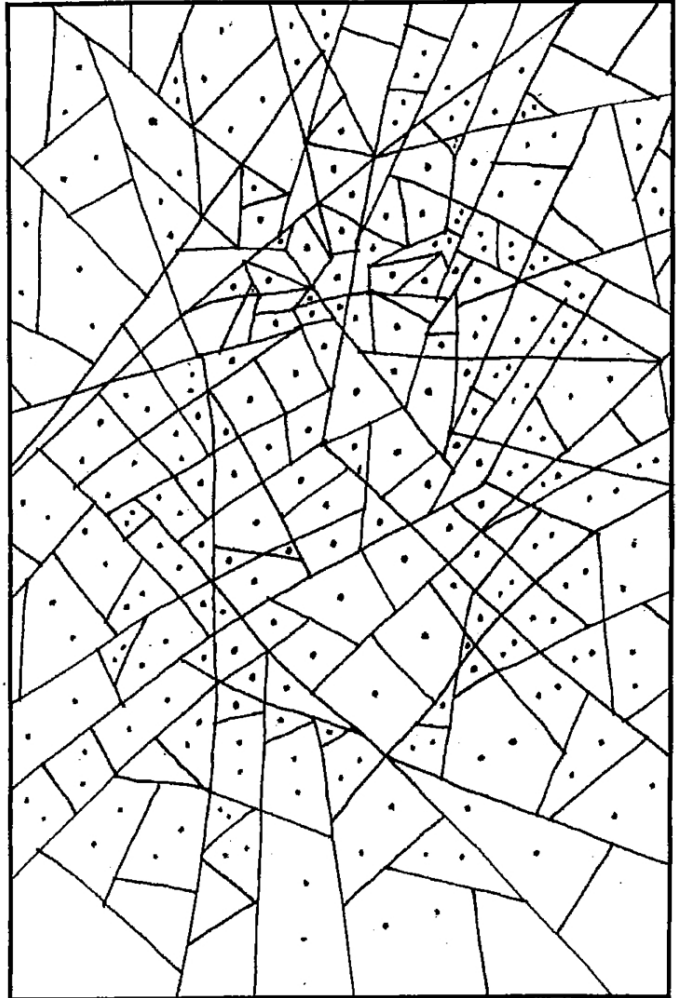
- Guessing game fruits & veggies in brown bags (red onion, celery, cantaloupe, avocado, kiwi)
- F&V picture cards
- Double-sided: fruit and vegetable coloring activity & word search
- Lesson plan
- Passports
- Passport stickers
- Pens
- Golf pencils
- Demographic sheets



Name: _____

LOTS O' DOTS!

Fill in all the
shapes with
only one dot
in them to
discover what
popular fruit
grows in
Hawaii.



This material was funded by USDA's Supplemental Nutrition Assistance Program (SNAP). SNAP provides nutrition assistance to people with low income. It can help you buy nutritious foods for a better diet. To find out more, contact your local DHS office, or call the URI SNAP-Ed Family Nutrition Program at 1-877-Food-URI (1-877-366-3874). In accordance with Federal law and U.S. Department of Agriculture's policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, religion, political beliefs or disability. To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TTY). USDA is an equal opportunity provider and employer.

Name _____ Date _____

Power Search

Find each word on the list and circle it. Words can be spelled across, down, or diagonally.

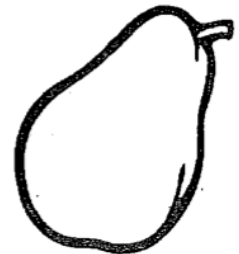


D T X C A R R O T S Q F N F B R
T B T Q N T L H E M V Z D N R X
N O R Y R N M C X G W B M R U G
K S M O R R U K P B R L L H S T
I X T A C T W A V O C A D O S C
W K B R T C F L G Z G W P L E E
I R P E A O O T R M P B S E L L
F L L Z H W V L C K E U W Y S E
R F M T X H B M I K G T T Q S R
U W G P E A R E O A Z H T N P Y
I F Q G V M K H R L H P X K R E
T F N K D R C A Q R R Q X X O S
M G L T N I P Y N G I L G J U X
B X M R T S Z F I T J E P K T L
P T B R A K M F Q P K Q S K S V
T B A Z N C A N T A L O U P E F

artichoke
broccoli
carrots
grapes
pear

asparagus
Brussels sprouts
celery
kiwifruit
strawberries

avocado
cantaloupe
fig
lettuce
tomato



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OF RHODE ISLAND



Lesson Plan 4

10-minute mini-lessons

Chad Brown Monday, May 7th 4:30-5:30pm

Manton Heights Wednesday, May 9th 4:30-5:30pm

Objective:

Children will become familiar with the how different fruits and vegetables grow.

Lesson Plan:

Introduction

Hi everyone, my name is _____, and we are back from the University of Rhode Island's SNAP-Ed program. Is anyone new this week? We'll get you started.

-(provide demographic sheet and fill out the child's passport)

-(get names of the children in the group & take out their passports, have passport stickers ready)

Lesson

1. Does anyone remember what we talked about last week? We talked about the different skins and seeds of many fruits and vegetables!
2. A few weeks ago we learned how many fruits and vegetables we should be eating each day. Does anyone remember **how many fruits** we should have every day? (2) And **how many vegetables**? (2) Does anyone remember the tip we talked about to help us eat those 2 fruits and 2 vegetables every day? (*The plate: filling half your plate with fruits and vegetables!*) Has anyone tried to fill half their plate with fruits and vegetables?
3. This week we are going to learn about **where our fruits and vegetables come from and how they grow**. I'm going to pass out these cards of fruits and vegetables growing and I'm going to have you help me explain how they grow. (*Pass out picture cards*)
4. Has anyone grown their own fruits or vegetables in a garden or maybe in a pot at home?
5. So, let's start with an apple. Does anyone know how apples grow? (*on trees*) Who has a picture of fruit growing on a tree? Can you show everyone your pictures? (*show pictures of apples & bananas growing on trees*) Has anyone gone apple picking before? What other **fruits grow on trees**? (*oranges, grapefruit, mangos, avocados, coconuts*)
6. Now, some **fruits and vegetables grow on plants and bushes** that are smaller than trees. Does anyone have a picture of a fruit or vegetable growing on a plant or bush? (*show picture of blueberry bush and pepper plant*) Can we think of other fruits and vegetables that grow on plants or bushes? (*tomatoes, strawberries, pineapples, green beans, peas*)

Lesson Plan 4 (cont.)

7. Let's talk about **fruits and vegetables that sit on the ground while they grow**. These vegetables can be small, but others are heavy so they have to sit on the ground while they grow. Does anyone have a picture of a fruit or vegetable sitting on the ground while it grows? (*show picture of lettuce and watermelon*) What other fruits and vegetables grow sitting on the ground? (*pumpkins, squash, broccoli, cucumber*)
8. Finally, let's talk about **vegetables that grow under the ground**. Does anyone have a picture of a vegetable growing in the dirt? (*show picture of carrots and potatoes*) What other vegetables grow underneath the ground? (*onions, beets, turnips*)
9. *(If time permits, and to your discretion, if you think the kids could benefit from something more interactive, **play fruit and vegetable relay**. (Can use only half of the F&V cards if you're short on time.)

Handout:

Double-sided 'How Fruits & Vegetables Grow'/F&V Word Scramble and Coloring Sheet w/ crayon boxes

Materials:

- Pictures of F&V growing
- Double-sided F&V handout w/ crossword
- Crayon boxes
- Lesson plan
- Passports
- Passport stickers
- Pens
- Golf pencils
- Demographics sheets
- F&V Relay Game

How Do Fruits & Vegetables Grow?

Many fruits grow on trees:

- Apples
- Mangos
- Oranges
- Bananas
- Peaches
- Plums
- Avocados
- Pears
- Coconuts



Some fruits and vegetables grow on plants and bushes:

- Blueberries
- Strawberries
- Green beans
- Peppers
- Tomatoes
- Pineapples



These vegetables sit on the ground while they grow:

- Squash
- Watermelon
- Broccoli
- Cantaloupe
- Lettuce
- Celery
- Cucumbers
- Pumpkins

Some vegetables like carrots, potatoes, beets, and onions grow below the ground.



APPENDIX C: DATA CONSENT

September 13, 2012

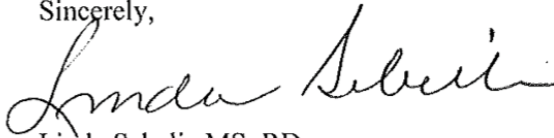
Supplemental Nutrition Assistance Program Education
University of Rhode Island
80 Washington Street, Room 300
Providence, RI 02903

University of Rhode Island IRB Office:

As Program Coordinator, I have given Elizabeth Patnode permission to review and use archival, de-identified participant data from previous SNAP-Ed lessons stored by our program. I have spoken with Elizabeth and understand the scope of her research, and how she will be using our data. All information to be obtained will be done in a confidential and appropriate manner.

Should you have any questions, please feel free to contact me.

Sincerely,

A handwritten signature in cursive script that reads "Linda Sebelia".

Linda Sebelia MS, RD
URI SNAP-Ed Program Coordinator

APPENDIX D: PRE-SURVEY AND POST-SURVEY

SNAP-Ed BGC YOUTH FV PRE-survey



Questions about the fruits and vegetables you eat.

Each of these is an example of 1 piece of fruit:



1. How many pieces of fruit **should** you eat every day? (Fill in one circle.)

- None
- 1 pieces
- 2 pieces
- 3 pieces
- 4 pieces
- 5 pieces or more

2. How many pieces of fruit **did** you eat **yesterday**? Do NOT include fruit juice.
(Fill in one circle.)

- None
- 1 pieces
- 2 pieces
- 3 pieces
- 4 pieces
- 5 pieces or more

Each of these is an example of eating vegetables 1 time:



3. How many vegetables **should** you eat every day? (Fill in one circle.)

- None
- 1 pieces
- 2 pieces
- 3 pieces
- 4 pieces
- 5 pieces or more

4. How many times **did** you eat vegetables **yesterday**? Do NOT include French fries.
(Fill in one circle.)

- None
- 1 time
- 2 times
- 3 times
- 4 times
- 5 times or more

Guide for SNAP-Ed Fruit & Vegetable Survey: YOUTH

We are going to give you this short survey so we can learn a little bit about the foods you eat. This is not a test! Think about the foods you ate yesterday, and then answer the questions on the paper.

(Pass out surveys)

1. Let's look at the first question. It says: "How many **pieces of fruit** should you eat every day?"

- These pictures are just some examples of pieces of fruit- there are many different types of fruit, but these are just some examples.
- Fill in the circle of the answer that you think is correct about the number of pieces of fruit you should eat every day.

2. Let's look at the second question. It says: "Each of these is an example of 1 piece of fruit. How many pieces of fruit did you eat yesterday?"

- This question is different because we want to know how many pieces of fruit **you** ate **yesterday**.
- These pictures are just some examples of fruits- if you ate a different kind of fruit yesterday that isn't shown here, you should count that as well.
- Think of everything you ate yesterday- **for breakfast, lunch, dinner, and snacks**.
- The only thing you shouldn't count is **fruit juice**.
- Once you have counted the number of fruits you ate yesterday, fill in the circle next to your answer on the paper.
- There is no right or wrong answer about the number of fruits you ate yesterday.

3. Let's look at the third question. It says: "How many **vegetables** should you eat every day?"

- These pictures are just some examples of vegetables- there are many different vegetables, but these are just some examples.
- Fill in the circle of the answer that you think is correct about the number of vegetables you should eat every day.

4. Let's look at the fourth question. It says: "Each of these is an example of eating vegetables 1 time. How many times did you eat vegetables yesterday?"

- This question is different because we want to know how many times **you** ate vegetables **yesterday**.
- These pictures are just some examples of vegetables- if you ate a different kind of vegetable yesterday that isn't shown here, you should count that as well.
- Think of everything you ate yesterday- **for breakfast, lunch, dinner, and snacks**.
- The only thing you shouldn't count is **French fries**.
- Once you have counted how many times you ate vegetables yesterday, fill in the circle next to your answer on the paper.

- There is no right or wrong answer about the number of times you ate vegetables yesterday.

(Make sure they have only chosen ONE answer per question, and prompt them if they try to circle the pictures instead of the answer choices.)