

**Evaluation of Teen Cuisine: An Extension-Based Cooking Program to
Increase Self-efficacy in Teens**

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Academic Abstract

Objective: The aim of the study was to evaluate the effectiveness of an Extension-based cooking program, Teen Cuisine, on improving student's self efficacy for cooking, cooking skills, and healthy eating.

Design: A combined cross-sectional, posttest only design was utilized.

Subject/Setting: Students involved in the 4-H Teen Cuisine Program, between the ages of 13-19 years residing within the Commonwealth of Virginia during the years of 2013 to 2015 were invited to participate. 4-H Extension Agents and Family Nutrition Program (FNP) Assistants administered the program.

Measures: A survey was used to assess n=531 student's self-efficacy for general nutrition knowledge, food choices, and cooking skills as a result of the 4-H Teen Cuisine Program during the academic year of fall 2013 to spring 2015.

Results: Teens that self-reported living in rural areas throughout the Commonwealth of Virginia perceived gains ($p < 0.05$) in an increased consumption of fruits and vegetables. Teens also indicated an increased frequency in cooking and a decrease in their consumption of soda/soft drinks.

Conclusion: Teen Cuisine was found to be effective at changing curriculum specific perceived health behaviors among participants.

Application: These findings provide insight on the importance of creating a foundation in cooking skills, food preparation and kitchen safety, and nutrition education for healthy eating among teens.

Public Abstract

Over the past 10 years, 4-H has delivered numerous childhood obesity prevention programs across the state of Virginia. 4-H Extension Agents expressed a need and for a curriculum targeting tweens and teens. Based on a national search, no programs existed. As a result, the Virginia Family Nutrition Program developed Teen Cuisine, a skilled and cooking based curriculum that focuses on nutrition education, food preparation and safety. In 2011, the Teen Cuisine program was targeted for low-income youth. The aim of this study was to create a culinary and nutrition education foundation to aid in the prevention of chronic diseases. Once students completed the six 90 minute lesson program, a posttest was distributed to students throughout the state of Virginia who participated in Teen Cuisine. Results were evaluated using the 4-H Common Measures Evaluation Instruments. Based on evidence from Teen Cuisine 72.1% of students agreed they consume more fruits and vegetables. While 73.0% agreed they drink fewer soft drinks. Students who successfully completed Teen Cuisine significantly improved their knowledge in nutrition education, physical activity, food safety and sanitation, acquired knife skills, and are now more conscious of their eating behaviors. Reinforcing the Dietary Guidelines and MyPlate, teens now have a road map to how their plate should look, and how to maintain a healthy weight.

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Jeremiah 29:11

For I know the thoughts that I think toward you, saith the LORD, thoughts of peace, and not of evil, to give you an expected end.

Table of Contents

Title Page	i
Academic Abstract	ii
Public Abstract	iii
Acknowledgements	iv
Chapter 1: Introduction	1
Chapter 2: Literature Review	
a.) U.S. Dietary Guidelines for Americans 2010 and 2015	4
b.) Current Dietary Patterns	5
c.) Review of literature pertaining to teen cuisine cooking program	11
d.) Limitation to the current research	22
e.) Summary of Literature	22
Chapter 3: Methods	
a.) Participants	25
b.) Teen Cuisine program	25
c.) Study Design	28
d.) Limitation of this Study	28
e.) Evaluation tool	28
f.) Statistics	32
Chapter 4: Results	
a.) Participants report	33
b.) Self-reported health behavior and cooking skills improvement	34
Chapter 5: Discussion	41
References	55
Appendices:	60
Appendix A: IRB approval	61
Appendix B: Sample Recipes from Teen Cuisine Program	62
Appendix C: Teen cuisine agreement	63

List of Figures

Figure 1: 4-H Healthy Living Post Survey for Grades 8 th -12 th	45
Figure 2: Interactive sections of the Teen Cuisine Manual	49

Chapter 1: Introduction

Obesity is a major health and economic concern both in the United States (US) and across the globe.^{1,2} It is estimated that in the United States, \$14 billion dollars are spent annually on healthcare costs and medical expenses associated with childhood obesity³ and this total rises to \$117 billion when overweight/obese adults are included in the calculation.⁴ The Commonwealth of Virginia spends about \$1.6 billion on annual healthcare costs related to obesity.⁵ Residents of Virginia spend approximately \$222 dollars per household in state and federal taxes for obesity-related expenses by the government, with 5.6% of the state budget directed towards obesity and related health consequences.⁵

In the United States, 35% of adults are classified as obese,¹ and 17% of all children and adolescents between the ages of 2 to 19 years are classified as obese.¹ More specifically, the Centers for Disease Control and Prevention also reported that 8.4% of children between the ages of 2 to 5 years, 18% of children aged 6-11 years, and 21% of adolescents between 12-19 years are classified as obese.¹ Obesity rates are even higher in minority populations in the US.¹ While approximately 14% of white children and adolescents are classified as obese, 22% of Hispanic and 20% of non-Hispanic black children and adolescents are classified as obese.¹ Among children 3-5 years of age, while 3.5% of non-Hispanic whites are classified as obese, 11% of non-Hispanic blacks and 17% of Hispanics were classified obese.¹ In children aged 6-11 years, 13% of non-Hispanic whites are classified as obese, but 24% of non-Hispanic blacks, and 26% of Hispanics are classified as obese.¹ Finally, among adolescents between the ages of 12-19

years, 20% of non-Hispanic whites, 22% of non-Hispanic blacks, and 23% of Hispanics were classified as obese.¹

Within the Commonwealth of Virginia, about 26% of Non-Hispanic white adults, 39% of Non-Hispanic African American adults, and 25% of Hispanic adults were classified as obese.⁶ In 2015 it was reported that 19% of those residing in Southwest Virginia were classified as obese, with 13% of high school students and 12% of middle school youth in the state of Virginia being reported as overweight or obese.⁷ There is clearly an epidemic of obesity both across the county and within the Commonwealth of Virginia.

Overweight/obese children and adolescents are of particular concern because they are at an increased risk for becoming overweight/obese adults.⁸ Additionally, children and adolescents who are overweight or obese are at risk for a number of obesity related chronic diseases such as cardiovascular disease,⁹ type 2 diabetes,¹⁰⁻¹² high blood pressure, cholesterol,¹³ stroke,¹⁴ cancer,^{15,16} gallbladder disease, sleep apnea, and fatty liver disease¹⁷ both as children and as adults. Furthermore, many of these diseases such as hypertension, diabetes, and cardiovascular disease are more prominent in African American and Hispanic communities.¹⁸

Poor adherence and consistency in meeting dietary and physical activity recommendations is a major problem throughout the United States.¹⁹ Furthermore, the likelihood of children meeting recommendations for fruit, vegetable, and whole grain intakes decreases with age.¹⁹ There is a clear need for interventions aimed at improving adherence to the dietary guidelines in children and adolescents.

Childhood obesity interventions have existed for over 20 years and these intervention programs aim to help children lose weight and/or prevent excessive body weight gain.²⁰ Interventions have been designed in various settings including hospitals and primary care clinics, schools and daycares, churches and other community-based settings, or for the home utilizing technology, such as video or internet-based programs, or the phone, to reduce resource and participant burden.²⁰ Cooking programs are an example of an intervention to potentially prevent childhood obesity by exposing them to cooking lessons, nutrition education, and increasing self-efficacy in the kitchen. Cooking programs can also be used to encourage the increased consumption of fruits, vegetables, and whole grains through the use of healthy recipes, while also providing nutrition education and cooking skills, particularly in children and teens. Although there isn't a clear standardized definition for "cooking program" they have often been described as hands-on interactive classes that provide nutrition education, while also developing cooking skills.^{21,22}

Teen Cuisine is a cooking program that targets teens between the ages of 13 to 19 throughout the Commonwealth of Virginia. Teen Cuisine incorporates and provides teens with the tools to create various recipes. It while also provides education related to safe knife skills, food safety and sanitation, as well as nutrition education related to basic nutrition (what is fat, sugar, sodium, etc.), the dietary guidelines, and reading and understanding food labels.²³ However, it is not currently known whether Teen Cuisine is effective in improving participants' self-efficacy in the kitchen. Therefore, the aim of the current study was to evaluate the effectiveness of Teen Cuisine for improving self-efficacy in the kitchen in a diverse group of adolescents across Virginia. It is

hypothesized that teens completing Teen Cuisine will have perceived gains in cooking skills, nutrition knowledge, and overall self-efficacy in the kitchen.

Chapter 2: Literature Review

a.) U.S. Dietary Guidelines for Americans (2015-2020)

The *Dietary Guidelines for Americans (DGA)* provides evidence based nutrition guidelines and recommendations for the American population.²⁴ The most recently released guidelines (2015-2020) focuses on healthy eating patterns throughout life that includes a diet that is nutrient dense and high in variety, limited in calorie dense and high fat high sodium foods, and an overall shift in dietary choices, such as fruits and vegetables.²⁴ These shifts can be accomplished through the incorporation of fruits and vegetables, grains (brown rice instead of white rice), fish and other seafood, and lean meats.²⁴

The DGA makes general recommendations for adults (with specific guidelines for males and females) and more specific guidelines for children and adolescents divided by age. These can be found below in Table 1.

Table 1.
Recommendation made by The Dietary Guidelines for Americans 2010 and 2015

Recommended Intakes	Children 2-3 years	Children 4-8 years	Girls 9-13 years	Girls 14-18 years	Boys 9-13 years	Boys 14-18 years	Women 19+	Men 19+
Fruit	1 c	1-1 ½ c	1½ c	1½ c	1 ½ c	2 c	2 c	2 c
Vegetable	1 c	1 ½ c	2 c	2 ½ c	2 ½ c	3 c	2 ½ c	3 c
Whole grains	2 c	2 ½ c	3 c	3 c	3 c	3 c	3 c	3 c
Dairy	3 oz. equ.	5 oz. equ.	5 oz. equ.	6 oz. equ.	6 oz. equ.	8 oz. equ.	6 oz. equ.	8 oz. equ.
Protein	2 oz. equ.	4 oz. equ.	5 oz. equ.	5 oz. equ.	5 oz. equ.	6 ½ oz. equ.	5 ½ oz. equ.	6 ½ oz. equ.

*Fruit, vegetable, and whole grain intakes are in cups.

* Dairy and protein intakes are recommended in ounce equivalent

The DGA also utilizes “MyPlate” as a way of presenting the guidelines in a format that the general population can understand by providing visual examples of serving sizes (amount of each food) on a place setting.^{24,25} Per the Dietary Guidelines, ½ of MyPlate should contain fruits and vegetables, ¼ whole grains, ¼ lean protein, and dairy should be incorporated into every meal.²⁵

Specifically, recommendations included in the guidelines for a healthy diet incorporate a regular intake of fruits, vegetables, lean protein and meats, low fat dairy, whole grains, and healthy oils.²⁴ The DGA also recommends a diet that limits daily sodium consumption to no more than 2300 milligrams per day, and to limit added sugar intake to less than 10% of total calories.²⁴ Children and adolescents are encouraged to exercise at least 60-minutes each day and participate in physical activities and exercises to increase muscle and bone strengthening.^{26,27} Additionally, adults are encouraged to participate in at least 150-minutes of moderate-intensity physical activity each week such as walking and riding a bike.²⁸

b.) Current Dietary patterns

According to the DGA, approximately 3/4 of Americans do not meet the recommendations for key nutrients (fruit and vegetable intakes).²⁴ Specifically, many Americans are not meeting recommendations for fruit (4 servings daily), vegetable (5 servings daily), and milk intakes (3 cup equivalents daily).²⁴ However, most Americans are meeting the recommendations for whole grains (6 ounces or 3 servings), with most Americans over-consuming added sugars, saturated fats, and sodium.²⁴ Teens and young adults are also consuming high amounts of sugar-sweetened beverages, such as soft

drinks, fruit drinks, coffee, and flavored water, which account for more than 47% of daily calories.²⁹

The National Health and Nutrition Examination Survey (NHANES) has observed that adolescents and children living in the United States have poor adherence to the Dietary Guidelines.¹⁹ Participants in the sample included 9,280 children between the ages of 4 to 18 years. The final study sample (n=8,390) excluded students with incomplete dietary recalls, and pregnant or lactating teens (n=890).¹⁹ Data for dietary intake was collected in three cycles using two 24-hour recalls during the years of 2005-2006, 2007-2008, and 2009-2010. Scores were assessed using Healthy Eating Index (HEI)-2010. HEI-2010, which is commonly used by dietitians, measures diet quality by implementing the Dietary Guidelines for Americans 2010. Scores for HEI-2010 range on a scale of 5 to 20, with 20 being the maximum possible score that can be achieved. The 12 components that are assessed in the measure include total fruit, whole fruit, dairy, whole grains, total protein foods, total vegetables, greens and beans, seafood and plant proteins, refined grains, sodium, fatty acids, and empty calories.¹⁹

According to the National Health and Nutrition Examination Survey, adolescents between 9 to 13 years of age consumed on average 4 servings of fruit (1 serving less than the recommendation), and 2 servings of both vegetables (3 servings less than the recommendation) and whole grains daily (1/2 serving less than the recommendation). Teens between the ages of 14 to 18 consumed about 2 ½ servings of fruit, 2 servings of vegetables, and 1 serving of whole grains daily.¹⁹ Importantly, all of these are below the recommendation daily levels. See table 2.

Table 2.
Poor adherence to intakes versus recommendations

Ages	Fruit	Fruit Recommendations	Vegetables	Vegetable Recommendations	Grains	Grain Recommendations
4 to 8	4 ½ servings	1- 1½ c or 2-3 servings	2 servings	1 ½ c or 3 servings	2 servings	1 ½ servings or 2 ½ c
9 to 13	3 servings	1 ½ c or 3 servings	2 servings	2-2 ½ c or 4-5 servings	1 ½ servings	1 ½ servings or 3 c
14 to 18	2 ½ servings	1 ½ to 2 c or 3-4 servings	2 servings	2 ½ c to 3 c or 5-6 servings	1 serving	1 ½ to 2 servings or 3 c

*Fruit, vegetable, and whole grain intakes are in cups.

* Recommendations for age groups 9 to 13 and 14 to 18 combine both boys and girls. For differences please see table 1.

The National Youth Physical Activity and Nutrition Study (NYPANS) was one of the first studies conducted by the Centers for Disease Control and Prevention (CDC) in 2013 to collect nationally representative data on eating and physical activity patterns in adolescents.³⁰ The study included 11,429 students from grades 9 to 12. Students completed a survey (parental permission was obtained) designed to assess behaviors related to physical activity, food intakes, and dietary habits. BMI was also calculated from their measured height and weight, BMI percentiles were determined.

Results from the study indicated that about 19% of the students were classified as obese and 17.8% were classified as overweight. Forty-one percent of students indicated they watch television when they eat at home, 37% of students participated in family meals at dinnertime, and almost 50% of students consumed cake, cookies, or chips regularly as snacks at home.³⁰ African American males reported a higher consumption of fried and fast foods than any other group.³¹ Furthermore, almost 80% of teens reported eating french fries, 73% indicated they consumed pizza, and 75% consumed at least one of their meals or snacks from a fast food restaurant at least one day per week, with the

highest intakes from African American teens.³⁰ The higher energy density, along with the lack of calcium, vegetables, vitamins and minerals make the consumption of these types of foods particularly alarming in teenagers.³²⁻³⁴ Furthermore, fast food intake directly correlates with an overall poorer diet as well as greater weight gain and the development of insulin resistance.³⁴⁻³⁶ The overconsumption of fast food leads to an increase of 309 calories per day as well as increases in total and saturated fat intake.³⁷

On the other hand, approximately 22% of the teens who participated in the study reported skipping meals, breakfast in particular. About 33% of participants reported consciously consuming fewer calories as a practice to lose or maintain current weight.³⁸ This study suggests that children and adolescents may be consuming high levels of energy dense foods such as pizza, fried potatoes, cookies and cakes,³⁰ which may result in a diet high in calories lacking key nutrients children and teens require for adequate growth and development.^{24,30,39} It also appears that body weight may be a concern to some teens and therefore they may be implementing their own strategies for weight loss or weight gain prevention. This suggests education related to nutrition and cooking may be beneficial.

In another study by Sebastian and colleagues,³⁹ researchers examined the effects of adolescent snacking in meeting fruit, vegetable, and grain recommendations. Four thousand three hundred and fifty-seven adolescents, 12 to 19 years of age participated in the study. The study sample was recreated from the What We Eat in America (WWEIA) Survey, a national food survey conducted as a partnership between the United States Department of Health and Human Services (DHHS), and United States Department of Agriculture (USDA).⁴⁰ Data was collected using one computerized self-reported 24-hour

dietary recall by a trained interviewer using the USDA 5-step (quick list, forgotten foods, time and occasion, detail cycle, and final probe) Automated Multiple Pass Method (AMPM).⁴¹ The AMPM method is an approach to ensure accurate data was collected, while reducing respondent burden through the use of a computer that reroutes questions based on previous responses and includes collected comments during interviews; the database is also used to search foods based on current food markets, and probes for frequently forgotten foods.^{39,41} As part of the survey, participants indicated the eating occasion from a defined list of foods and included the day and time they consumed the snack. Results include percentages of total food group portions consumed as snacks from based off the nine MyPyramid food groups (grains, vegetables, fruits, milk, meat/beans, discretionary calories, added sugars, and solid fats) of those foods eaten for the snack.³⁹ Adolescents reported snacking on high fat, high sodium foods, such as cakes, cookies, frozen desserts, and candy (table 3).³⁹

Table 3.
Foods frequently eaten at snack

MyPyramid group	Food subgroups	Percent contributed to MyPyramid portions
Discretionary calories	Soft drinks	35%
	Cookies	
	Fruit and sport drinks	
Added sugars	Candies	43%
	Cake	
	Frozen dairy desserts	
Solid fats	Pizza	24%
	Milk	
Fruit	Orange juice	39%

	Bananas	
	Apples	
Vegetables	Carrots	15%
	Lettuce	
	Salsa	

Results also indicated that African American adolescents from low income backgrounds were less likely than white adolescents to meet daily milk intake, but were more likely to meet fruit intake recommendations.³⁹ Although frequent snacking appears to contribute to excessive carbohydrate, total fat, and calorie intake in teens, it also may have an unexpected benefit of increasing the chance of adolescent’s meeting recommendations for whole grains and/or other key vitamins and minerals (can you include a couple of examples), depending on their snack preferences.³⁹ Data is displayed in table 3.

Thirty-nine percent of adolescents self-reported they consumed fruit or a fruit alternative during a snacking occasion.³⁹ As a result, fifty-nine percent of boys met recommendations for grains when they consumed at least four snacks in a day. The percentage of boys meeting fruit recommendations was 28% with at least four snacks in a day versus 15% from consuming one snack. While twenty-seven percent of girls met fruit recommendations when they consumed at least four snacks per day, only 11% met the recommendation when they consumed one snack per day.³⁹ More specifically, results from the study also suggested that snacking provided a large portion of total fruit consumed in an adolescent’s diet, with the most significant intake of Vitamin C coming from orange juice (boys 18% and girls 8.5%).³⁹ Although snacking is contributing to additional calories, it is potentially aiding adolescents in meeting key recommendations. Therefore, there could potentially be some advantages as well as disadvantages to

students snacking. Adolescents should be encouraged to make food choices that help to increase their intakes of fruits, vegetables, and whole grains.^{9,24}

Cooking programs that implement nutrition education can potentially be used to motivate participants to make shifts in their dietary patterns and begin making healthier food choices. Cooking programs can also provide knowledge and key skills in order to make these impactful choices throughout life.⁴²

c.) Review of literature pertaining to teen cooking program

Cooking programs are a way to promote healthier eating patterns such as increasing the intake of fruits, vegetables, and whole grains, by exposing children and adolescents to new foods and providing cooking and nutrition education to them. Several studies have suggested that cooking programs can improve self-efficacy (perceived expectation that you can perform a task)^{43,44} in the kitchen by providing nutrition education (relationship between diet, health, the prevention of disease, strategies for the promotion of healthy dietary patterns)²³ along with cooking (physical or mechanical skills used during the preparation of a meal) and food preparation (the skills required for planning and preparation of ingredients in a specific order for a meal to be prepared) skills.^{21,45} Educating teens in the kitchen and providing them with cooking skills, nutrition education, and food preparation skills may give them the confidence and knowledge to make healthier food choices that could positively impact their lives as they transition into gaining full independence.⁴⁶

It has been suggested that the current generation of children and adolescents are growing up with little or no skills or knowledge related to food and/or nutrition.⁴⁷

Cooking programs could potentially help remedy this through the combination of cooking skills and nutrition education in order to provide specific skills not otherwise available to children or teens, while also exposing them to foods they would not otherwise be exposed to. These programs could also potentially provide nutrition education related to calorie, sugar, and fat content of common foods to understand why foods are “healthier” than others.⁴⁸ Combining the two can potentially aid in awareness and knowledge, thereby providing kids with the tools to make healthier food choices.⁴⁸

For example, a study by Gibbs et al,⁴⁹ was aimed at determining whether participating in a kitchen garden program was effective in increasing the variety of participants’ diet and their willingness to try new foods.⁴⁹ In this study, children 8 to 12 years of age provided self-reported information regarding the readiness to try new foods, fruit and vegetables intakes in response to participating in their school-based kitchen garden program, known as the Stephanie Alexander Kitchen Garden Program (SAKG). The garden program was a weekly 45-minute gardening class and a 90-minute cooking class that occurred continuously over 2.5 years. The program provided content about sustainable gardening and involved students in garden development and maintenance. In the gardening class students planted seeds, weeded the garden, transplanted seedlings, watered plants, prepared homemade fertilizer to apply as an organic pest control, and harvested the plants. During the cooking portion of the program students prepared recipes including, pastries, pasta, bread, and pasta salad. They were also given the opportunity to sample their prepared recipes with their peers and adult volunteers.⁴⁹ Qualitative survey data was collected through focus group interviews that took place after school. Researchers observed students participating during the SAKG program and recorded

behaviors, interactions with peers, conversations relating to cooking and gardening tasks, and especially noted changes in student's behaviors throughout the program.⁴⁹

Results indicated that students self-reported enjoying eating the foods they created and also reported that they began consuming a diet with increased consumptions of fruits and vegetables. More specifically results also indicated at baseline 29.8% (+6% increase at follow-up) of the intervention group had a willingness to try new foods they never tried before, 38.5%(+13% increase at follow-up) were willing to try food they cooked, and 33.4%(+5% increase at follow-up) indicated their willingness to try foods they grew.⁴⁹ About 84%(-4% decrease follow-up) of participants at baseline consumed at least 2 servings of fruit each day.⁴⁹ The comparison group results indicated that 25.3%(-1.3% decrease at follow-up) of participants had a willingness to try food they never tried before, 31.7%(-2% decrease at follow-up) indicated their willingness to try foods the cooked, 25.1%(-2% decrease at follow-up) were willing to try food they cooked, and 23.8%(-2% decrease at follow-up) were willing to try foods they grew.⁴⁹

These results indicate that a cooking program that includes nutrition education and also exposes kids to healthier food options, through the use of an edible garden and nutrition education may not only positively impact their knowledge in the area of nutrition and food, but also promotes a diet with more variety foods they would not have otherwise been exposed to.⁴⁹

In a study by Gould,⁵⁰ researchers sought to determine if changing the types of available foods in the cafeteria during lunchtime could lead to students changing their food choices and help them meet dietary recommendations. The study assessed the food available during the lunch period at a school in Sheffield, UK. Cross-sectional data was

collected on 74 students aged 11-12 years from three different schools from different socioeconomic backgrounds.⁵⁰ The three schools were provided different options for lunch items, and the students were able to choose from those options. Food items available at the first school included a baked bean salad, burgers, fish sticks, garlic bread, custard, and ice cream doughnuts. Food items available at the second school included macaroni and cheese, pizza, bread rolls, biscuits, muffins, orange juice, and squash. Food items available at school three included onion rings, chicken pie, potato wedges, bread, milkshakes, yogurt, and apples.⁵⁰ Food intake, menu composition, and intakes of nutrients were recorded over a 5-day period. Five-day menus for the three schools were gathered and compared to dietary guidelines and each school was awarded a point for every food group that met dietary guidelines.

Results indicated that school 1, which was the lowest socioeconomic status (SES) school had the lowest quantitative score when it came to meeting Reference Nutrient Intakes (RNIs)(quantitative estimates of nutrient intakes for the purpose of evaluating and developing dietary patterns and intakes for healthy people).⁵¹ RNI aim to meet both the recommended daily allowance and adequate intake (experimentally determination of nutrient intakes based on a group of healthy people)⁵¹ and use the upper tolerable limit (highest level of a nutrient intake that can be consumed daily without posing a risk)⁵¹ as a reference point and guide to limit intakes.⁵¹ Only 62.5% of girls from school 1 met the RNI for protein, and 6.3% met recommendations for Calcium in comparison to 85% of girls at school 3 (highest SES) meeting recommendations for protein and 9.5% for Calcium.⁵⁰ Forty-four percent of boys and 62.5% of girls from school 1 consumed more than 50% of their food energy from carbohydrates in comparison to 6.7% of boys and

30.8% of girls at school 2 (mid SES).⁵⁰ Regardless of foods offered and SES, both boys and girls within the three schools failed to consume, and meet dietary recommendations for Iron and Folate.⁵⁰

This study further enforces the need to change the attitudes and behaviors of youth especially in public school systems towards food choices and preferences in order to consume essential nutrient, vitamins, and minerals.⁵⁰

In a study by Cullen and colleagues⁵² researchers evaluated a ten session cooking intervention program titled “Squire’s Quest”. The program used goal setting while also providing cooking lessons and nutrition education to help adolescents increase the consumption of fruit, 100% fruit juices, and vegetables. The study included 671 students with a mean age of 9.4 years from various socioeconomic backgrounds, African American (43%), Hispanic (31%), Asian or other (8%), white (18%), and students eligible for free and reduced priced lunch (40%).⁵²

The five week, ten session program included class themes like Razzle Dazzle, Royal Slush, Milky Way, Veggie Power, Round Table Pizza, French Fry Fantastic, Wizard’s Magic Pocket, Golden Knight Burrito, Heart-y Rice, Stone Soup, Celebration Sundae, and Great Shake. The program also included activities that targeted food preparation skills, self-efficacy, and goal setting.⁵² Self-efficacy and goal setting were targeted by having students choose a fruit and vegetable recipe to prepare at home in the virtual kitchen before the next session. Goal attainment was defined as those students who prepared their fruit or vegetable recipes in the virtual kitchen and those students who consumed the fruit or vegetables at their specific eating occasion, reported through signed parental notes. As part of the program, students worked in a virtual kitchen, which

allowed them to create healthy recipes such as pita veggie sandwiches, vegetable soup, fruit parfait, glazed carrots, and a vegetable burrito. A four-day, 24-hour dietary recall was recorded during a two-week baseline period and two weeks immediately post intervention. Surveys were also used to measure fruit and vegetable preferences.⁵²

At baseline, students in the intervention group consumed 0.8 servings of 100% fruit juice and vegetables, and 1.6 servings of fruit.⁵² Results indicated that participants in the program increased their daily fruit, 100% fruit juice, and vegetable consumption on average by for the three categories by 1 serving each day.⁵² Specifically, a direct correlation was observed in fourth grade students at baseline between education level of the parents and fruit and vegetable consumption in the children and teens.⁵² Lower income homes may have fewer fruit and vegetable choices for teens due to limited availability of fruits and vegetables at home, however; further research should be conducted.⁵² This can pose a problem for students living in these settings by providing fewer options and/or opportunities to make healthier choices and therefore highlight a need for income and education-specific cooking programs.

Cooking with Kids (CWK) is a cooking program started in 1995 in Santé Fe, New Mexico with the mission of “educating and empowering children and families to make healthy food choices through hands-on learning with fresh, affordable foods from diverse cultural traditions”. The programs targets to children in underserved, health disparate areas in the Hispanic community.⁵³ Cunningham-Sabo and colleagues⁵⁴ was interested in determining whether CWK could be effective in a non-Hispanic community, with no previous cooking knowledge.⁵⁴ The randomized control study included 257 participants from four low-income public schools in Colorado. The four elementary schools were

randomly assigned to either an intervention (two schools) or comparison group (two schools).⁵⁴ The program consisted of a one-hour introductory course covering the importance of fruit and vegetable intakes, three 2-hour culinary courses, and three 1-hour fruit and vegetable tasting sessions. The 10-week six-session program exposed students in grades K through 6th to inexpensive and fresh foods. The three tasting lessons (sampling) consisted of a multi-sensory assessment of citrus, pears, and salad greens. Additionally, students created and sampled various cuisines outside of their region during these lessons, such as Chinese-American and East Indian. The Chinese-American cooking lesson incorporated vegetable fried rice, and the East Indian cooking lesson included a potato and cabbage persillade with a lentil, carrot, and raisin pilaf recipe.⁵⁴

To assess the effects of the program on fruit and vegetable preferences, as well as attitudes and self-efficacy towards cooking, students completed a 20-minute, 35 item survey prior to and at the completion of the program.

Results indicated that the students in the intervention group increased their preferences towards fruits (+0.67 servings for boys and a +0.72 serving increase for girls), and vegetables (+3.37 servings for boys and +2.51 servings for girls).⁵⁴ With regards to self-efficacy in cooking, boys increased their self-efficacy by 3.62 and girls increased their self-efficacy towards cooking by 2.93.⁵⁴ The comparison group made less impactful changes towards fruit (0.11 for boys and -0.45 for girls) and vegetable (0.27 for boys and 0.39 for girls) preferences, and fewer gains in self-efficacy (1.35 for boys and 0.89 for girls) in the kitchen than the CWK intervention group.⁵⁴

Programs like CWK can potentially aid students in improving self-efficacy in the kitchen and nutrition knowledge,⁸ this study unfortunately does not include adolescents

between the ages of 13 to 19 years of age who are close to adulthood and gaining their full independence in food choices. Students should be encouraged to participate in the preparation of food in the kitchen because those students who receive little to no nutrition and food related support from their families could potentially have a lower self-efficacy in the kitchen and not consume fruits and vegetables. Those students in the intervention group made impactful gains in consuming more fruits and vegetables, and gained confidence in the kitchen and in the preparation of food.⁵⁴

Another cooking program designed by Caraher and colleagues,⁵⁵ called “When chefs adopt a school” (CAAS) was aimed at educating adolescents between 9-11 years of age on the benefits of healthy eating. The three-session program included instruction on food preparation and proper cooking techniques, how to improve personal hygiene and health practices, and develop diverse flavor preferences. Specific topics included “healthy eating”, “flavor profiles and taste”, “the importance of hand washing during meal and food preparation”, and “practical food preparation”. The core delivery was completed in the two sessions (hand washing, healthy eating and experiencing food through the senses, with a focus on taste).⁵⁵ Session three was a recap of practical cooking sessions and hygiene.⁵⁵

Self-efficacy in the kitchen, self-confidence cooking with ingredients found at home, and fruit and vegetable intakes were all assessed prior to and after completion of the program via self report.⁵⁵ Specific questions included students’ perceived ability to cut fruits and vegetables, ability to follow a recipe, confidence in executing the pasta salad recipe, and confidence in asking a guardian for a favorite vegetable. Results indicated that at baseline 63% (+10% increase at follow-up) of students could cut fruits and

vegetables, 49% (+6% increase at follow-up) can now follow a recipe, 26% (+28% increase at follow-up) felt comfortable executing the pasta salad recipe alone, and 60% (+14% increase at follow-up) of students were confident in asking their parent or guardian for their favorite vegetable for dinner.⁵⁵

Davis and colleagues⁵⁶ examined the effectiveness of LA Sprouts, a Los Angeles based intervention designed to improve food choices and reduce the risk of obesity in Latino youth. The 12-week program focused on gardening, nutrition, and cooking education in fourth and fifth graders.⁵⁶ Los Angeles has a large Hispanic community and many of the youth in this community are at risk for developing chronic diseases such as obesity, which could potentially lead to type 2 diabetes and cardiovascular disease.⁵⁷ The study included 104 participants (70 controls and 34 LA Sprouts participants) with an average age of 9.8 years, predominantly Latino (97% intervention and 93% control),⁵⁶ 52% percent were boys and 59% classified as overweight/obese.⁵⁶

The 12-week program consisted of weekly 90-minute sessions. The students received one 45-minute preliminary interactive cooking lesson and nutrition education orientation (increasing vegetable and fruit intake, and introduction to cilantro, beans, corn, and squash) prior to beginning the program in order to familiarize students with the curriculum.⁵⁶ Each week, the program discussed a nutrition topic, made a recipe, and a gardening hands-on interactive project for each week, all with the underlying goal of increasing fruit and vegetable consumption. Some sample lesson titles include, “Introduction to LA Sprouts Kitchen and knife safety”, “Adding fruit to your diet”, “Adding vegetables to your diet”, and “Real food versus packaged food and how to read ingredients.” Students were taught the benefits and sources of fiber, how to read a

nutrition facts label, the importance of vitamins and minerals, and the importance of consuming breakfast. In addition to the lessons, parents and students participated in three 60-minute combined parental nutrition and gardening classes. Dietary intakes of fruit, vegetable, dairy, whole grain, legume, and meat consumption were assessed before and after the program using a 41-item Block Food Screener for ages 2-17 years.⁵⁶

Results indicated that 61% of students in the control group and 53% of participants in the intervention group were classified as overweight or obese.⁵⁶ The LA Sprouts students significantly increased their intake of fiber by 22% in comparison to a 12% decrease in the control group.⁵⁶ LA Sprouts participants also reported increasing their meat intake by almost 1 additional serving of meat/poultry/fish per day. They also reported increasing their dairy intake 2 servings per day.⁵⁶ Specifically, overweight/obese participants increased their lean meat and dairy intakes by 1 serving each day.⁵⁶

Importantly, diastolic blood pressure also decreased by 5% in the kids participating in the program; in comparison to only a 3% decrease in the control participants.⁵⁶ These results demonstrate that a 12-week intervention that includes gardening, nutrition education, and cooking skills can potentially increase dietary improvements in a Hispanic and Latino community in Los Angeles, California, which may result in reduced diastolic blood pressure and decreased weight gain.⁵⁶

Wrieden and colleagues⁴⁶ evaluated the feasibility and effectiveness of CookWell, a food skills intervention program⁵⁸ in a community-based setting on confidence in cooking skills, food preparation, perceived improvements in dietary choices, and consumption of fruits, vegetables, and lean protein in an urban community.⁴⁶

Sixty-three adults with an average age of 32.3 years from eight low-income communities (areas that ranked as the most deprived by the Scottish Index of Multiple Deprivation) in Scotland participated in the CookWell program. The program included 2-hour classes held once per week for seven-weeks, which included cooking lessons for making various dishes (cheese sauce and pasta bake, soups and scones, mince-based dishes, rice-based dishes, pizza and salad, chicken curry stew, and carrot cake and healthy pudding), and nutrition education (topics relating to health benefits of consuming fruits, vegetables, and fiber, role and sources of vitamins A and C, and servings sizes) Participants also completed a food frequency questionnaire and a dietary recall/food diary before and after the intervention. Only data from participants that completed the study were included in the analysis. Results indicated that individuals participating in the program increased their consumption of fruits and vegetables by almost 2 servings, 100% fruit and fruit juice by 1 serving, and consumed $\frac{1}{2}$ a serving more of salads each week.⁴⁶ Participants also reported a 20% increase in the self-perceived ability to follow a recipe, and an 18% increase in their confidence in cooking with basic ingredients.⁴⁶

Although, the study was conducted in adults, it still demonstrates the effectiveness of cooking lessons and nutrition education on individual food choices.⁴⁶ Cooking classes can potentially improve dietary behaviors, but must be maintained for continued positive patterns in the consumption of fruit and vegetable intakes.⁴⁶ There should also be continued follow-up with lessons and evaluation to continue to improve students' dietary patterns in an effort to ensure permanent changes.⁵²

A summary of the presented cooking programs are presented in Table 4.

Table 4.
Cooking intervention programs

Name of study	Teen Cuisine	Squire's Quest	CookWell	*CWK	LA Sprouts
Number of Participants	531	671	63	257	104
Targeted age group/average	13-19	9.4	32.3	9-10	9.8
Targeted teens ages 13-19	Yes	No	No	No	No
Study design	20 -minute 4-H Common Measures survey	Four 24-hour food recalls	**FFQ and 24-hour food recall	20-minute 35 item questionnaire	41-item Block Food screeners
Minimum of 6 cooking classes	Yes	No	No	No	No
Intervention and control group	No	Yes	Yes	Yes	Yes
***F/V intakes increased	Yes	Yes	Yes	Yes	Yes
Address self-efficacy	Yes	Yes	Yes	Yes	No
Nutrition education	Yes	No	Yes	No	Yes
Food Safety and Sanitation	Yes	No	No	No	No

*Cooking with kids (CWK)

**Food frequency questionnaire (FFQ)

***Food and vegetables (F/V)

d.) Limitations to the current research

There are several limitations to the above studies such as underreporting and other inherent issues related to self reported data, clarity in the definition of snacking or other meals, inconsistencies or differences in methodology or data collection,³⁹ lack of diversity of study populations, differences in the definition of cooking skills or cooking class.⁵² Lastly, many of these studies suffered from high dropout rates, which makes data interpretation difficult.⁴⁶

e.) Summary of Literature

With adolescents experiencing a period of rapid growth and the potential for gaining excess weight, it's important to keep teens on track with healthy eating.⁵⁹ Populations

often the most affected are those of the African American and Hispanic communities.⁶⁰ These populations are at an increased risk of becoming overweight and obese and for developing chronic diseases and therefore it is important for them to have healthy eating habits.^{21,48,54}

Teens with limited to no cooking experience may find it difficult to choose and create healthy foods.⁴⁸ By exposing these individuals to cooking-based education programs that provide cooking lessons, nutrition education, as well as giving them an opportunity to taste new food, teens can potentially improve their cooking skills and self-efficacy in the kitchen and identify new healthier foods they may like.⁵⁴ The implementation of cooking programs creates a foundation for youth in years leading into adulthood. Available cooking programs may be essential to the promotion of the health and well-being of students to encourage healthy eating and positive attitudes towards fruits and vegetables.^{21,48}

Literature indicates cooking programs may potentially create a foundation for healthy eating by building upon skills teens already currently have.^{21,54} Nutrition education can help to prevent the development of chronic diseases by providing opportunities for teens to eat healthier, while also improving their self-efficacy in the kitchen.

A limitation such as inconsistency in data collection was incorporated and prevented in the Teen Cuisine program by using JMP 12 software for data collection. Data was also collected and evaluated by one researcher to eliminate inconsistencies in data and potential differences in methodology. Teen Cuisine didn't suffer from high dropout rates as this was a form of enrichment for those teens participants in the 4-H program taking place after school. Based on self-reported data Teen Cuisine was able to reach those of

minority populations throughout the Commonwealth of Virginia, with about 39% of the participants reporting they were of African American descent. These teens were exposed to the cooking lesson, nutrition education, and given the opportunity to become familiar with the kitchen in order to improve self-efficacy and increase their intakes of fruits and vegetables.

When comparing Teen Cuisine to other cooking programs,⁵⁴ there are several points to highlight. For example, Squires Quest, used a virtual kitchen, which while beneficial, prevents participants from physically creating recipes and becoming familiar with the kitchen and cooking equipment. Cooking With Kids, on the other had a cooking component, but targeted a younger age group of kids⁵⁴. It has been determined that the age of 12 appears to be the age where shifts in food related decisions occur.^{69,70} Parents are generally the primary decision makers with regards to food options in children younger than twelve. However, children and teens over the age of 12 become more influential in what and when they eat.^{69,70} Additionally, other programs failed to include food and kitchen safety and sanitation and none included a resource manual for follow up and reinforcement of the material.^{46,52,54,56}

However, it is not currently known whether Teen Cuisine is effective in improving participants' self efficacy in the kitchen. Therefore, the aim of the current study was to evaluate the effectiveness of Teen Cuisine for improving self-efficacy in the kitchen in a diverse group of adolescents across Virginia. It is hypothesized that teens completing Teen Cuisine will have perceived gains in cooking skills, nutrition knowledge, and overall self-efficacy in the kitchen.

Chapter 3: Methods

a.) Participants

The participants in the study were teenagers between 13 to 19 years of age that were all enrolled in high school, and involved in a 4-H after school program during the academic school years 2013 to 2015. 4-H is a private non-profit organization, delivered by Virginia Cooperative Extension, that provides programs in science, agriculture, and health. It also incorporates lifelong skills, such as independence, compassion, self-confidence, and education for youth.⁶¹ Funding is allocated from the local, state, and national level.⁶¹

Both males and females from all races and ethnicities were included in the study. Prior to participation, students were informed of the risks and benefits in participating in the study and participation in the study was voluntary. The procedures were approved by the Institutional Review Board at Virginia Tech (Appendix A). Students did not provide informed consent since they filled out the survey anonymously and no identifying information was collected.

b.) Teen Cuisine program.

Teen Cuisine is a cooking skills based program created by the Virginia Tech Family Nutrition Program.⁶² Teen Cuisine focuses on educating youth on nutrition, food preparation (following recipes, proper knife skills, and appropriate measuring techniques) and sanitation, and kitchen safety.

The Teen Cuisine program consisted of six 90-minute lessons, each conducted once per week. During the program, students participated in creating recipes with healthier

alternatives) and improving their cooking skills through meal preparation (practicing measuring and cutting) skills, and employing various cooking methods. With assistance from the Extension Agent (post-graduate professional who actively educates and identifies resources for community members, creates goals and objectives for the community, designs and implements programs for target audiences, and recruit and diversify programs within the community)⁶³ or their peers, students prepared the recipe associated with each lesson. At the conclusion of each lesson, students were able to sample the recipes created by themselves and their peers. All of the participants received the Teen Cuisine manual, which included all the recipes from the program along with general nutrition information, such as serving sizes and key vitamins and minerals. (See table 5 and figure 2)

Table 5.
Topics discussed with each nutrition and cooking lesson

Week number	Topic	Nutrition Lesson	Cooking Lesson
Week 1	Eat Smart	Learn importance of MyPlate, proper hand washing, and learn food preparation skills.	Orange yogurt dip, peanut butter yogurt dip, fruit smoothies, or mock sour cream dip
Week 2	You Are What You Eat	Identify nutrition facts label	Green Bean and Tomatoes Pablo's Salsa Corn Sweet Onion & Tomato Salad Chinese Vegetable Stir-fry
Week 3	Power Up With Breakfast	Plan a healthy meal using MyPlate, learn the importance of physical activity and	Breakfast burritos Omelets

		prevention of food borne illnesses.	Hummus
Week 4	Find the Fat	Classify foods based on frequency they should be consumed.	Baked chicken nuggets Baked french fries Mock sour cream dip and veggies
Week 5	Whole Truth on Whole Grains	Identify a variety of whole grains and differentiate between simple carbohydrates and complex carbohydrates.	Whole grain pancakes Apple Raisin Bran Muffins Granola Yogurt Parfait
Week 6	Snack Attack	Identify snacks high in salt, fat, and sugar content.	Salad factory Homemade salad dressing Smoothies

As part of the recipe preparation, students practiced safe knife skills, and food safety and sanitation such as hand washing, prevention of cross contamination through the use of multiple cutting boards for fruit, vegetables, and raw protein meats (to prevent the spread of food borne illnesses), and how to properly clean and sanitize surfaces.

The program utilized MyPlate and created interactive activities using the Teen Cuisine manual where teens were able to log their fruit, vegetable, and whole grain intake (see appendix). Students also learned about balancing their diet through the use of MyPlate, for example, they learned appropriate serving and portion sizes, and how to meet recommendations established in the Dietary Guidelines (see appendix). Other activities and lessons in the program included matching macronutrients and micronutrients, and how to properly read a nutrition facts label. Lessons were also provided on how to limit the consumption of unhealthy fats and how to identify healthier

options by substituting ingredients in recipes for those containing lower calories and or less fat content.

c.) Study design

The study used a convenience sample of high school students within the Commonwealth of Virginia. Data were collected (the researcher using a likert scale to tally responses) between the fall of 2013 and spring of 2015. Instruments were mailed to 4-H extension agents throughout the Commonwealth. Agents were asked to distribute the instrument to their participants, ensuring they omitted their names, and other identifying information, participants were also notified that the survey was voluntary. Measurements were conducted upon completion of the Teen Cuisine program for all participants.

d). Limitations of this Study

Limitations to the study include voluntary participation in the Teen Cuisine program and survey, subjective questions, lack of control and intervention group, absence of pretest prior to start of study, and the study taking place in a community setting with less research rigor. These limitations could have potentially caused teens to perceive gains that may not have taken place, caused difficulty in recalling behaviors six weeks prior, and skewed results due to voluntary participation in the survey.

e). Evaluation tool

The 4-H Common Measures Healthy Living Evaluation Tool (see appendix) was developed as part of the national 4-H Healthy Living Logic Models and was designed to

aid in 4-H program preparation and evaluation.⁶⁴ Common Measures evaluates the impact of science, college/career readiness, and healthy living, while aiding in various cross-program comparisons to evaluate potentially similar outcomes among programs.⁶⁵ The Healthy Living Logic Model targets professional development of youth (by increasing knowledge, skills, and competencies through various learning opportunities), the promotion of physical activity and healthy eating, youth living lives that balance mental, physical, and emotional health (social and emotional development).⁶⁴ The Healthy Living Logic Model also targets the prevention of alcohol and tobacco use, and the use of other harmful drugs.⁶⁴ The Healthy Living Logic Model incorporates core youth outcomes (maintaining a healthy lifestyle, identifying resources in the community, and developing social and emotional skills), and highlights the importance of healthy eating patterns incorporated in the National Institute of Food and Agriculture Plan of Work Systems.⁶⁴ The Healthy Living Logic Model also sought to aid youth in making healthy eating patterns, and developing mentally and emotionally by increasing their knowledge and skills, and through the adoption of healthy behaviors in youth and their family members by providing learning opportunities that promote physical activity, and social and emotional skills. 4-H also exposed youth and their family members to the healthy living principles by integrating them into local, regional, and state programs and events.⁶⁶ The Teen Cuisine program focused on the healthy eating portion of the Healthy Living Logic Model, which was also used to help develop the program.⁶⁴

Since the focal point for the Teen Cuisine program was on the healthy eating portion of the Healthy Living Logic Model, questions regarding tobacco and drug use, and other questions not applicable to the current study were excluded from the survey.⁶⁴

Supplemental questions (table 5) were added to assess the food preparation and cooking skills components of the program.

Table 5.
Supplemental Questions

Section:	Question:	Answer:
Tell us about your Experience	Teen Cuisine is a program that is offered through 4-H, as well as the Family and Consumer Sciences (FCS) and Family Nutrition Programs (FNP). How many years have you been participating in 4-H?	<ul style="list-style-type: none"> • This is my first year • This is my second year • Three or more years
	Which one of the following best describes how many hours you typically spend in 4-H programs/projects each week?	<ul style="list-style-type: none"> • Less than one hour • Between one and three hours • More than three hours
	Which of the following best describes how you are involved in 4-H?	<ul style="list-style-type: none"> • Clubs • Camps • After-school programs • In-school programs • Local fairs/events • Community service projects • Working on my projects at homes • Other
Cooking Skills		
As a result of participating in a 4-H Healthy Living Program I now take the following actions...	I read recipes now when I cook or bake I have better measuring skills now I know how to safely use a knife now I cook more I wash my hands more before I cook I wash my hands more before I eat	<ul style="list-style-type: none"> • Strongly Agree • Agree • Disagree • Strongly Disagree • Not Applicable to Teen Cuisine
Tell us about You	How old are you	_____ years
	What grade are you in	_____ grade
	Which of the following best describes your gender	<ul style="list-style-type: none"> • Female • Male
	Which of the following best describes your race	<ul style="list-style-type: none"> • American Indian or Alaskan Native • Asian • Black or African American • Native Hawaiian or Other

		<ul style="list-style-type: none"> • Pacific Islander • White
	Which of the following best describes your ethnicity	<ul style="list-style-type: none"> • Hispanic or Latino • Not Hispanic or Latino
	Which of the following best describes the primary place where you live	<ul style="list-style-type: none"> • Farm • Rural (non-farm residence, pop. <10,000) • Town or City (pop, 10,00-50,000) • Suburb of a city (pop. >50,000) • City (pop. > 50,000)

The survey (figure 1 on page 44) was designed to capture the experiences and skills perceived to be gained by students in the 4-H program. Responses were based on a likert scale ranging from 0 to 4. Students were asked to select responses they most identified with and felt best described them and their knowledge gained from the completion of the Teen Cuisine Program. Teens were asked about their nutrition knowledge and the difficulty in completing tasks. Students were asked to indicate the extent they agreed or disagreed to certain statements pertaining to food choices made in response to their experience in the 4-H program. For example, “I eat more fruits and vegetables.” Information collected in the survey included nutrition related knowledge, food choices and cooking skills. The survey required approximately 15-20 minutes to complete. Upon completion, Extension Agents and Family Nutrition Program Peer Educators mailed all surveys to the project coordinator. Data entry was checked for accuracy upon arrival of surveys to Virginia Tech. Each survey was assigned a code to ensure confidentiality.

f.) Statistics

The average mean and standard deviation of each of the survey variables (demographics, nutrition knowledge, cooking skills, sex, ethnicity, grade, county, and race) were calculated. Ordinal regression analysis was performed on all data using JMP 12 Mac software to compare the possible influences of sex and counties on students' gains in cooking skills and food preparation, knife skills, and a perceived increase in self-efficacy in the kitchen. Ordinal regression was used to predict the outcome of one dependent variable selected through JMP to analyze (a survey question) and one or more independent variables⁶⁷. It was also used to determine if there were significant differences among specific groups, such as race, ethnicities, sex, and county or residing area. Significance was set a p-value <0.05. Since the study was not designed to test differences across individual counties, as well as the fact that there were large discrepancies in n size from the various counties, they were divided based on geographic location and median household income. Those counties in northern Virginia had an overall higher mean household income (\$63,151.80) than the counties in southern Virginia (\$46,451.22), a difference of \$16,700.58.⁶⁸ As such, survey data was analyzed by comparing counties in northern Virginia (Caroline, Greenville, Harrisonburg, Prince William, and Stafford) to those in southern Virginia (Fairview, Chesterfield, Franklin Henrico, Newport News, Nottoway, Norfolk, Pittsylvania, and Wise).

Chapter 4: Results

a. Participants

There were 1,135 teens that participated in the Teen Cuisine Program. Data was collected on the 531 participants between the ages of 13 to 19 years. Demographic information is displayed in table 6. Fifty-nine percent of the participants were female and 41% male. The ages ranged from 13 to 19, with an average age of 15 years. Fifty-three percent of students that participated in the survey were white, 40% were African American, 6% were Hispanic, 5% were American Indian/Alaskan Native, and 3% were either Asian or Native Hawaiian or Other Pacific Islander. When asked where they lived, 33.8% of teens reported living in a rural area (population <10,000), 24.8% indicated they lived within in a town or city (population 10,000-50,000), 17.4% resided in a suburb of a city (populations >50,000), 12.2% lived on a farm, and 11.8% in a city (population >50,000). Participants self-reported the county in which they lived and 4.7% reported living in Caroline, 5.7% in Greenville, 1.2% in Harrisonburg, 0.8% in Prince William, 10.8% in Stafford, 2.2% in Fairview, 8.3% in Chesterfield, 34.0% in Franklin, 10.6% in Henrico, 3.7% in Newport News, 3.7% in Nottoway, 4.1% in Norfolk, 8.0% in Pittsylvania, and 2.2% in Wise County.

Table 6.
Teen Cuisine Participants' Self-Reported Socio-Economic and Demographic Information
(n=531)

Demographic Variable		n(%) *
Sex (M/F)	Male	214 (41.1%)
	Female	307 (58.9%)
Age**	13	77 (14.8%)
	14	150 (28.8%)
	15	134 (25.8%)

	16	86 (16.5%)
	17	47 (9.0%)
	18	23 (4.4%)
	19	3 (0.6%)
Grade	8	147 (28.3%)
	9	191 (36.7%)
	10	64 (12.3%)
	11	78 (15.0%)
	12	40 (7.7%)
Race**	White	271 (52.9%)
	African American	204 (39.8%)
	American Indian/Alaskan Native	23 (4.5%)
	Asian	7 (1.4%)
	Native Hawaiian/ Pacific Islander	6 (1.2%)
Ethnicity	Latino/Hispanic	31 (6.1%)
	Non-Latino/Non-Hispanic	474 (93.9%)
Place you live	Rural	175 (33.8%)
	Town	128 (24.8%)
	Suburb of City	90 (17.4%)
	Farm	63 (12.2%)
	City	61 (11.8%)

*The percent was computed based on responses for that question and therefore do not include missing responses. There are responses missing for sex (10), age (11) grade (11), race (19), ethnicity (26), and place you live (14).

** Represents those responses that do not add up to 100%

b. Self-reported health behavior and cooking skills improvements

The information related to self-reported health behaviors is included in Table 7. Seventy-four percent of participants both strongly agreed or agreed with the statement that as a result of participating in the program they used fewer video games and computers in their free time, 73.0% drank less soft drinks, 72.1% consumed more fruits and vegetables, and 71.3% make healthy food choices whenever they can. Additionally, a smaller percent of the group reported that they strongly agreed or agreed with the statements, “I eat less saturated fat” (55.2%), “watch less television” (53.7%), and “my

family eats at least one meal together a day
(48.1%).

Table 7.
Participants self-reported health behavior improvements after participation in Teen Cuisine (n=531)

	Strongly Agree n(%)	Agree n(%)	Strongly Disagree n(%)	Disagree n(%)
I make food choices based on what I know my body needs	191(26.3%)	256(50.1%)	12(3.7%)	51(19.9%)
I use video games and computers less in my free time	202(41.1%)	163(33.1%)	37(7.5%)	90(18.3%)
I drink less soda/soft drinks	178(34.8%)	195(38.2%)	29(5.7%)	109(21.3%)
I eat more fruits and vegetables	140(27.2%)	231(44.9%)	25(4.9%)	119(23.1%)
I make healthy food choices whenever I can	120(23.7%)	237(47.6%)	32(6.3%)	118(23.3%)
I eat more whole grains	106(20.9%)	199(39.2%)	37(7.3%)	165(32.5%)
I match my food intake to the number of calories I need to eat each day	116(23.0%)	186(36.8%)	45(8.9%)	158(31.3%)
I eat less junk foods	109(21.4%)	186(36.5%)	58(11.4%)	156(30.6%)
I eat smaller portion sizes	111(22.1%)	171(34.0%)	54(10.7%)	167(33.2%)
I eat less saturated fat	93(18.3%)	188(36.9%)	45(8.8%)	183(36.0%)
I watch less t.v.	113(22.8%)	153(30.9%)	78(15.8%)	151(30.5%)
My family eats at least one meal a day together	90(22.8%)	100(25.3%)	148(37.5%)	57(14.4%)

*The percent was computed based on responses for that question and therefore do not include missing responses.

There are responses missing for those who self-reported they make food choices based on what they know their bodies need (13), use video games and computers less in their my free time (39), drink less soft drinks, eat more fruits and vegetables (16), make healthy food choices whenever I can (24), eat more whole grains (23), match their food intake to their calories (26), eat less junk food (22), eat smaller portion sizes (28), watch less television (39), and eat at least one meal with their family a day (136).

The information related to self-reported food preparation and cooking skills improvements is included in Table 8. Participants strongly agreed or agreed that as a

result of participating in the program, 91.2 % “wash their hands more before they cook”, 90.6% “wash their hands before they eat”, 84.0% “cook more”, and 83.4% “have better measuring skills”.

Table 8.
Participants Self-Reported Food Preparation and Cooking Skills Improvements based on Teen Cuisine Program posttest (n=531)

	Strongly Agree n(%)	Agree n(%)	Strongly Disagree n(%)	Disagree n(%)
I wash hands more before I cook	275(53.6%)	193(37.6%)	12(2.3%)	33(6.4%)
I wash my hands more before I eat	275(53.7%)	189(36.9%)	12(2.3%)	36(7.0%)
I cook more	220(43.0%)	210(41.0%)	23(4.5%)	59(11.5%)
I have better measuring skills now	200(39.5%)	222(43.9%)	21(4.1%)	63(12.5%)
I know how to safely use a knife now	197(38.6%)	216(42.3%)	22(4.3%)	75(14.7%)
I read recipes now when I cook or bake	178(34.9%)	200(39.2%)	26(5.1%)	106(20.8%)

*The percent was computed based on responses for that question and therefore do not include missing responses.

There are responses missing for those student who self-reported they wash their hands before they cook (18) and eat (19), cook more (19), have better measuring skills (25), know how to safely use a knife (20), and now read recipes when they cook or bake (21).

It was important in the current study to determine whether there were differences in responses to the program based on sex, ethnicity, race, or where the participants reside. Knowing this information would help researchers identify whether this program is more appropriate for certain audiences and/ or highlight areas of adjustment or modification. To this end, the data was analyzed for differences in perceived response to the program with regards to sex, ethnicity, race, or where the participants reside.

The information related to self-reported nutrition knowledge improvements in relation to sex, ethnicity, race, and residing county is included in Table 9. Based on self-reported data from the participants there were no significant differences in the survey responses with regards to sex, race or ethnicity.

Table 9.
Nutrition Knowledge
P values

	Sex (p value)	Ethnicity (p value)	Race (p value average)
I learned the foods that I should eat everyday	0.0955	0.4651	0.9849
I learned why it is important for me to eat a healthy diet	0.2904	0.1105	0.9851
I learned the importance of fruits and vegetables in my diet	0.1142	0.9741	0.9840
I learned the importance of whole grains in my diet	0.7255	0.0925	0.7000

The information related to self-reported improvements in food choices is included in Table 10. There were no significant differences in survey responses with regards to sex, ethnicity, or race in how participants self-reported their perceived gains in food choices.

Table 10.
Food Choices
P values

	Sex (p value)	Ethnicity (p value)	Race (p value average)
I think about what foods my body needs during the day	0.2234	0.7240	0.5385
I make food choices based on what I know my body needs	0.5360	0.9902	0.6904
I make healthy food choices whenever I can	0.6082	0.9391	0.6159
I match my food intake to the number of calories I need to eat each day	0.8576	0.5377	0.7086

The information related to improvements in self-reported cooking skills is included in Table 11. Although, there were no significant differences in self reported gains in cooking skills with regards to race and ethnicity, there were significant differences observed between males and females, with females reporting perceived gains in cooking skills as a results of participating in the Teen Cuisine program.

Table 11.
Cooking Skills
P values

	Sex (p value)	Ethnicity (p value)	Race (p value average)
I read recipes now when I cook or bake	0.0227	0.3959	0.9832
I have better	0.0047	0.4554	0.9840

measuring skills now			
I know how to safely use a knife now	0.0004	0.9018	0.9838
I cook more	0.0052	0.5818	0.5790
I wash my hands before I cook	0.0020	0.2596	0.9855
I wash my hands before I eat	0.0014	0.4403	0.9854

The information related to nutrition knowledge, cooking skills, and self-efficacy in the kitchen is included in Table 12. Self-reported results indicated that there were significant differences between the northern and southern counties with regards to perceived gains in nutrition knowledge, cooking skills, and self-efficacy in the kitchen. More specifically, participants from the Northern counties self-reported, “I cook more”, “I learned the foods that make up a balanced diet”, and “I learned the foods they should eat each day”, at a higher rate than students from the southern.

Table 12.
County and independent city self-reported results on Nutrition Knowledge, Cooking Skills, and Self-efficacy in the kitchen
P values

	Northern versus Southern Counties (p value)
I learned the foods that I should eat every day	0.0388
I learned the foods that make up a balanced diet	0.0129
I learned how to make healthy food choices	0.9345
I learned the importance of fruits and vegetables in my diet	0.4940
I learned the importance of whole grains in my diet	0.9115
I eat more fruits and vegetables	0.2771
I eat more whole grains	0.3473

I drink more water	0.1578
I eat smaller portion sizes	0.7982
I have better measuring skills now	0.0571
I cook more	<0.0001
I know how to safely use a knife now	0.7972

The information related to self-reported nutrition knowledge and cooking skills with regards to the students reporting the place they live, age, and grade is included in Table 13. There were no significant differences observed in perceived gains regarding age and grade in nutrition knowledge and cooking skills. However, there was a significant difference between where participants self-reported living, and their perceived gains in frequency in cooking, their consumption of soft drinks, and the amount of screen time they were receiving.

Table 13.
Nutrition Knowledge and Cooking Skills
P values

	Place you live (p value)	Age (p value)	Grade (p value)
I watch less t.v.	0.0043	0.1480	0.1077
I eat more whole grains	0.4993	0.7629	0.3874
I drink less soda/soft drinks	0.0083	0.1957	0.6555
I cook more	<0.0001	0.5089	0.3289
I read recipes now when I cook or bake	0.1750	0.7420	0.0515

More participants who reported living in rural areas reported that they drank less (soda/soft drinks), watched less t.v., and cooked more when compared to students who

reported living in a city. Also more participants, who reported living in a suburb also reported drinking less soda/soft drinks and cooking more. These results may suggest that individuals from rural or suburb areas may be more likely to perceive benefits from the program than individuals from a city.

Chapter 5: Discussion

The overall goal of the study was to evaluate the effectiveness of Teen Cuisine in improving student's perceptions about their nutrition knowledge and self-efficacy in the kitchen in a diverse group of adolescents across the Commonwealth of Virginia. It was hypothesized that teens completing the Teen Cuisine program would have perceived gains in nutrition knowledge, cooking skills, and overall self-efficacy in the kitchen.

The Teen Cuisine program specifically targets teens between the ages of 13 to 19 years throughout the Commonwealth of Virginia and incorporates nutrition education with food safety, and in person cooking lessons. Participants in the program also received an interactive resource manual, which gave them the opportunity to review and reinforcement material covered in the classes, (creating weekly goals, tips on how to increase consumption of fruits and vegetables, figures and illustrations to improve knowledge of nutrient sources in foods, assistance when considering food groups at mealtimes, and how to incorporate portion control into their everyday lives) a component missing from other programs.⁶²

Another benefit of Teen Cuisine was that it utilized a survey specifically designed to assess students' perceptions about nutrition knowledge, food safety, and cooking skills. Other programs used food frequency questionnaires and 24-hour food recalls, which was

not specific to evaluating gains in cooking skills, nutrition knowledge, and perceived gains in self-efficacy in the kitchen. However, an important limitation of the current study was that because it did not directly evaluate food intake or cooking skills, it is not possible to conclude whether the program was effective in actually altering the participants' diets or whether they cooked more or tried new foods.

Results from the study demonstrated that teens perceived they achieved gains in nutrition knowledge, cooking skills, and self-efficacy in the kitchen as a result of participating in the program. Other findings from the study included a greater percentage of teens that reported living in rural areas or a suburb, also reported, drinking less soda and cooking more when compared to teens living on a farm, in a city, or town. Additionally, a greater percentage of teens that reported living on a farm and in a rural area also reported watching less t.v since the completion of the Teen Cuisine program when compared to teens living in a town, suburb, or city. Additionally, a greater percentage of girls when compared to boys reported, “ I read recipes now when I cook or bake, I have better measuring skills now, I know how to safely use a knife now, I cook more, I wash my hands before I cook , and I wash my hands before I eat”, as a result of participating in the Teen Cuisine program. Lastly, more teens that reported living in a county within northern Virginia reported, “I learned the foods that I should eat every day, I learned the foods that make up a balanced diet, and I cook more”, as a result of participating in the Teen Cuisine program that teens that reported living in a southern County.

Results from the current study also indicated that more participants from northern Virginia counties reported a beneficial effect of the program on nutrition knowledge and

cooking skills. Counties in northern Virginia have a higher median household income in comparison to those teens living or residing in southern Virginia.⁶⁸ This fact could potentially impact kids' perceptions of their available opportunities for consuming healthier options and perceived gains in behaviors.^{71,72} However; since the current study lacked a control group and baseline data there is no way to know conclusively why these differences exist. It could also be speculated that the participants from the northern counties had higher baseline perceptions of these variables and therefore the differences were not a direct result of the program.

Results also indicated that more teens who reported living in rural areas, on farms, or in a suburb also reported perceived gains in their nutrition knowledge, cooking skills, and self-efficacy in the kitchen. However, again since baseline data was not collected, it is not possible to know from the current study whether these differences are a result of differences in baseline data (lower baseline in these groups) or if greater changes actually occurred in these groups.

As stated previously, limitations from the study include the absence of a pre-test and a control group. Additionally, several questions from the survey were left unanswered by participants, suggesting potential issues with the student's ability to adequately comprehend all of the questions. Lastly, data collected was self-reported perceptions of nutrition knowledge, cooking skills, and behavior changes upon completion of the program, rather than more direct assessments of food intake, nutrition knowledge, and objective assessments of cooking skills. Collecting the latter, would have provided a more direct assessment of the programs effectiveness. As such, future studies would include interventions that incorporate a control group along with pre and

posttest measures of not only perceptions of cooking skills and nutrition knowledge, but also direct measures of these parameters (food intake, cooking skills, nutrition knowledge).

Through the use of the interactive manual, the weeks' lessons were reinforced, allowing participants the opportunity to revisit the material and continue making shifts in their dietary patterns, set goals, "tips on how to eat smart and be healthy", and learn about the importance of fruits, vegetables, and whole grains in the diet.

Results from the Teen Cuisine program do suggest a need for cooking skills programs that targets teens, and incorporates cooking lessons with nutrition knowledge, and food safety and sanitation. Teen Cuisine increased perceived gains in self-efficacy in the kitchen, and the consumption of fruits, vegetables, and whole grains in the diet. Future interventions should also include long-term follow-up to ensure students are maintaining the improvements resulting from the program and continuing to combat and prevent obesity.

Overall, Teen Cuisine was found to be effective in improving perceptions of curriculum specific health behaviors, cooking skills, food safety and sanitation, and perceived gains in self-efficacy in the kitchen. Although future research should be conducted, it suggests that cooking programs can potentially aid and impact the overall health and well-being of teens.

Figure: 1



4-H Healthy Living Program Post Survey For Grades 8th – 12th

Dear Participant:

You are being given this survey because you are part of a Virginia Cooperative Extension program – Teen Cuisine - offered by 4-H, the Family and Consumer Sciences, and the Family Nutrition Program. Your responses help us know how well the program is doing to reach its goals.

This survey is voluntary. If you do not want to fill out the survey, you do not need to. However, we hope you will take a few minutes to fill it out because your answers are important.

This survey is private. No one at your school, home, or 4-H program or project will see your answers. Please answer all of the questions as honestly as you can. If you are uncomfortable answering a question, you may leave it blank.

This is not a test. There are no right or wrong answers, and your answers will not affect your participation or place in the program in any way.

Thank you for your help!

Tell us about your Experience

Please select the responses that best describe you.

1. Teen Cuisine is a program that is offered through 4-H, as well as the Family and Consumer Sciences (FCS) and Family Nutrition Programs (FNP). How many years have you been participating in 4-H?

(Mark one box)

- This is my first year
- This is my second year
- Three or more years

2. Which one of the following best describes how many hours you typically spend in 4-H programs/projects each week? (Mark one box)

- Less than one hour
- Between one and three hours
- More than three hours

3. Which of the following best describes how you are involved in 4-H? (Mark each box that applies to you.)

- | | |
|--|---|
| <input type="checkbox"/> Clubs | <input type="checkbox"/> Local fairs/events |
| <input type="checkbox"/> Camps | <input type="checkbox"/> Community service projects |
| <input type="checkbox"/> After-school programs | <input type="checkbox"/> Working on my projects at home |
| <input type="checkbox"/> In-school programs | <input type="checkbox"/> Other |

The U.S. Department of Agriculture (USDA) is an equal opportunity provider and employer. This material is partially funded by USDA's Supplemental Nutrition Assistance Program – SNAP which 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 county or city Department of Social Services or to locate your county office call toll-free: 1-800-552-3431 (M-F 8:15-5:00, except holidays). By calling your local DSS office, you can get other useful information about services. This material was partially funded by the Expanded Food Nutrition Education Program, USDA, NIFA.

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4-H Healthy Living Program Post Survey • OCTOBER 2013

PAGE 1



Nutrition Knowledge

4. Please indicate to what extent you agree or disagree that *your experience in Teen Cuisine* has resulted in the following outcomes. (Select one response in each row by marking the appropriate box)

As a result of participating in a 4-H Healthy Living Program...	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>	<i>Not Applicable to Teen Cuisine</i>
I learned the foods that I should eat every day	<input type="checkbox"/>				
I learned what makes up a balanced diet	<input type="checkbox"/>				
I learned why it is important for me to eat a healthy diet	<input type="checkbox"/>				
I learned how to make healthy food choices	<input type="checkbox"/>				
I learned how many calories I need to eat each day	<input type="checkbox"/>				
I learned the importance of fruits and vegetables in my diet	<input type="checkbox"/>				
I learned the importance of whole grains in my diet	<input type="checkbox"/>				

Food Choices

5. Please indicate to what extent you agree or disagree that *your experience in Teen Cuisine* has resulted in the following outcomes. (Select one response in each row by marking the appropriate box)

As a result of participating in a 4-H Healthy Living Program I now take the following actions...	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>	<i>Not Applicable to Teen Cuisine</i>
I think about what foods my body needs during the day	<input type="checkbox"/>				
I make food choices based on what I know my body needs	<input type="checkbox"/>				
I make healthy food choices whenever I can	<input type="checkbox"/>				
I match my food intake to the number of calories I need to eat each day	<input type="checkbox"/>				
I encourage my family to eat meals together	<input type="checkbox"/>				
I encourage my family to cook meals together	<input type="checkbox"/>				



6. Please indicate to what extent you agree or disagree that *your experience in Teen Cuisine* has resulted in the following outcomes. (Select one response in each row by marking the appropriate box)

As a result of participating in a 4-H Healthy Living Program I now take the following actions...	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable to Teen Cuisine
I eat more fruits and vegetables	<input type="checkbox"/>				
I eat more whole grains	<input type="checkbox"/>				
I eat less junk foods	<input type="checkbox"/>				
I drink less soda/soft drinks	<input type="checkbox"/>				
I drink more water	<input type="checkbox"/>				
I eat less saturated fat	<input type="checkbox"/>				
I eat smaller portion sizes	<input type="checkbox"/>				
I watch less t.v.	<input type="checkbox"/>				
I use video games and computers less in my free time	<input type="checkbox"/>				

Please select the responses that best describe you.

7. My family eats at least one meal a day together.

- Yes
 No

Cooking Skills

8. Please indicate to what extent you agree or disagree that *your experience in Teen Cuisine* has resulted in the following outcomes. (Select one response in each row by marking the appropriate box)

As a result of participating in a 4-H Healthy Living Program I now take the following actions...	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable to Teen Cuisine
I read recipes now when I cook or bake	<input type="checkbox"/>				
I have better measuring skills now	<input type="checkbox"/>				
I know how to safely use a knife now	<input type="checkbox"/>				
I cook more	<input type="checkbox"/>				
I wash my hands more before I cook	<input type="checkbox"/>				
I wash my hands more before I eat	<input type="checkbox"/>				

9. Please share any additional comments or feedback you would like to share about your experience with Teen Cuisine.

Tell us about You

10. How old are you? _____ years

11. What grade are you in? _____

12. Which of the following best describes your gender? (Mark one box)

- Female
- Male

13. Which of the following best describe your race? (Mark each box that applies to you.)

- American Indian or Alaskan Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White

14. Which of the following best describes your ethnicity? (Mark one box)

- Hispanic or Latino
- Not Hispanic or Latino

15. Which of the following best describes the primary place where you live? (Mark one box)

- Farm
- Rural (non-farm residence, pop. < 10,000)
- Town or City (pop. 10,000 – 50,000)
- Suburb of a City (pop. > 50,000)
- City (pop. > 50,000)

THANK YOU!



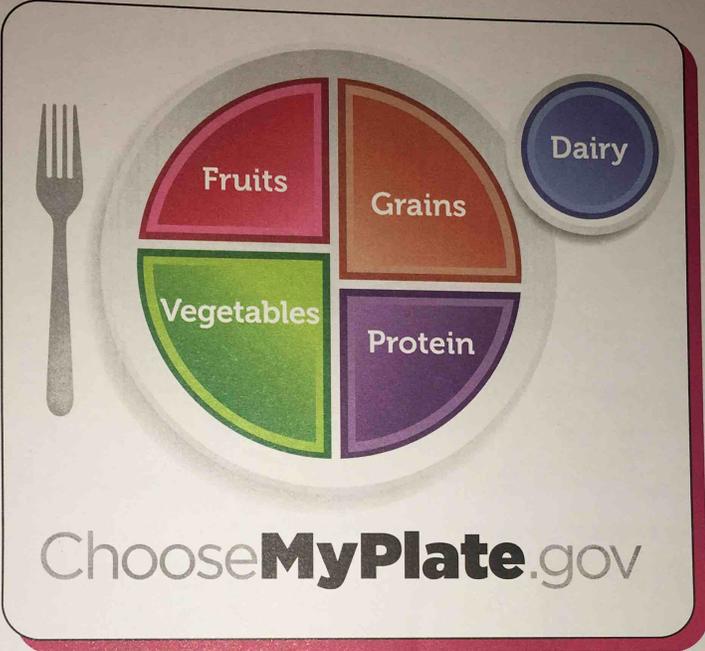
4-H Healthy Living Program Post Survey • OCTOBER 2013
PAGE 4



Figure: 2

Eat Smart

MyPlate Makes Good Nutrition Simple!



Choose **MyPlate**.gov

My Goals for This Week

Write two nutrition goals you want to work toward this week.

Goal 1:

Goal 2:

 18 U.S.C. 707

1

Eat Smart

Follow the MyPlate Tips to Eat Smart and Be Healthy

My Daily Food Plan

Based on the information you provided, this is your daily recommended amount for each food group.

 <p>GRAINS 6 ounces</p>	 <p>VEGETABLES 2 1/2 cups</p>	 <p>FRUITS 2 cups</p>	 <p>DAIRY 3 cups</p>	 <p>PROTEIN FOODS 5 1/2 ounces</p>
<p>Make half your grains whole Aim for at least 3 ounces of whole grains a day</p>	<p>Vary your veggies Aim for these amounts each week: Dark green veggies = 1 1/2 cups Red & orange veggies = 5 1/2 cups Beans & peas = 1 1/2 cups Starchy veggies = 5 cups Other veggies = 4 cups</p>	<p>Focus on fruits Eat a variety of fruit Choose whole or cut-up fruits more often than fruit juice</p>	<p>Get your calcium-rich foods Drink fat-free or low-fat (1%) milk, for the same amount of calcium and other nutrients as whole milk, but less fat and Calories Select fat-free or low-fat yogurt and cheese, or try calcium-fortified soy products</p>	<p>Go lean with protein Twice a week, make seafood the protein on your plate Vary your protein routine—choose beans, peas, nuts, and seeds more often Keep meat and poultry portions small and lean</p>

List foods you like to eat that fit into each of the food groups.

MyPlate Tips to Eat Smart

Make at least _____ your grains whole grains. Vary your _____.

focus on _____. Get your _____-rich foods.

Go _____ with protein.

And get 60 minutes of physical activity every day!

Power Up With Breakfast

"Eat breakfast like a king, lunch like a prince, and supper like a pauper." — Adele Davis

List the top three reasons why teens skip breakfast.

1. _____ _____	2. _____ _____	3. _____ _____
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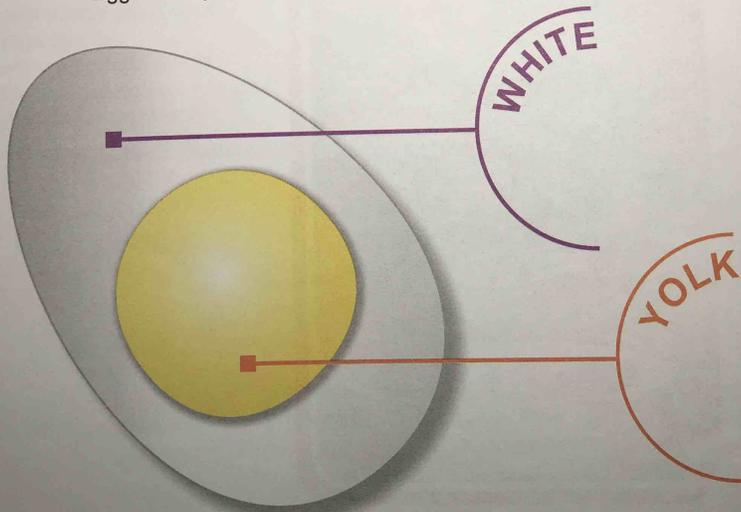
What's for Breakfast?

List foods from each group that would make great breakfast foods.

Fruit	Vegetables	Grains	Protein	Dairy
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

EGGcellent Source of Nutrients!

Eggs are a perfect breakfast food. Describe the nutrients found in each part of the egg.



Nutrients on the Nutrition Facts Labels

See if you can match the nutrients as seen on the Nutrition Facts label with what they do in your body.

Nutrients That Provide Energy

Carbohydrate <input type="checkbox"/>	Provides the most concentrated source of energy. Protects our organs, provides insulation, and transports and stores many important vitamins.
Protein <input type="checkbox"/>	Made of amino acids that are important for building muscles, hormones, and many body functions.
Fat <input type="checkbox"/>	Made of saccharides or chains of sugar molecules. Can be short or very long chains.

Nutrients We Need to Limit

Saturated fat <input type="checkbox"/>	A waxy, fat-like substance that can lead to heart disease if found in high quantities in the blood.
Sodium <input type="checkbox"/>	Simple carbohydrates that are added to many processed foods.
Cholesterol <input type="checkbox"/>	Fat from animal sources. Is less healthy and, if eaten in large quantities, can lead to heart disease.
Unsaturated fat <input type="checkbox"/>	Fat from plant sources. Can actually protect against heart disease. Eat in moderation.
Sugar <input type="checkbox"/>	A mineral that is essential for the body in small amounts but found in very high amounts in most processed foods.

Nutrients We Need to Increase

Dietary fiber <input type="checkbox"/>	Calcium and iron are listed on the Nutrition Facts label but there are many others. They do important things like give you strong bones, help move nerve signals around the body, and keep your water balance constant.
Vitamins <input type="checkbox"/>	An indigestible carbohydrate that aids in digestion, makes you feel full, and can help lower cholesterol.
Minerals <input type="checkbox"/>	Also a nutrient but not listed on the Nutrition Facts label. You should get about 64 ounces of this every day.
Water <input type="checkbox"/>	A and C are on the Nutrition Facts label but there are more. They help with many body processes like converting food to energy, healing wounds, and helping you see clearly at night.

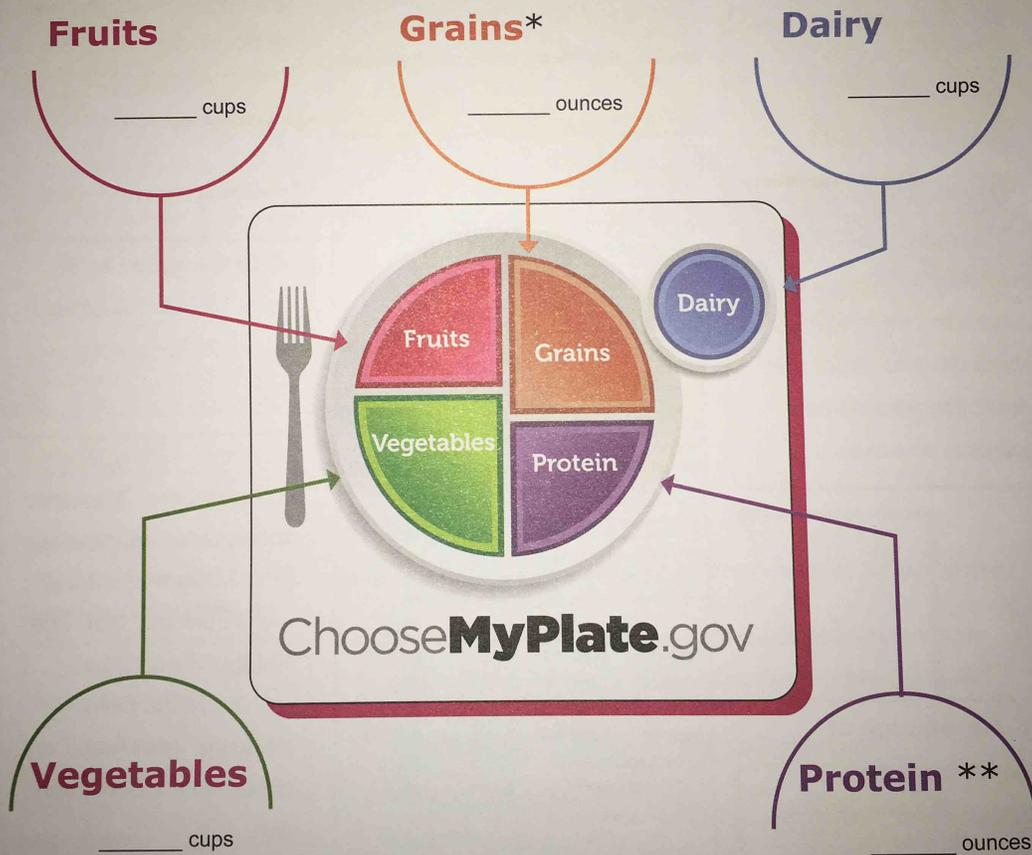


You Are What You Eat

My Daily Food Plan

MyPlate shows you what your plate should look like at each meal to have a balanced diet. But how do you know how much of each food group you should aim for each day? Go to ChooseMyPlate.gov and choose "Daily Food Plans." There you can find how much you should eat based on your age, gender, and activity level. You can also download a worksheet to track what you eat and see if you reach your recommended levels.

Visit ChooseMyPlate.gov and record the recommended amounts for you! Record your findings in the MyPlate graphic below.



* In general, 1 slice of bread; 1 cup of ready-to-eat cereal; or ½ cup of cooked rice, pasta, or cereal can be considered equivalent to 1 ounce from the grains group.

** In general, 1 ounce of lean meat, poultry, or fish; 1 egg; 1 tablespoon of peanut butter; ¼ cup of cooked, dry beans; or ½ ounce of nuts or seeds can be considered equivalent to 1 ounce from the protein group.

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Appendices

Appendix A: IRB Approval

Appendix B: 4-H Healthy Living Program Post Survey and Figures for Grades 8th -12th

Appendix C: Recipes in Teen Cuisine Program

Appendix D: Teen Cuisine Agreement

Appendix A: IRB Approval

IRB # 13-789: Application History

Current Application

Application Type	New Application
Last Status	Approved on Sep 13, 2013
Submitted Date	Sep 12, 2013
Created By	Elena L Serrano
Created Date	Sep 9, 2013

[« Return To IRB #13-789 Summary](#)

Old Applications

Application	Status	Submitted Date	Approval Date	Created By
There are no previous applications for this protocol.				

[« Return To Your Protocols](#)

Appendix B: Sample Recipes From the Teen Cuisine Program

Basic Omelet	
Ingredients:	Directions:
2 eggs	1. Spray the skillet with nonstick cooking spray and cook raw vegetables until tender. Set aside for later.
2 tablespoons milk	2. Beat eggs, milk, salt, and pepper in a small bowl until blended.
1/8 teaspoon salt	3. Heat butter in a nonstick skillet over medium-high heat until hot
1/8 teaspoon ground black pepper	4. Pour in egg mixture. Mixture should set immediately at edges.
1 teaspoon butter	5. Gently push cooked portions from edges toward center with inverted spatula so uncooked eggs can reach the pan's hot surface. Continue cooking, tilting pan and gently moving cooked portions as needed.
½ filling, such as shredded cheese, onions, spinach, or other vegetables	6. When the top surface of eggs is thickened and no visible liquid egg remains, place filling on the bottom half of the omelet.
	7. Fold omelet in half-top to bottom, covering the filling- with spatula and slide onto a plate.
You'll also need	8. Serve immediately.
Nonstick cooking spray	
Skillet	
7- to 10-inch or nonstick skillet	
Small bowl	
Spatula	
Fork or whisk	
Measuring cups and spoons if available	
Knife and cutting board, depending on choice of filling	

Tortilla Bean Dip	
Ingredients:	Directions:
15 ounces refried beans	1. Open can of refried beans and place in a bowl.
15 ounces salsa	2. Stir in salsa.
4 ounces low-fat cheddar cheese, shredded	3. To serve hot, microwave for 1-2 minutes, then stir.
8 ounces baked tortilla chips	4. Top with shredded cheese and serve hot or cold with chips.
You'll also need:	
Mixing bowl	
Large Spoon	
Grater	
Microwave (optional)	

Appendix C: Teen Cuisine Agreement



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Teen Cuisine



Thank you for agreeing to use the curriculum from the Family Nutrition Program. To help us comply with our federal funding requirements, please complete this form:

Thanks again! Pauline Stokes, Nutrition Outreach Instructor Central District

I have received the Teen Cuisine curriculum and handouts:

I understand that these materials are the property of the Family Nutrition Program and are free to use while the school or center is teaching the Teen Cuisine curriculum. I agree to teach at least 6 hours with these materials. _____ *Please initial here*

I understand that the school, center, or church will keep the materials until the lessons are completed, and that they will then be returned to the Family Nutrition Program. I also understand that, if the materials will be used in the future, arrangements to extend the loan of materials can be made with the Nutrition Outreach Instructor.

_____ *Please sign here*

Pauline Stokes, Nutrition Outreach Instructor
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This material was partially funded by the Supplemental Nutrition Assistance Program – SNAP. The Supplemental Nutrition Assistance Program (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 county or city Department of Social Services (phone listed under city/county government). For help in finding local number, call toll-free: 1-800-552-3431 (M-F 8:15-5:00, except holidays). By calling your local DSS office, you can get other useful information about services. This institution is an equal opportunity provider and employer. This publication was partially funded by the Expanded Food Nutrition Education Program, USDA, NIFA.

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Memorandum of Agreement

Between

&

Virginia Polytechnic Institute and State University for its Virginia Cooperative Extension

Virginia Cooperative Extension (VCE) and Virginia Department of Social Services address the nutrition needs of Supplemental Nutrition Assistance Program (SNAP) participants and other low income adults and youth through the Supplemental Nutrition Assistance Program - Education (SNAP-Ed). This nutrition program and the Expanded Food and Nutrition Program (EFNEP) are known in Virginia as the Family Nutrition Program (FNP).

The likelihood of nutrition education messages leading to changed behaviors is increased when consistent and repeated messages are delivered through multiple channels. Cross-program coordination/collaboration at the state and community levels include working together toward a common goal to reinforce and amplify each other's efforts.

In an effort to reach limited resource adults and youth with an effective nutrition education program, the _____ (name of agency) and FNP agree to a collaborative relationship. In this relationship, a FNP Assistant or Nutrition Outreach Instructor will provide nutrition education programs according to guidelines of SNAP-Ed or EFNEP and the _____ (name of agency) will assist in the implementation of FNP by (check all that apply):

- | | |
|--|---|
| <input type="checkbox"/> Facilitating/encouraging involvement in FNP of local counterparts | <input type="checkbox"/> Assembling participants for food/nutrition classes |
| <input type="checkbox"/> Providing client referrals | <input type="checkbox"/> Organizing/preparing meeting space |
| <input type="checkbox"/> Identifying/coordinating meeting sites | <input type="checkbox"/> Organizing/preparing materials for food/nutrition classes |
| <input type="checkbox"/> Supplying food for cooking experiences | <input type="checkbox"/> Assisting with teaching food/nutrition information/skills to FNP clients |
| <input type="checkbox"/> Providing transportation | <input type="checkbox"/> Assisting with group classes in ways other than in teaching |
| <input type="checkbox"/> Providing child care | <input type="checkbox"/> Other (please describe) _____ |
| <input type="checkbox"/> Providing office supplies (photocopies, paper . . .) | |

This agreement is effective for the period commencing October 1, _____ and ending September 30, _____ or until the two entities mutually agree to void the agreement.

Authorized Signatures:

Printed Name: _____

_____ Date: _____

Signature: _____ Date: _____

Edwin J. Jones, Director, Virginia Cooperative Extension

Title: _____ Phone#: _____

College of Agriculture and Life Sciences, Virginia Tech

Name of Agency: _____

Confidentiality Statement: As a partner with the Virginia Family Nutrition Program, I understand that some of my work may involve access to information/ records that are considered confidential. I acknowledge my responsibility to respect the confidentiality of SNAP-Ed participants and to follow the rules of confidentiality as required by Virginia's Family Nutrition Program and the Department of Social Services and Federal regulations at 7 CFR 272.3(c) to protect privacy and to act in a professional manner.

This material was partially funded by the Supplemental Nutrition Assistance Program - SNAP. The Supplemental Nutrition Assistance Program (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 county or city Department of Social Services (phone listed under city/county government). For help in finding local number, call toll-free: 1-800-552-3431 (M-F 8:15-5:00, except holidays). By calling your local DSS office, you can get other useful information about services. This institution is an equal opportunity provider and employer. This publication was partially funded by the Expanded Food Nutrition Education Program, USDA, NIFA.

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