

Evaluation of Arizona State University's Camp CRAVE:
Does a Week-Long Cooking Camp Alter Eating Behavior, Improve Nutrition
Knowledge, and/or Promote Cooking in Young Children?

by

Kelly Bell

A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Science

Approved May 2017 by the
Graduate Supervisory Committee:

Carol Johnston, Co-Chair
Christina Shepard, Co-Chair
Sandra Mayol-Kreiser

ARIZONA STATE UNIVERSITY

August 2017

ABSTRACT

Pediatric obesity is a continuing concern in the United States. Preventative intervention methods in the form of nutrition education, including hands-on cooking lessons may improve personal choices for healthy eating. This study assessed the effectiveness of Arizona State University's Camp CRAVE, a one-week course promoting healthy eating and teaching basic cooking skills. Children ages 9-13years (mean 10.3years, n=31) participated in a pre- and post-test survey to assess if the one-week course would increase self-efficacy to cook at home and increase knowledge of nutrition. The course showed significant increase in the participants' nutrition knowledge and preference for healthier food options. There was a significant improvement in the children's confidence levels to prepare meals at home. Further research on family socioeconomic status and parental perception of cooking at home would be beneficial.

TABLE OF CONTENTS

	Page
LIST OF FIGURES	v
LIST OF TABLES	vi
CHAPTER	
1 INTRODUCTION	1
Overview.....	1
Statement of the Problem.....	2
Research Aim.....	3
Hypothesis.....	3
Delimitations.....	3
Limitations.....	4
2 REVIEW OF LITERATURE.....	5
Childhood Obesity.....	5
Dietary Choices.....	8
Nutrition and Cooking.....	18
iCook 4-H Program.....	18
Brighter Bites.....	19
Cooking with Kids.....	21
The CATCH Kids Club.....	23
The Cookshop Program.....	24
Camp CRAVE.....	27
3 METHODS.....	30

CHAPTER	Page
Study Design.....	30
Recruitment and Consent.....	30
Anthropometrics.....	30
Participants.....	30
Support Staff.....	31
Class Structure.....	31
Materials.....	32
Statistical Analysis.....	34
4 RESULTS.....	36
Demographics.....	36
Self-Efficacy Assessment.....	37
Food Knowledge and Behavior.....	41
Food Perceptions.....	44
Secondary Analysis: Food Choices.....	48
Secondary Analysis: Willingness to Try New Foods and Food Choices.....	48
Secondary Analysis: Number of Times Cooking at Home.....	49
5 DISCUSSION.....	51
6 CONCLUSION.....	55
REFERENCES.....	56
APPENDIX	
A. IRB APPROVAL PAGE.....	60
B. CAMP CRAVE DAILY STRUCTURE.....	62

APPENDIX	Page
C. CAMP CRAVE BASIC CAMP WEEK.....	64
D. QUESTIONNAIRE.....	66
E. ADDITIONAL FIGURES, TABLES, AND DATA.....	73

LIST OF FIGURES

Figure	Page
1: Question 1 – Participant Grade Level.....	36
2: Question 2 – Age Range of Participants.....	36
3: Question 4 – Ethnic Background of Participants.....	37
4: Questions 5-10 – Confidence to Perform Tasks Independently.....	40
5: Questions 17, 19-20 – Food Knowledge and Behavior.....	42
6: Questions 21-23 – Food Knowledge and Behavior.....	42
7: Question 24 – Perceived More Healthy Foods.....	44
8: Question 24 – Perceived Less Healthy Foods.....	45

LIST OF TABLES

Table	Page
1. Data from Questions 1-4: Demographics of Participants.....	37
2. Data from Questions 5-10: Confidence Assessment.....	39
3. Data from Questions 17-23: Food Knowledge and Behavior.....	43
4. Data from Question 24: Food Perceptions – Healthy Foods.....	46
5. Data from Question 24: Food Perceptions – Not Healthy Foods.....	47

INTRODUCTION

Overview

Pediatric obesity has been a growing epidemic in the past two decades. According to NHANES 2003-2004 data, 18.8% of children 6-11 years of age were designated as obese (having a BMI greater than the 95th percentile) and 37.2% were at risk for becoming overweight (having a BMI between the 85th and 95th percentile). In children 2-6 years of age, 13.9% were classified as overweight and 26.2% at risk for becoming overweight. These percentages increased since the NHANES 1988-1994 data were released and are continuing to grow among children.¹

Statistics from the NHANES 2007-2008 data suggest this trend may be plateauing; however, BMI remains steadily high with no decline in the past decade.² The 2013-2014 NHANES data show the prevalence of obesity for children and adolescents aged 2-19 years was 17.0% (extreme obesity was 5.8%). For children 2-5 years, the trend towards obesity increased until 2003-2004 where it then decreased with the current data showing 8.9% of children obese. In children 6-11 years, the trend increased until 2007-2008 then plateaued (17.5% of children in this age group in the obese category). The trend towards obesity is continuing to increase for adolescents with the current data showing 20.5% of children 12-19 years of age are obese.³

There are multiple factors that contribute to childhood obesity. Thus, the treatment for childhood obesity is complex and difficult.⁴ Children's BMI is associated with being larger when one parent is obese as compared to children with two parents that are not overweight. Larger BMI values are most associated in children with both parents being obese.⁴⁻⁸

The most effective intervention thus far is prevention.^{4,9,10} In response to this increasing rate of obesity in children, programs have been initiated that promote physical activity and healthy eating, including cooking.¹¹ Many children do not eat the recommended amounts of fiber-rich foods, such as vegetables, fruits, and whole grains.¹¹⁻¹⁴ The literature suggests hands-on cooking experiences and the activity of eating food with peers paired with learning may have a positive impact for younger children taking an interest in healthy foods.¹¹

Arizona State University's Camp CRAVE is a summer program promoting physical activity, nutrition knowledge, and basic cooking skills. The aim of this program is to promote healthy lifestyle decisions for children in grades 4-6. Camp CRAVE is an acronym for Creative, Resourceful, Active, adVenturous, and Enthusiastic. The camp takes place on Arizona State University's downtown campus during the summer. There are four week-long camps available that run daily Monday through Friday for approximately 4 hours each day. Camps consist of two basic camps, teaching basic cooking skills and nutrition information, and two advanced camps, building from the lessons of the basic camp. Students who wish to enroll in the advance camp must complete a basic camp first. Both basic and advanced classes are identical in lessons. Students may attend all four sessions. For purposes of this study, we evaluated the effects of a basic camp that a student is attending for the first time.

Statement of the Problem

The primary purpose of this study is to examine data from participating campers at Arizona State University's Camp CRAVE to determine the impact the one-week

course has on the child. Specifically, this study will measure if the child takes an increased self-efficacy in cooking and gains knowledge in nutrition.

Research Aim

The purpose of this study is to determine if a one-week cooking class increases the self-efficacy and knowledge of cooking and nutrition in children grades 4 through 6.

Hypotheses

It is anticipated that there will be a positive impact on self-efficacy towards cooking with participation in Camp CRAVE. Additionally, it is anticipated there will be an increase in nutrition knowledge with participation in Camp CRAVE. The findings in this study are expected to support findings in previous studies that evaluate the associations between classes that promote healthy lifestyles and personal interest towards making healthy choices.

Specific Aim 1: To explore whether cooking classes increase a child's confidence to cook.

Hypothesis 1: Self-efficacy in cooking will increase in Camp CRAVE campers after participating in a one-week course.

Specific Aim 2: To determine if a one-week course of basic nutrition information will improve a child's ability to identify more nutritious foods vs. less nutritious foods.

Hypothesis 2: Nutrition knowledge will increase in Camp CRAVE campers after participating in a one-week course.

Delimitations

Subjects were boys and girls aged 8-10 years as participants of Arizona State University's Camp CRAVE, a one-week (five day) class series promoting healthy

physical activity, eating, and cooking skills. Participants were all from Phoenix, AZ. All participants in this study must be able to read and write in English.

Limitations

The scope of data collection is limited to just the participants in Arizona State University's Camp CRAVE. Children will complete the same questionnaire at the beginning and end of each one-week course. Although children will be encouraged to answer honestly and reassured answered will not be judged, the information could be skewed if a child feels compelled to give answers based on perceived expectation rather than honest experience, which may limit the accuracy of the scores.

REVIEW OF LITERATURE

Childhood Obesity

Over the past two decades, pediatric obesity has been a growing concern. Obesity is defined as having a BMI greater than or equal to the 95th percentile of the Centers for Disease Control and Prevention (CDC) growth charts. According to the National Health and Nutrition Examination Survey (NHANES) data, children ages 2-5 years showed an increasing trend in obesity from 1988-2004. This trend decreased for the 2007-2008 data and currently shows 8.9% of children in this age group being obese for 2011-2014.¹⁻³ In children ages 6-11 years, the obesity trend increased according to NHANES data in 1988-2008. During the 2007-2008 period, data showed a plateau, and current 2011-2014 data show this age group at 17.5% obese.¹⁻³ The adolescent age group (12-19 years) show the most concern with an increasing obesity trend during 1988-2008. Current NHANES data show adolescent children at 20.5% obese.¹⁻³

With multiple contributing factors to childhood obesity, the best remedy for this epidemic may be complex.⁴ Furthermore, considering a child's BMI is linked with being greater when one or more parent is also obese, prevention may be the most effective strategy for intervention.⁴⁻¹⁰ Over the past couple decades, programs promoting physical activity and healthy eating have attempted to encourage healthy lifestyle behaviors in hopes of preventing this trend from increasing.

The Centers for Disease Control and Prevention evaluated various children participating in the Special Supplemental Nutrition Program for Women, Infant, and Children (WIC), finding similar trends in overweight and obesity for children 2-4 years of age as the NHANES data with 14.5% of children in this program in the obese

category. WIC is a program that includes nutrition education to the parent, sometimes involving the children, to promote healthy eating.¹⁵

In Central Pennsylvania, 168 girls were assessed every two years for obesity prevalence at ages of 5 years, 7 years, 9 years, 11 years, and 13 years. Participants' parent's BMI were measured when girls were at age 5 years. The participants' measurements for BMI were taken at age 5 years and every two years to the age of 13 years. Participants were divided into four groups: both parents overweight, mother-only overweight, father-only overweight, and neither parents overweight. Girls' weight status increased on average in all groups from ages 5-11 years with a slight decrease in prevalence of overweight/obesity at age 13 years. There was no noted difference between groups with one parent being overweight, whether it was the mother-only or father-only group. However, there was a significant difference in prevalence of overweight and obese measurements among girl participants, where prevalence was significantly highest in the group with both parents being overweight. Following, the groups with one-parent overweight had significantly higher occurrences of overweight/obesity compared to the group with neither parent overweight. The results of this study show the compounding effect parents have on children and the early age when this influence may start.⁵

Like the previous study, another study looked at data of children ages 0-8 years, following the participants for six years. This study found children had a significantly increased risk of obesity when the mother was overweight or obese. The risk for children to become overweight or obese was 1.5 times greater when mothers were overweight, and the risk for children to become overweight or obese was three times greater when the mother was obese.⁷

Another study also measured children's weight and height to predict likelihood of obesity risk as they enter adulthood. This study found consistent results with the other studies, where the risk factor increased when the mother was obese vs. the father. The risk factor was significantly greater when both parents were overweight or obese. Children under 10 years of age were found to have the largest risk for overweight and obesity when one or both parents were overweight during this time in their life.⁸

With such strong association for parental influence on childhood obesity, preventative measures are warranted for reaching children and families to influence healthier food and lifestyle choices. The Health and Obesity: Prevention and Education (HOPE) project aimed to train pediatric clinicians to recognize patients at risk for obesity. Clinicians were trained to counsel patients and families to promote a healthy weight, focusing on health consequences of obesity and using constructive weight counseling to promote behavior change. In focus groups, pediatric medical clinicians and dentists reported positive reception towards addressing the obesity epidemic. However, many practitioners voiced concern of upsetting patients/families and the possibility of a poor success rate using medical office visits as an intervention tactic towards obesity.⁹

Rather than intervening in the medical office setting, a broader focus may be beneficial to positively influence better healthy lifestyle choices that promote a healthy weight. Being that the state of overweight and obesity among parents show to have a positive correlation with the state of the child's weight status, reaching the parent may be beneficial to create a positive impact towards remedying the obesity epidemic. However, a challenge exists to reach adults and effect behavior change. Prevention has become a

focus to reach children before becoming adults challenged with balancing their weight status and other life responsibilities.

Dietary Choices

To first understand the best method for prevention, one must look at the current state of dietary intake and choices. Many children do not eat the recommended amounts of vegetables, fruits, and whole grains.¹²⁻¹⁴ The literature suggests hands-on cooking experiences and the activity of eating food with peers paired with learning may have a positive impact for taking an interest in healthy foods.^{11,16,17}

With dietary intake of fruits and vegetables helping to prevent risk of chronic diseases⁴, one study focused on assessing a program targeted towards 1,698 children in fourth grade eating fresh fruits and vegetables. In Birmingham, Alabama, this study worked with 28 elementary schools within three school districts. Groups were assigned to an intervention group or a control group. The study assessed the students at the beginning of the fourth-grade school year, one year later after completing the 14-lesson intervention, and two years later after three “booster” sessions were given during the fifth-grade year.¹²

Lessons were 30-45 minutes. Classes, called High 5 lessons, were held for seven weeks with a three-day pattern: a class given on two days in the week and an observation day between with reminders on current lesson objectives. On days lessons were given, children were encouraged to consume five servings of fruits and vegetables, with parents receiving hand-out information to help with encouragement. The outcome of the classes was measured by 24-hour diet recalls reported by the parents. Days of dietary recall were randomly assigned to reflect the best average intake.

By the end of the sessions, 56% of children in the intervention group reported consuming five or more servings of fruits and vegetables on days the High 5 lessons were given. The intervention group consumed significantly more fruits and vegetables than the control group in both diet recall and cafeteria setting. This shows how lessons on healthy foods may have a positive impact on improved dietary intake.

Another study looked at 48 schools in DeKalb County, Georgia. Seven-day food records were collected from third grade children. Children received lessons on how to complete records and judge portion sizes to check off on their forms. Foods were categorized into fruits, 100% fruit juices, non-fried vegetables, fried vegetables, and legumes. Seeds, nuts, and fruit-based desserts were not included. The study found significantly more fruits and vegetables were consumed during weekday lunch with students who participated in the school lunch program.¹³

Children at home may not be receiving the opportunity to learn about healthy foods and cooking. The amount adults cook meals at home varies greatly. Information from the 2007-2008 NHANES data found many adults are cooking at home, excluding reheating leftover foods, with as much as 49% of the population cooking as much as 6-7 times within the week. Factors such as socioeconomic status effected the rate of home-cooked meals. Individuals living below 130% of the federal poverty line prepared meals less often (5.4 dinners per week). However, individuals living 350% above the federal poverty line average even fewer home-cooked meals (4.8 dinners per week). Adults with less education showed to cook an average of 6 dinners per week, while adults who have attended some college only cooked an average of 4.9 dinners per week.¹⁸

Many adults perceive having time constraints to be able to prepare meals at home due to cultural changes of higher frequencies of dual-working parents, single parenting, and perceived busier lives.¹⁹ This correlates with less time being devoted towards at-home meal preparation over that past few decades.^{20,21} Along with perceived time constraints, many adults feel less self-efficacy towards being able to create a healthy home-cooked meal.¹⁹ In addition, with more convenient sources of quick or ready-to-eat foods, adults may be preparing meals less as a means of managing stress and/or time for work-life balance.²²⁻²⁴

One study looked at 35 employed mothers and how they used time for food for themselves and the family.¹⁹ Mothers had to work at least 20 hours per week to be considered for the study. The women were between 25-54 years of age. All had at least one child under the age of 16 years living in their home. Women were interviewed for 45-90 minutes to assess their perception of time and food preparation. Specific questions revolved around meals on busy days, on days with minimal stressors, and on days when they did not have to go into work.

Common findings in this study included the mothers' feelings of time scarcity. There were significantly higher reports of time scarcity with younger children in the household vs. older children that could help contribute to meal preparation and clean up. Single mothers and mothers with less supportive partners reported more time scarcity than those with household members that assisted in meal preparation activities. With the perception of time scarcity, mealtime was often rushed to move on to other household / family tasks. This means younger children may experience more rushed family meals with less opportunity to learn about the foods they are offered.

Another study looked at data from surveys taken between 1965 to 2007, including the Household Food Consumption Survey, the Nationwide Food Consumption Survey, the Continuing Survey of Food Intakes by Individuals, and the National Health and Nutrition Examination Survey. Using data from 38,565 individuals between ages 19 to 60 years, this study assessed dietary intake changes over the past decades. Foods were categorized as being purchased in grocery stores to be eaten at home or as away from home foods from a restaurant or fast food source.²⁰

The study found a significant increase in daily energy consumption among females. Over the period looked at, energy consumed from at-home food sources significantly decreased by 23%. Less people cook at home from 1965 to 2007, with the lower income groups showing the most significant decline from 67% to 56% of people who cook at home. All data showed a significant decrease in time spent cooking at home, with 35-36 minutes less time devoted towards at-home meal preparation on average. With focus on home meal preparation declining, children may have less exposure and experience to learn to cook at home as they grow towards adulthood.

Since less people are preparing meals at home, it is important to look at how this may change how a child experiences meal time. One study looked at parenting practices in the different settings of meals at home vs. away from home.²² The study looked at 25 mothers of children 5 to 8 years of age. Mothers were asked to eat away from home at minimum twice weekly. Interviews were conducted with the mothers with focus on the following areas: food practices and policies at home and restaurants, decision making practices on restaurant choice and menu selection of meals and beverages, and restaurant preferences.

The study found most mothers had their children order off the children's menu. Full service restaurants and quick-service restaurants were visited in equal proportions. Most mothers reported being more flexible with their child's food selections at restaurants. It was also noted most mothers concurred choosing to eat away from home allowed convenience and saved time. Some mothers reported using time at a restaurant as an opportunity to teach their child(ren) about healthy food choices but ultimately left the decision up to the child.

With perceived time constraints and food choices, another study assessed 69 mothers' and fathers' perceptions of time with meal preparation. Interviews were conducted to assess eating and food preparation routines, strategies on work and non-work days, family roles to provide at home meals, and food choice strategies for family members. All parents worked a minimum of 20 hours per week with seven participants working more than one job. Of the participants, about 67% earned income below the county median for the Upstate New York area studied.²⁴

Like the previous studies, parents reported increased strain towards meal preparation when lacking a supportive partner or having younger children in the home. Many parents reported feelings of a lack of energy to prepare meals, especially on days when they work. The study found many working parents developed coping strategies to compensate for feelings of time constraints and lack of energy by sacrificing quality of nutrition at meal time and including more convenience foods, often with inferior nutrition compared to home-cooked meals.

Research shows when adolescents were included in at-home meal preparation, diets were healthier as they entered adulthood.²⁵ However, there was also conflicting

evidence that involving adolescents may not have the best influence on emerging adulthood food choices due to this stage of life where adolescents strive for independence and begin to enter a busier lifestyle as adults, often choosing less healthy food choices.²⁶ This includes higher intakes of processed foods and less intake of fruits and vegetables.²⁷

One study took data from the Project EAT (Eating Among Teens) study, looking at the dietary intake and weight status among 1,710 younger people. The data was pulled from public schools in the Minneapolis and St. Paul, Minnesota area and followed adolescent participants into early adulthood. The data compared questionnaires completed at a mean age of 15 years and then five years later at a mean age of 20 years. The assessment included meal frequencies, social eating preferences, perceptions of time constraints, and diet quality.²⁵

Data was controlled for ethnicity, socioeconomic status, age, and total energy consumption. The study found a significant positive correlation with family meal frequency during adolescence and increased daily intake of fruits and vegetables, particularly dark green and orange vegetables, during adulthood. This also correlated with increased intake of calcium, magnesium, potassium, and fiber during adulthood. Those who had more family meal frequency during adolescence also had a likelihood of less intake of soft drink beverages during adulthood. Young adults also had a significantly increased likelihood to have higher preference for social meals and planned meals more often when participating in meals with family during adolescence.

Another longitudinal study looked at adolescents and followed them for a ten-year period also using the Project EAT data. The study focused on food preparation practices in the adolescent to early adulthood stages of life. The following assessments were taken:

frequency of helping to prepare food for dinner, frequency of helping to purchase food, frequency of writing a grocery list, attitudes towards food, and diet quality.²⁶

The study found significant positive correlations with adolescents who helped prepare food for dinner and young adults that buy fresh vegetables, write a grocery list, and prepare dinner for themselves and others. Additionally, helping to prepare food for dinner during adolescence had a significant positive correlation with enjoyment in cooking ten years later in early adulthood. Interestingly, for adolescents that helped to cook family dinner, there was a significant increase in young adults preparing meals with vegetables five years later but no significant association ten years later. Approximately one-third of the adults reported having children in the ten-year follow-up study. This may indicate that while involving adolescents in at-home meal preparation may benefit practices as they start early adulthood, time management strategies may not have been mastered once other adult obligations begin, such as having children and advancing in career.

Taking data from the 2009-2010 NHANES report, another study assessed the average dietary intake of individuals in the United States (U.S.). Two 24-hour dietary recalls were collected from 8,406 individuals. Foods in the recall were categorized into four groups: made with unprocessed or minimally processed foods that are as close to its natural form as possible, made with processed culinary ingredients such as sugars and oils used to make scratch recipe items, made with processed foods such as canned or premade foods without preservatives, and made with ultra-processed foods that include preservatives and additives to extend shelf life. Foods with added sugars, not naturally occurring in the food, were also assessed.²⁷

The study found 57.9% of daily average calories consumed by U.S. Americans were from ultra-processed foods. Foods that were minimally processed made up only 29.6% of total average daily calories consumed. Foods that contained added sugars were 14.1% of the average daily calories consumed; 89.7% of this were in the ultra-processed foods category.

Another study took information from the School Nutrition Dietary Assessment Study, a data collection of participants in the National School Lunch Program. This study looked at 2,314 children in grades 1 through 12 from 287 schools within the U.S. The study collected 24-hour diet recalls as well as surveys from each child and parent. Most children eating in school were found to consume low-nutrient, energy dense foods (88%) and sugar-sweetened beverages (25%). Ninety-five percent of the group consumed low-nutrient, energy-dense foods at some point during the 24-hour dietary recall on a weekday. Among the children participating in the National School Lunch Program, the average caloric intake for school lunch was 40% of the total daily intake for elementary age children. Those that participated in both the National School Lunch Program and the School Breakfast Program consumed an average 51% of daily total caloric intake from these two meals. This shows the opportunity for school settings to set a good example for offering healthy foods. Parental role modeling is also important for children. The earlier healthy role modeling starts, the longer-lasting the impact.²⁸

Looking at young adults, one study used the Student Health and Wellness survey to assess students in the St. Paul and Minneapolis, Minnesota area. Students were 603 young adults enrolled in four-year public universities and 598 young adults enrolled in two-year community colleges. The mean age of students was 21 years of age with 79% of

all participants ranging in ages 19-24 years. Questionnaires assess nutrition attitudes and behaviors, including fruit and vegetable intake, fast food consumption, and sugar-sweetened beverage intake. Other food behaviors measured included food preparation, meal routines, food purchasing, and time allocation.²⁹

This study found a positive association between students that prepared meals at home and an increased intake of fruits and vegetables. Conversely, there was a negative association with students that prepared meals at home and a decreased consumption of fast food. When students reported minimal time allocated towards preparing meals, there was an increase in fast food consumption as well. Similar findings with fast food were found with sugar-sweetened beverage intake. The findings of this study suggest the way a young adult structures mealtime and allocates time towards food preparation will determine healthy food choices. If a young adult does not know how to balance his or her time towards these tasks, less healthy food choices could be the consequence.

Another study looked at similar associations with dietary intake and meal structure among young adults. Using the Project EAT (Eating Among Teens) data, this study assessed whether young adults sit down to eat with others or eat on the run and average nutrient intake among 1,687 participants. Most young adults agreed regular sit-down meals accompanied by other people is enjoyable and important. However, many (35% males and 42% females) felt time constraints to structure meals in this manner. Young adults that perceived time constraints showed significantly less frequency of social meals and reported more frequently eating on the run.³⁰

In addition to similar findings of time constraints, this study also found similar associations with dietary intake. Those young adults that reported more frequently eating

meals socially also had significantly higher intake of fruits and vegetables, particularly dark-green and orange vegetables. For the social eaters, females showed significantly less intake of total fat, and males showed significantly higher intakes of total energy, calcium, and fiber. Among those who would eat on the run, there was a significant increase of fast food intake as well as sugar-sweetened beverages, total fat, and saturated fat. There was a significant decrease in fruit, vegetable, and fiber intake among this group. Like previous studies, this study found young adults make healthier decisions on dietary intake when making the time for sit-down meals with others.

A study in New Zealand also surveyed students aged 13-17 years to assess dietary intake with cooking at home. Data was collected from the Youth'12 survey, assessing self-reports of ability to cook from scratch and cook meals for others. The questionnaire also assessed fruit, vegetable, and fast food consumption among the 8,500 secondary school students. Like previous studies, the reports from the surveys found students reporting an ability to cook also had a significantly greater intake of fruits and vegetables, higher frequency of shared family meals, and decreased intake of fast food.³¹

Although the evidence is clear involving adolescents in the meal preparation and planning process is positively associated with healthier nutrient intake in adulthood, adults also report perceived time constraints once younger children enter the home. Currently, family and consumer science classes teach cooking skills to the adolescent range of 12-19 years of age. With statistics showing many adults choose to eat away from home and choose time-saving ultra-processed foods when perceiving time constraints, it may benefit to pursue nutrition and meal preparation education in younger age groups than adolescence.

Nutrition and Cooking

It is known that meals prepared at home tend to be healthier than meals from other sources, such as restaurants or fast-food establishments.²⁸ Giving time for meal preparation is correlated with higher nutrition quality and better weight status among young adults.^{29,30} With perceived time constraints to prepare meals at home, it may be beneficial to start early when teaching cooking skills so that it can be perceived as an easier task to complete within the day.

Cooking classes conducted for children are showing positive effects on the child's choice towards healthy foods. By offering a hands-on experience, children are exposed to different foods and have increased interest towards consuming fruits and vegetables.^{11,32,33} Strategies to incorporate children in education involving healthy food choices and cooking skills may be an effective measure to prevent childhood obesity by promoting healthy choices.³⁴

iCook 4-H Program

One study called the iCook 4-H program paired a child aged 9-11 years with the parent that does most of the meal preparation at home. In this study, the family pair attended six courses over three months, learning about nutrition and cooking skills. This hands-on approach incorporating MyPlate nutrition lessons with cooking healthy recipes showed an increase in using nutrition labels to make food choices and in consuming fiber-rich foods. The outcome also showed a decrease in fast food consumption. Most important, the adult participants reported more involvement with children when preparing meals.¹⁶

This study took place in Maine, Nebraska, South Dakota, Tennessee, and West Virginia. Curriculum focused on MyPlate, food safety, and using technology. Classes were on average two hours long with each lesson covering culinary skills using recipes. Family communication and goal setting was also included in lessons. Fifty-four parent-child pairing participated in the study. Parental ages ranged from 27-54 years. Classes were given every other week over three months with a total of six classes.

Using the pre- and post-test design, the study had participants complete surveys at the beginning of the first class and at the end of the last class to assess the outcome. Surveys were completed online. By the end of the classes, participants showed a significant improvement in meal planning, shopping with grocery lists, and using the Nutrition Facts Label to decide how to eat. There was no significant difference in number of times families ate meals together. However, the group reported a high amount at the beginning of the classes, which could account for the lack of change by the end. Participants did show a significant improvement in purchasing less fast food meals by the end of the classes. The group also showed a significant increase in 100% fruit juice consumption, vegetable-based soup consumption, and whole grain consumption.

Most noted, parents reported an improvement in their child's desire to assist with cooking at home. The beginning of the classes showed 63% of children helping their parents. By the end of the classes, a significant increase to 96% was reported. Self-efficacy in cooking were also significantly improved by the end of the class.

Brighter Bites

Also using a parent-child pairing, another study found improved attitudes towards choosing fruits as a snack (instead of candy) and towards the taste of healthy foods after

implementing a nutrition education program. Part of this education involved using the Coordinated Approach to Child Health (CATCH) curriculum, an evidence-based nutrition and physical activity education program promoting obesity prevention.¹⁷

Brighter Bites is a school-based co-op program in Houston, TX that encourages easier access to fresh fruits and vegetables, including nutrition education. The program runs for 16 weeks with a target towards low-income children and their families. With help from the Houston Food Bank, the program sent home fresh fruits and vegetables, providing an average of 30 pounds of produce to each participating family.

The educational component is based on the CATCH school health program. The CATCH Kids Club program is an evidence-based curriculum designed to teach students nutrition and healthy lifestyle choices. The aim is to influence students to make healthy dietary and physical activity choices. Developed with the support of the National Heart, Lung, and Blood Institute, it is a 32-lesson after-school program. The program was designed for the early prevention of cardiovascular disease.³² It includes a nutrition education manual, an activity box, and hands-on snack preparation activities.³³

Lessons are given weekly at the same time as produce pick-up. Hand-outs, recipes, and demonstrations are included in lessons. An elementary school in Houston participated, where three 3rd grade classrooms received the Brighter Bites program. There were 57 parent-child pairs that participated. Children were 7-9 years of age.

The study used a pre- and post-test design to measure outcomes of food consumption/choice, self-efficacy of food preparation, attitudes towards food, meals at home, and preferences towards fruits and vegetables. Questionnaires were given at the beginning, end, and 8-week mid-point of the program.

By the end of the program, there was a significant increase in self-efficacy to choose fruit as a snack instead of candy. There was also a significant improvement in attitudes towards the taste of healthy foods. Preference for fruits and vegetables showed significant improvement by the end of the program as well. Reported intake of fresh produce showed no significant change throughout the program. Parents reported a significant increase in children helping to prepare meals at home by the end of the program, showing that educational hands-on programs may increase a child's interest and self-efficacy towards nutrition and food preparation.

Cooking with Kids

Evaluating students in fourth grade, one study evaluated the effectiveness of a cooking class compared to a class that involved only tasting foods. In both classes, self-efficacy improved; however, kids in the cooking and tasting group showed the most improvement in confidence to perform culinary tasks. Similarly, preference for fruits and vegetables improved with the greatest improvement shown in the children who participated in classes that allowed hands-on cooking lessons.³⁴

Cooking with Kids is a school-based education program focusing on nutrition hands-on learning. Classes consist of 16 hours of cooking and tasting lessons. These classes are conducted throughout eleven sessions within the school year. This program invited parents to volunteer in the classes and sent recipes home featuring foods in the lesson.

This study was conducted in Santa Fe, NM, involving public school students in fourth grade classrooms. Classes were divided into three groups: lessons with cooking and tasting, lessons with tasting only, and a control group receiving no food lessons. Pre-

and post-test questionnaires were given to assess students' attitudes towards cooking, cooking self-efficacy, and food preferences. Completing both pre- and post-surveys, 961 students participated in the study. The students' ages ranged between 8-12 years. Measurements were taken after each group completed one year of lessons and again after a second consecutive school year of Cooking with Kids curriculum.

All three groups reported improved self-efficacy for cooking. Among students who reported not cooking at home in the pre-test questionnaire, self-efficacy significantly improved 2.5 times more than students who did report to cook at home. The largest improvement was noted among the students in the cooking and tasting group.

Cooking attitudes were more positive among students who reported cooking at home in the pre-test questionnaire compared to student who reported not cooking at home. There was no significant change in attitudes shown among the groups. Food preferences showed the greatest significant improvement among the cooking and tasting group. Both cooking and tasting and the tasting only classes had a significantly positive improvement towards preference for vegetables compared to the control group. All groups reported slight improvement towards fruits with no significant differences among groups.

The Cooking with Kids program showed the most impact when students learned about foods with the experience of hands-on cooking and tasting. Classes that included tasting only showed some improvements in self-efficacy and food preferences for vegetables compared to the control groups. However, including cooking lessons so students could apply food preparation skills to their lessons created the most positive impact towards self-efficacy and food preference for vegetables.

The CATCH Kids Club

In Texas, another study looked at the effectiveness of a nutrition and physical activity educational after-school program. The CATCH (Coordinated Approach To Child Health) program is geared towards third to fifth grade students to promote healthy eating and increase physical activity. The CATCH Kids Club was adapted from this program as an after-school program for grades K-5. The Kids Club was broken into three parts: nutrition education, structured physical activity, and a snack. This ran for three weeks and five days each week.³²

Nutrition education focused on promoting healthy dietary choices, nutrition knowledge, cooking skills, and improved self-efficacy. The CATCH Kids Club nutrition education lessons were 15-30 minutes each day. Topics included lessons on fruits, vegetables, fat, fiber, and the Food Guide Pyramid. The physical activity component was approximately 30 minutes each day. The snack component was used as a way of teaching children how to prepare foods for themselves, with a focus on whole grains, low fat dairy, fruits, and vegetables. In this hands-on approach, children learned kitchen skills then tasted their foods as the snack for the day.

This study used a pre- and post-test design to test the effectiveness of the program. The study created an intervention group in El Paso (n=69) and a control group that received only the physical activity component in Austin (n=113). Children in grades 3 to 5 participated in the study, completing the questionnaires. Mean age of the participants was nine years.

The questionnaires in the study, called the System for Observing Fitness Instruction Time and the After-School Student Questionnaire, measured the behavior and

psychosocial aspects of the classes. The results of the study showed that physical activity increased after receiving the structured physical activity component of the CATCH Kids Club in both groups. Children also decreased their time sitting and standing still.

Children in the intervention group showed a positive response to the lessons. The After-School Student Questionnaire measured dietary intake of the previous day, behavior, food choices, and nutrition knowledge. The children showed a significant improvement in food knowledge after receiving nutrition education. There was a significant trend towards increased intake of vegetables and choosing fruit for lunch. The CATCH Kids Club showed a positive correlation of hands-on nutrition education with increased food knowledge and healthy food choices.

The Cookshop Program

The Cookshop Program is another study focusing on the impact of hands-on education on food behavior. Promoting increased consumption of fruits and vegetables in its lessons, students were exposed to and able to work with new foods. Self-efficacy to prepare food, preference for healthier foods, and knowledge of nutrition improved after participating in classes that incorporated cooking skills compared to a control group learning about nutrition without involvement of culinary application.¹¹

This study took place over five months in Central Harlem of New York City during the 1995-1996 school year. The goal of the program was to increase children's consumption of minimally processed whole grains and vegetables, particularly thirteen foods: broccoli, cauliflower, spinach, collard greens, vegetable salad, winter squash, sweet potatoes, whole wheat bread, pumpernickel bread, rye bread, pita bread, rice, and

beans. Other goals included to enhance nutrition knowledge, preference for these foods, and self-efficacy.

Children in kindergarten to sixth grade from two public elementary schools participated with voluntary parental consent. Thirty-nine classes were involved in the study with 590 children that completed pre- and post-tests during the program. Questionnaires included a short version for children kindergarten to third grade and a long version for children fourth to sixth grade. The questionnaire assessed plant food preferences, attitudes towards health and cooking, knowledge of food, self-efficacy in cooking, and food choices towards plant foods. Visual plate waste was assessed in the lunchroom for the focus foods offered on the menu.

The Cookshop Program was divided into three groups: a school lunch component, a classroom component, and a parent/community component. The school lunch component had a goal to expose children to new foods. The set of minimally processed whole grains and vegetables were rotated on the menu six times throughout the study period. These foods were the same foods used in the classroom setting. Lunchroom staff received training and participated in the decision-making process for recipes including these foods.

The classroom component involved two educational strategies. One group attended ten cookshops, learning about the 13 foods and how to prepare them. Each lesson was a hands-on experience consisting of 60-90 minutes. To best provide guidance to the children, the teacher had assistance from other adults to teach the lesson in the classroom. Adult assistants received training on how to conduct the cookshop lessons. The children were divided into three groups to create the most involvement with each

child. Lessons focused on cooking and tasting the specific foods from the whole grains and vegetables subset.

The other group in the classroom component consisted of the same curriculum as the cookshop group. Hands on participation was still included in lesson planning by planting seeds of the foods. This group, however, did not prepare or taste the foods in the lesson. Lessons in this group were about 45 minutes in length with a focus on food and environment.

The third component of the study was the parent/community component. Parents of children in the study received monthly newsletters giving information on how to best purchase, store, and prepare the same foods their children were learning about in the classroom. Recipes were included in the newsletters. Parents were given the opportunity to attend training sessions and volunteer to be an adult assistant for the cookshop classrooms.

The 39 participating classes were divided into four groups: cookshop lessons, food and environment lessons, a combination of cookshop with food and environment lessons, and a control group receiving no lessons. All participating classes were exposed to the foods in the lunchroom setting, and all parents of children received the newsletters with information on the foods. Results were determined by comparison of groups and changes in pre- and post-test answers. Visual assessment of plate waste was also used to determine results.

The cookshop lessons had a positive impact on preferences for plant foods compared to the food and environment lesson group and the control group. Both cookshop and food and environment lessons showed positive improvements in food

knowledge. However, children involved in the hands on cookshop lessons had significantly greater knowledge scores. The cookshop children had significantly higher self-efficacy towards cooking and improved food choice answers compared to the food and environment only group. Plate waste was highest among children in the control group, followed by successively less waste shown by the food and environment only group then the cookshop only group. Children involved in the combination cookshop with food and environment lessons had the least amount of plate waste in the lunchroom setting.

The cookshop program suggested children receive the most positive influence to try healthy foods when given hands-on lessons towards how to prepare the foods. Exposure in the lunchroom did not provide enough impact for children to be open to trying new foods. While children showed a positive response with lessons in food and environment, the children that participated in the cookshop lessons, where he or she could prepare and taste the foods, showed the most positive impact towards willingness to try new healthy foods.

Camp CRAVE

Since we know childhood obesity and overweight is a growing concern and children exposed to more at-home meals have an increased likelihood for consuming healthier foods, it appears cooking classes for children would have a beneficial outcome towards promoting a healthy weight status. As the literature shows, nutrition lessons that are more hands-on and involve food preparation and tasting tend to have a greater impact for children to be willing to try more healthy fruits, vegetables, and whole grains.

Arizona State University's Camp CRAVE is a summer program promoting physical activity, nutrition knowledge, and basic cooking skills. The aim of this program is to promote healthy lifestyle decisions for children so they may become Creative, Resourceful, Active, adVenturous, and Enthusiastic (CRAVE) about healthy food and activity. The aim of this program is to promote healthy lifestyle decisions for children going in to grades 4-6. Held on Arizona State University's downtown campus during the summer, Camp CRAVE offers four week-long camps. The program runs daily Monday through Friday for approximately 4 hours each day and consists of two basic camps and two advanced camps.

The basic camps are offered in the first and third weeks of June. These sessions are identical and teach basic cooking skills and nutrition information. The advanced camps are offered in the second and fourth weeks of June and build off the lessons of the basic camp. Students who wish to enroll in the advance camp must complete a basic camp first. Like the basic camp, the advanced classes are identical in lessons. Students may attend all four weeks as desired.

The primary purpose of this study is to examine data from participating campers at Arizona State University's Camp CRAVE to determine the impact the one-week course has on the child, evaluating the effects of a basic camp that a student is attending for the first time. Specifically, this study will measure if a one-week basic cooking class increases the self-efficacy and knowledge of cooking and nutrition in children. It is anticipated that there will be a positive correlation between level of self-efficacy towards cooking and participating in Camp CRAVE. Additionally, it is anticipated there will be a positive correlation between increased nutrition knowledge and participating in Camp

CRAVE. The findings in this study are expected to support findings in previous studies that evaluate the correlation between classes that promote healthy lifestyles and personal interest towards making healthy choices.

METHODS

Study Design

In this pretest/posttest study, the dependent variable investigated was the level of confidence and knowledge a child participant of Camp CRAVE had before and after they participated in the week-long course. The study assessed participants enrolled in the basic course of Camp CRAVE during the first and third weeks of June in 2016. Basic camp courses ran daily from Monday through Friday for four hours.

Recruitment and Consent

Children were recruited for the camp via flyer advertisement. Consent forms were completed at the beginning of each one-week course. Flyers were distributed around Arizona State University's downtown Phoenix, AZ campus. Many participants were children of faculty from Arizona State University or children participating in the local Boys and Girls Club in the downtown Phoenix, AZ area.

Anthropometrics

No anthropometric data was collected during this study. The aim of the study was to measure the child's experience and perception of nutrition and cooking after participating in the classes.

Participants

The participants were enrolled campers for Arizona State University's Camp CRAVE. The age range of campers were 8-10 years. All child participants had to be able to read and write in English. All participants were from Phoenix, AZ and volunteered for

the study. Parental consent was obtained for all participants, and the study was approved by the Arizona State University Institutional Review Board. See Appendix A.

Participants were recruited for Camp CRAVE via flyer advertisement posted on and around the Arizona State University downtown campus in Phoenix. Recruitment was targeted towards children going into 4th through 6th grade. Cost for the camp was \$75 per week with scholarship opportunity available as needed.

Support Staff

The Camp CRAVE program was led by an Arizona State University Registered Dietitian staff member in the nutrition department. An on-campus Certified Chef also staffed the program. Junior and senior nutrition and exercise wellness students in the Arizona State University School of Nutrition and Health Promotion were trained as counselors for the camp. Students helped to create the curriculum for the respective areas of nutrition and physical activity.

Class Structure

Arizona State University's Camp CRAVE is a structured children's program promoting healthy foods and physical activity. Children may enroll in a one-week program that runs for four hours Monday through Friday. The day starts with one hour of structured physical activity, followed by a nutrition lesson, and ends with a cooking lesson/demonstration and opportunity for the children to cook from a recipe. The class structure is like that of the CATCH program which integrates physical activity and nutrition in educational settings, aiming to positively influence elementary school age children's choices on food.^{32,37}

Each week of Camp CRAVE is an independent course of either basic level or advanced level. The first and third weeks offer the basic course. The second and fourth weeks offer the advanced course. Both basic courses are identical in lesson plans, as well as the advanced courses. Children may choose to attend all four weeks of camp. A child must complete a basic camp week before beginning the advanced camp week.

A camp week would operate daily Monday through Friday from 9:00am to 12:30pm. The first hour consists of a structured physical activity usually outdoors or inside the local YMCA gym. The physical activity is led by an exercise wellness student. Three other students assist with the children in the class. Children then receive a snack before moving inside to the nutrition classroom for a nutrition lesson. The nutrition lesson is led by a nutrition student, with the other three students assisting in the classroom as needed. Nutrition lessons are often an hour long with interactive games / activities.

The campers then move to the interactive kitchen classroom for their cooking lesson with the Arizona State University Certified Chef. Children will watch a demonstration of the day's recipe and then break into groups of 2-3 to complete their recipe. The trained nutrition and exercise wellness students walk through the classroom offering assistance and answering questions. Approximately 60-90minutes of class time is devoted to the food preparation portion of camp. Children end each camp day with the opportunity to try the foods they prepared in class. Lessons on food safety, kitchen cleanliness are given during this time as well. See Appendix B and Appendix C.

Materials

Participants enrolled in Arizona State University's Camp CRAVE completed a five-day course and filled out a questionnaire at the beginning and end of the one-week

course. Data was collected during the month of June 2016 for both basic courses offered during the first and third week of the month. The questionnaire was adapted from the CATCH Kids Club questionnaire. The CATCH Kids Club is an after-school program aimed at elementary school-aged children (grades K–5), and has been found to have positive influence on children’s healthy food choices through the means of physical activity and nutrition education.^{32,37}

The CATCH Kids Club questionnaire is designed for children in grades 3 to 5. Questions were from the After-School Student Questionnaire used in the CATCH Kids Club study.³² Questions measured the child’s behavior and psychosocial trends towards food behavior, choices, and knowledge. Questions were derived from the Health Behavior Questionnaire and the School-Based Nutrition Monitoring Student Questionnaire. Both questionnaires have been shown to be valid and reliable with a greater than 0.6 internal consistency.^{38,39}

The questionnaire is designed to measure changes in the child’s knowledge, perception, and behavior towards nutrition and physical activity. For purposes of this study, questions relating to physical activity were removed from the survey as the aim of the study was to measure impact on nutrition. The CATCH Kids Club questionnaires were given in a group setting to the participants at the beginning of camp on the first day and at the end of camp on the last day.

The survey consisted of 34 questions. See Appendix D. The first 4 questions collected demographic data of age, grade, gender, and ethnicity. No socioeconomic status information was collected. Six questions assessed self-efficacy and confidence levels to perform cooking tasks. Seven questions measured the participants’ choice of dietary

intake from the past 24 hours. Another seven questions measured the children's knowledge and behavior towards food. Eight questions assessed the participants' choices of dietary intake based on two options. Two questions were open-ended to assess perceptions of healthy food and participation in at-home meal preparation.

Questions assessing self-efficacy addressed various cooking task skills on following a recipe, measuring ingredients, peeling carrots, grating cheese, preparing chicken for baking, and cutting fruits and vegetables. Each question provided three statements where the participant had to choose which statement best fit. As an example, the participant had to choose one of three options stating: I can follow a recipe by myself, I can follow a recipe with help from someone else, or I have never followed a recipe and I do not feel I could follow a recipe by myself. Participants completed these questions at the beginning and end of camp, measuring the first hypothesis: change in confidence level to perform food preparation tasks.

All surveys were completed inside the nutrition class room. Students were encouraged to answer questions to the best of his or her ability and to not talk to classmates during the survey until all students had completed. Students were encouraged to ask questions to counselors as needed. All students volunteered to take the survey, with no students opting out. Surveys were printed on paper (see Appendix B) and completed by writing in answers with no time limits given.

Statistical Analyses

All statistics were run using the Statistical Package for the Social Sciences (SPSS 15.0). Descriptive statistics were generated for all variables and were used to examine

distributions and search for potential outliers. Chi square analysis was used to examine differences in questionnaire response frequencies pre- and post-camp.

RESULTS

Demographics

Participants were enrolled in Camp Crave and completed surveys (n=31). Among the group, campers were about to enter 3rd to 8th grade (mean 5th grade level) and were ages 9-13 years young (mean 10.3 years, SD 1.1). See Figure 1 and Figure 2 respectively. Within the group, 64.5% were girls (n=20) and 35.5% were boys (n=11). Campers self-reported ethnicity: 67.7% reported to be white (n=21), 12.9% reported to be of Hispanic decent (n=4), and 9.7% reported to be black or African American (n=3). See Figure 3. All data is listed in Table 1.

Figure 1: Question 1 - Participant Grade Level

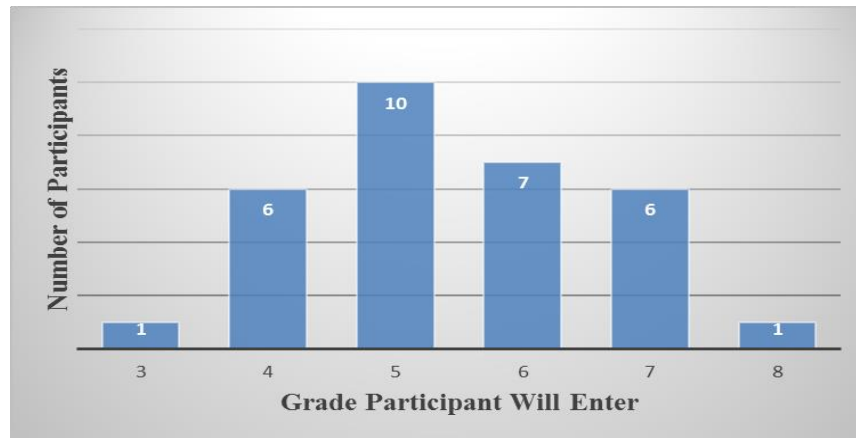


Figure 2: Question 2 - Age Range of Participants

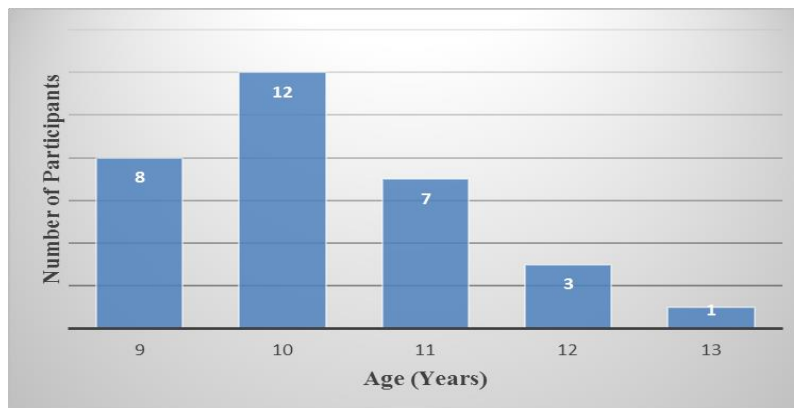


Figure 3: Question 4 - Ethnic Background of Participants

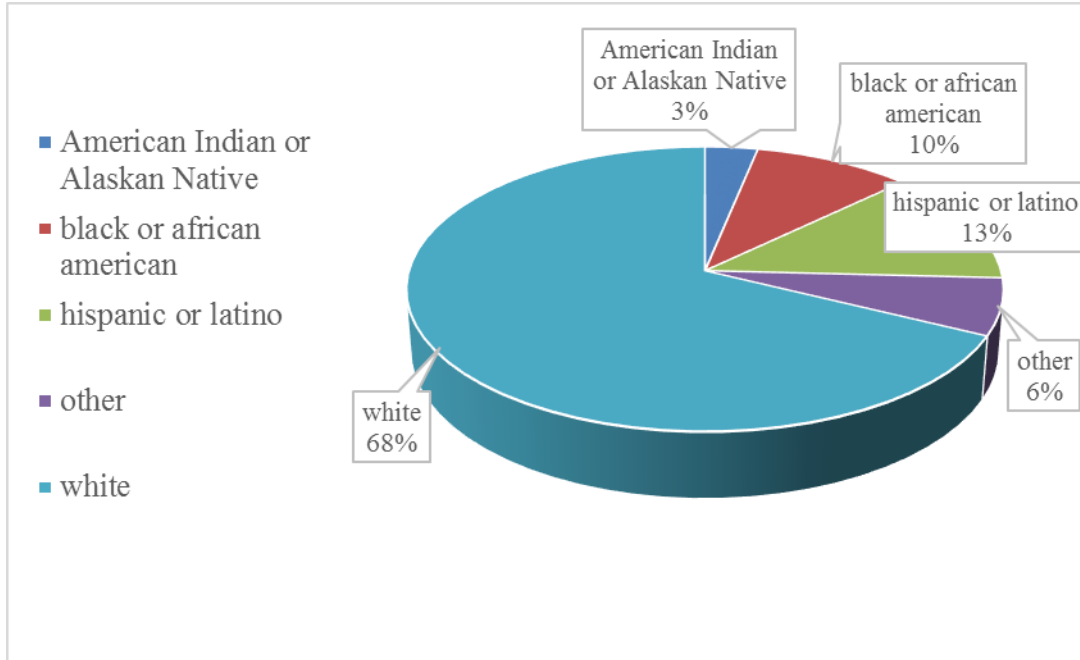


Table 1. Data from Questions 1-4: Demographics of Participants

Subjects	Frequency	% of total
Grade (school grade about to enter)	5 (mean)	
Age (years)	10.3 (mean)	
Boys	11	35.5%
Girls	20	64.5%
American Indian or Alaskan Native	1	3.2%
black or African American	3	9.7%
Hispanic or Latino	4	12.9%
other	2	6.4%
white	21	67.7%

Self-Efficacy Assessment

Questions 5-10 in the survey addressed the level of confidence in various cooking tasks. The survey assessed the following areas: following a recipe, measuring ingredients, peeling carrots, grating cheese, preparing chicken, and cutting up fruits and vegetables.

Participants were to assess whether he or she could complete these tasks independently or if they felt it would require help from someone else. The children showed positive significant changes ($p < 0.05$) in all categories from the beginning of class to the end of class. See Figure 4 and Table 2.

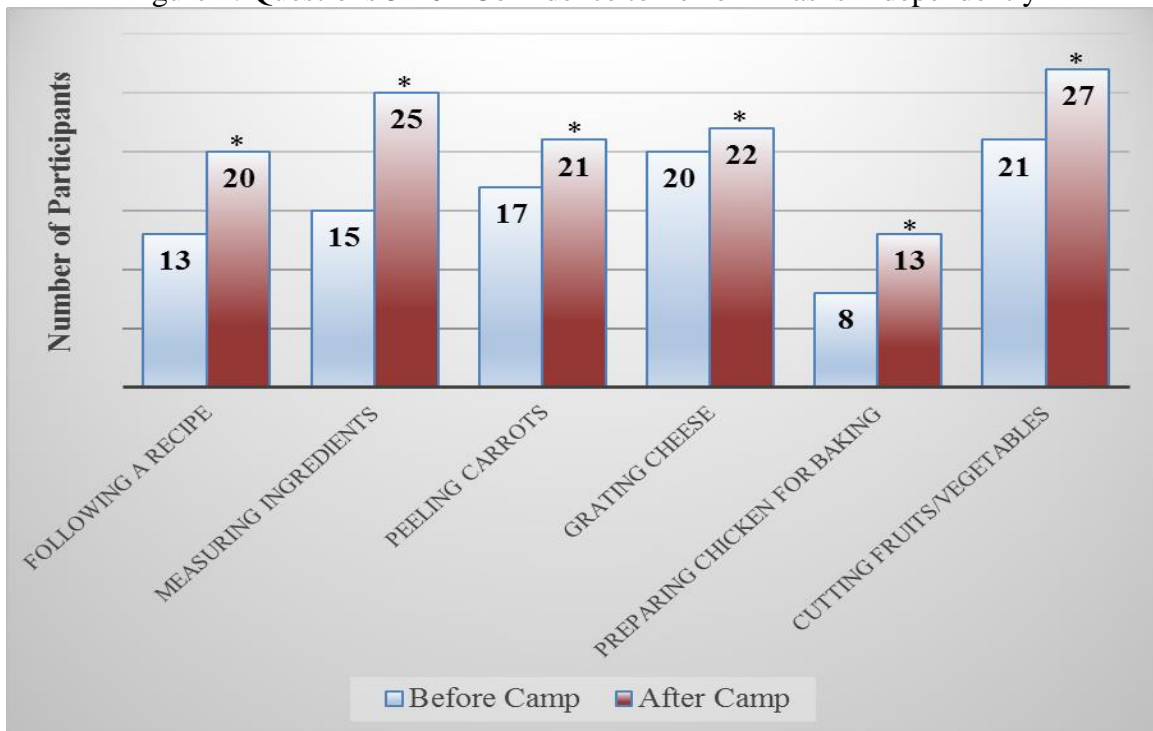
Table 2. Data from Questions 5-10: Confidence Assessment

Question	Confidence Level	Before Camp (n)	After Camp (n)	<i>p</i> Chi square analysis
Following a Recipe (5)	By myself	13	20	0.004
	With help from someone else	10	10	
	I do not feel I could do task by myself	8	0	
Measuring Ingredients (6)	By myself	15	25	<0.001
	With help from someone else	10	4	
	I do not feel I could do task by myself	6	2	
Peeling Carrots (7)	By myself	17	21	<0.001
	With help from someone else	8	5	
	I do not feel I could do task by myself	6	5	
Grating Cheese (8)	By myself	20	22	<0.001
	With help from someone else	5	6	
	I do not feel I could do task by myself	6	3	
Preparing Chicken for Baking (9)	By myself	8	13	0.001
	With help from someone else	11	16	
	I do not feel I could do task by myself	12	2	
Cutting Fruits/Vegetables (10)	By myself	21	27	0.007
	With help from someone else	5	3	
	I do not feel I could do task by myself	5	1	

Most noted, the participants showed an increase in confidence to independently perform the tasks: following a recipe ($p=0.004$) and measuring ingredients ($p<0.001$). At the beginning of the week, only 41.9% and 48.4% of the participants felt confident to independently perform following a recipe and measuring ingredients, respectively. By the end of the course week, 66.7% and 80.6% of the participants felt confident to independently follow a recipe and measure ingredients, respectively.

The task of preparing chicken for baking also showed improvement for the children. At the beginning of the camp week, 25.8% of participants felt they could perform this task alone. This increased to 41.9% of participants by the end of the camp week ($p=0.007$). All other tasks showed significant increases in confidence levels to complete tasks in the kitchen (see Table 2).

Figure 4: Questions 5-10 - Confidence to Perform Tasks Independently



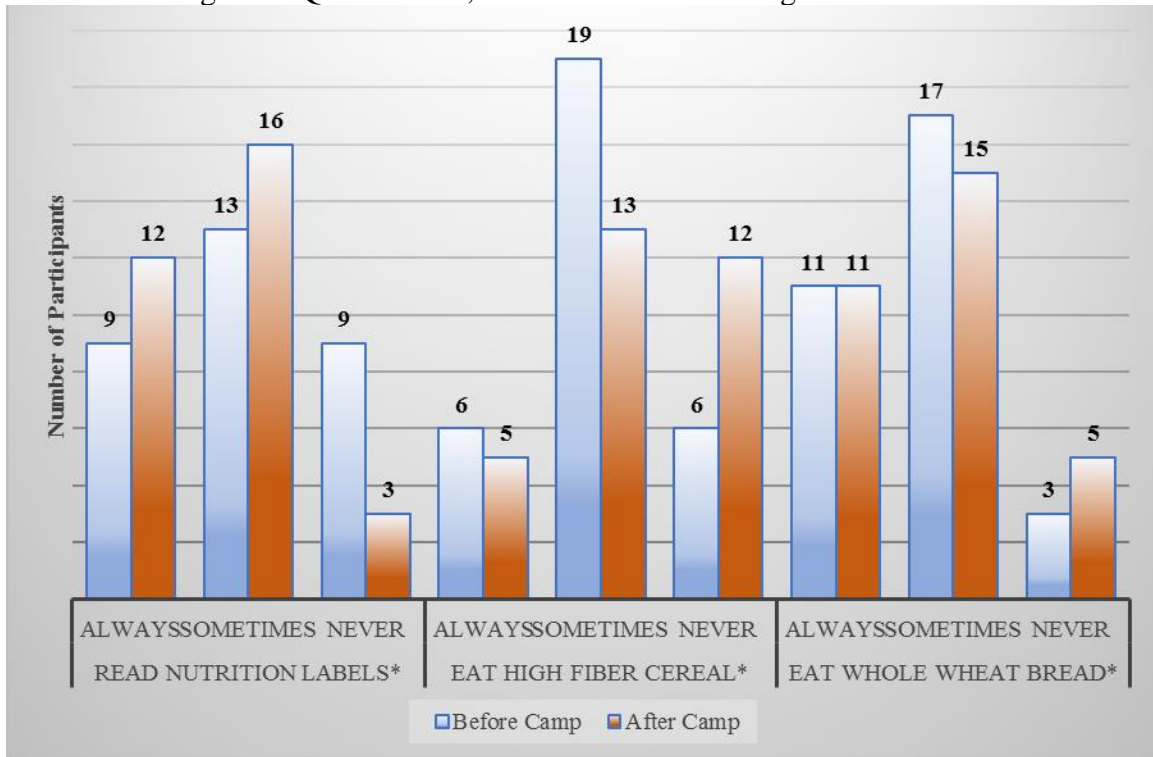
* signifies significant change $p<0.05$ Chi square analysis
Only answers for completing independently shown.

Food Knowledge and Behavior

Questions 17-23 addressed food knowledge or behavioral choices towards food. These questions address reading nutrition labels, daily servings of fruits and vegetables, eating high fiber cereal, eating whole grain bread, choosing 100% fruit juice, and having fruits and vegetables with meals. All categories showed significance. See Table 3.

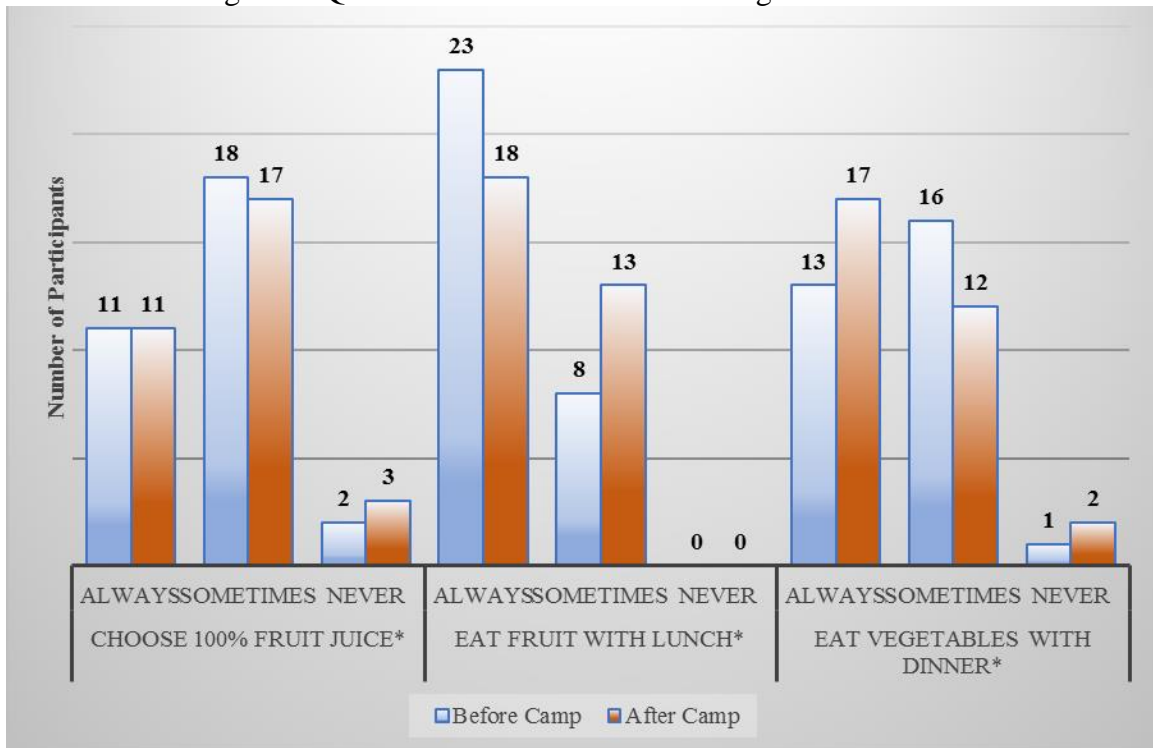
By the end of the camp week, 90.3% of the children answered always or sometimes to reading nutrition labels vs. 71.0% at the beginning of the week ($p=0.002$). More participants could answer correctly the daily recommendation for fruits and vegetables by the end of camp week (35.5% vs 45.2%, $p=0.016$). Participants answered questions on his or her general intake of high fiber cereal, whole wheat bread, and 100% fruit juice. In all three categories, fewer stated they always or sometimes consumed these foods by the end of the camp week ($p=0.016$, $p<0.001$, $p<0.001$ respectively). While children were encouraged to consume these foods, it was observed many were unaware of how these foods were defined. Changes in numbers may reflect increased knowledge of how to identify a whole grain or fiber vs. consumption. See Figure 5 and Figure 6.

Figure 5: Questions 17, 19-20 – Food Knowledge and Behavior



* signifies significant change $p < 0.05$ Chi square analysis

Figure 6: Questions 21-23 – Food Knowledge and Behavior



* signifies significant change $p < 0.05$ Chi square analysis

Table 3. Data from Questions 17-23: Food Knowledge and Behavior

Question		Before Camp (n)	After Camp (n)	<i>p</i> Chi square analysis
Read Nutrition Labels (17)	Always	9.0	12.0	0.002
	Sometimes	13.0	16.0	
	Never	9.0	3.0	
Knowledge of Fruit & Veggie Daily Rec (18)	a. At least 2	11.0	9.0	0.016
	b. At least 5	11.0	14.0	
	c. At least 9	1.0	4.0	
	d. At least 10	0.0	0.0	
	e. I don't know	8.0	4.0	
Eat High Fiber Cereal (19)	Always	6.0	5.0	0.016
	Sometimes	19.0	13.0	
	Never	6.0	12.0	
Eat Whole Wheat Bread (20)	Always	11.0	11.0	<0.001
	Sometimes	17.0	15.0	
	Never	3.0	5.0	
Choose 100% Fruit Juice (21)	Always	11.0	11.0	<0.001
	Sometimes	18.0	17.0	
	Never	2.0	3.0	
Eat Fruit with Lunch (22)	Always	23.0	18.0	0.003
	Sometimes	8.0	13.0	
	Never	0.0	0.0	
Eat Vegetables with Dinner (23)	Always	13.0	17.0	<0.001
	Sometimes	16.0	12.0	
	Never	1.0	2.0	

Food Perceptions

Participants were asked to list foods they ate often that were perceived as healthy or not healthy. Assurance was given there was no right or wrong answer. Possible answers were unlimited. See Table 4 and Table 5. The children considered healthy foods to be vegetables, fruits, and protein sources such as fish, meat, and poultry. See Figure 7. Contrary, the children perceived not healthy foods to be more processed and/or less nutrient dense foods such as ice cream, baked desserts, and snack foods such as Cheetos and chips. See Figure 8.

Figure 7: Question 24 - Perceived More Healthy Foods

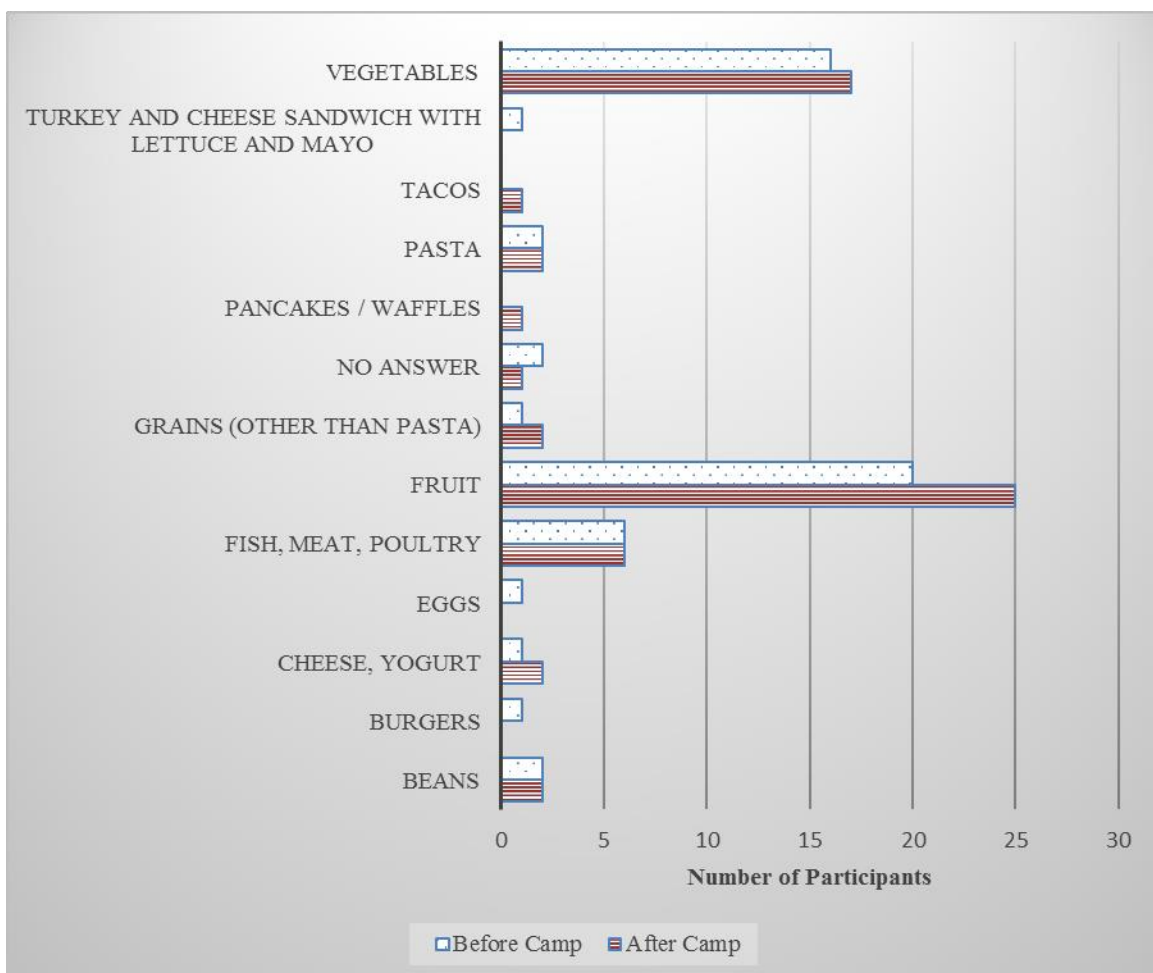


Figure 8: Question 24 - Perceived Less Healthy Foods

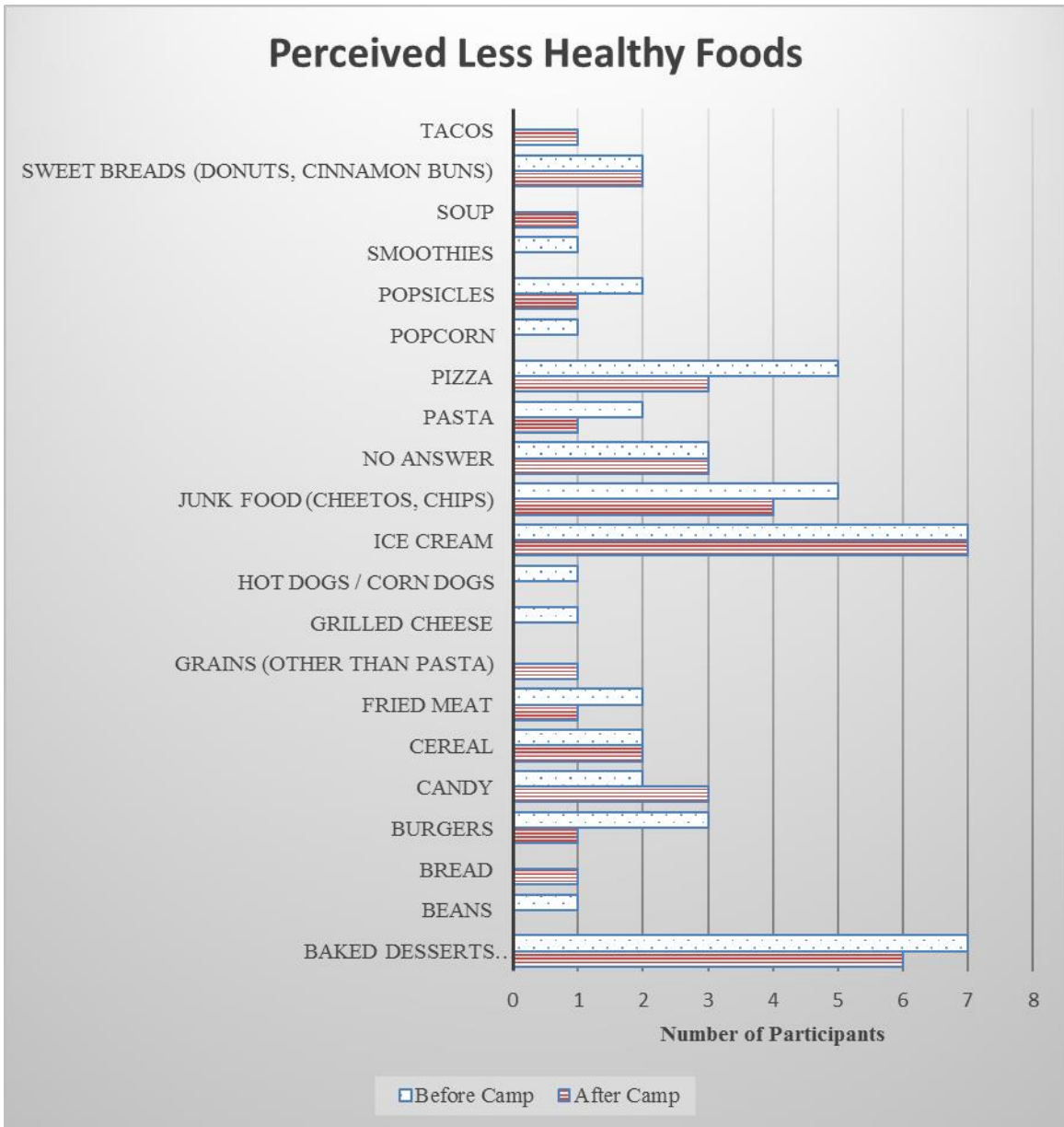


Table 4. Data from Question 24: Food Perceptions - Healthy Foods

Perceived Healthy Foods		
	Pre	Post
beans	2	2
burgers	1	0
cheese, yogurt	1	2
eggs	1	0
fish, meat, poultry	6	6
fruit	20	25
grains (other than pasta)	1	2
no answer	2	1
pancakes / waffles	0	1
pasta	2	2
tacos	0	1
turkey and cheese sandwich with lettuce and mayo	1	0
vegetables	16	17
N	31	31

Table 5. Data from Question 24: Food Perceptions - Not Healthy Foods

Perceived Not Healthy Foods		
	Pre	Post
baked desserts (cake, cookies, pie)	7	6
beans	1	0
bread	0	1
burgers	3	1
candy	2	3
cereal	2	2
fried meat	2	1
grains (other than pasta)	0	1
grilled cheese	1	0
hot dogs / corn dogs	1	0
ice cream	7	7
junk food (Cheetos, chips)	5	4
no answer	3	3
pasta	2	1
pizza	5	3
popcorn	1	0
popsicles	2	1
smoothies	1	0
soup	0	1
sweet breads (donuts, cinnamon buns)	2	2
tacos	0	1
N	31	31

Secondary Analysis: Food Choices

Questions 11-16 and question 34 addressed food consumption choices made on the previous day. Answers given on the first day of camp reflected the Sunday before camp started, and answers given on the last day of camp reflected choices made on Thursday, the day before the end of camp. Participants answered if they consumed the following foods: French fries / chips, vegetables, beans, whole fruit, 100% fruit juice, and desserts. (See Table 5 in Appendix E.) The children showed a significant increase in consumption of vegetables ($p=0.015$) and whole fruits ($p=0.004$). (See Figure 8 and Figure 9 in Appendix E.)

There was a significant decrease in consumption of 100% fruit juice ($p=0.007$). While the children were encouraged to choose 100% juice over fruit drinks, the lesson also included limiting total juice consumption and seeking nutrition in whole fruit form. The participants also showed a significant decrease in fast food intake ($p=0.002$). (See Figure 10 and Figure 11 in Appendix E.) There was no statistically significant change in consumption of French fries or chips, beans, or desserts.

Secondary Analysis: Willingness to Try New Foods and Food Choices

Questions 25-27 addressed the participants' willingness to try new foods, including vegetables, fruits, and desserts. Willingness to try new vegetables decreased significantly ($p<0.001$). However, willingness to try a new fruit increased significantly ($p=0.046$). There was no change noted for willingness to try desserts. See Figure 12 and Table 6 in Appendix E.

Questions 28-32 asked the children to choose between two food options. The aim was to assess if participants would make healthier choices after experiencing camp.

Question 28 asked children to choose a breakfast item at a restaurant: scrambled eggs or a cinnamon bun. There was a significant increase of participants who chose the healthier option, where 56.7% of the participants chose scrambled eggs at the beginning of the course vs 62.1% of the group by the end of the week ($p < 0.001$). A dessert choice of frozen yogurt or ice cream was addressed in question 29. The children showed a significant preference for frozen yogurt: 54.8% at the beginning of the class vs 60.0% by the end of their camp week ($p < 0.001$).

For dinner choices in question 30, campers were asked to choose between helping to cook French fries or a baked potato. There was a significant increase in choosing a baked potato: 73.3% at the beginning of the camp week vs 83.9% by the end of the camp week ($p < 0.001$). Participants were asked to choose how he or she preferred to eat cooked vegetables in question 31: with or without butter. The children showed a significant change in preference towards vegetables cooked without butter 64.5% to 66.7% from the beginning to the end of the course week ($p = 0.002$). Question 32 asked the children to choose between two fast food items: hamburger or grilled chicken. There was a significant change in preference where 46.7% of the group chose grilled chicken at the beginning of the week with 45.2% at the end of the week ($p = 0.003$). See Figure 13 and Table 6 in Appendix E.

Secondary Analysis: Number of Times Cooking at Home

Question 33 asked the participants how often in the past week he or she helped cook a meal at home. Campers could write in any number for this question. There was a non-significant increase in number of times the campers helped to cook a meal with the family at home. Answers given in the beginning of the class ranged from 0-5 times with

the mean answer 1.8 times ($SD = 1.4$). By the end of the week, campers answered with a range of 0-10 times (mean = 3.2, $SD = 2.6$). See Table 7 and Figure 14 in Appendix E.

DISCUSSION

The aim of this study was to determine if a one-week cooking class would increase the participants' interest and knowledge of cooking and nutrition. With the tendency of meals prepared at home being healthier than meals from restaurants or fast-food establishments²⁹, this study aimed to assess whether Arizona State University's Camp CRAVE course would increase a child's confidence to cook at home. Furthermore, since it is known educational programs revolving around healthy living may improve a child's interest towards healthy eating^{11,16,17,32,34,35,37}, this study aimed to determine if participants' knowledge of basic nutrition improved their ability to identify more nutritious foods.

Participants in this study could be representative to other local area children of similar age-range. Subjects were boys and girls aged 9-13 years from Phoenix, AZ. However, with recruitment flyers sent around the area of the downtown Arizona State University campus, participants are likely children of faculty members. There was a local Boys and Girls Club that provided some participants. Socioeconomic status was not measured for this study. Further research could measure socioeconomic status of the family home as other research suggests at-home meal preparation is influenced when above or below the federal poverty line.¹⁹

The data from this study shows significant improvement in the participants' confidence to perform kitchen-related tasks independently. This supports the study's first hypothesis that Camp CRAVE will improve self-efficacy to cook. The children self-reported their self-efficacy on independently performing tasks that enable cooking at home. As other research has found, the hands-on cooking experience provided during the

course promoted more confidence to the participants.^{11,16,17,34} With any self-report, answers could be skewed due to over- or under-confidence. However, the participants' answers matched observations during the camp.

Like the Cookshop Program study, children at Camp CRAVE showed higher self-efficacy towards cooking, increased knowledge in food, and improved food choices of healthy foods.¹¹ The Cooking with Kids educational program also showed to improve self-efficacy towards cooking and improve preference towards vegetables among children 8-12 years of age.³⁴ In line with these studies mentioned, Camp CRAVE utilized hands-on cooking lessons in their curriculum showing similar results.

While children showed increased confidence to perform food preparation tasks by the end of one week at Camp CRAVE, it was unclear whether children participated more often in meal preparation at home. Since socioeconomic status is an unknown factor in this study, a child's participation in at-home cooking may have been influenced by this information. Participants were asked how often in the past week he or she helped to cook a meal at home to directly measure the study's first hypothesis that a week-long cooking class would increase a child's interest to cook at home. Answers could vary based on family home activity, which was not assessed during this study. Although not significant, there was an increase in number of times the campers helped to cook a meal at home. While the sample size (n=31) provides statistical power, further research with a larger sample or a longer course could provide more insight on the impact of cooking at home.

Answers were also given on a Monday and Friday during the week. If a family does more meal preparation during weekend, the participants would not be able to answer differently between the pre- and post-test. Further studies could assess the impact on

students who enroll in both the basic and advanced classes at Camp CRAVE as well as follow up studies with camp participants and parents. Measuring the parental perspective of cooking at home would be beneficial as well since it is known perceived time constraints may negatively influence a parent's choice to prepare meals at home.^{20,23-25}

The study's second hypothesis was a week-long course on nutrition and cooking will increase the child's knowledge on nutrition. Part of the questionnaire assessed the participants' dietary intake before the start of class and at the end of the week. The children showed increased intake of whole fruits and vegetables and decreased intake of fast food by the end of the week. This is consistent with other studies that state nutrition and cooking classes improve the intake of fresh fruits and vegetables^{28,35,36} and of healthier more nutrient dense foods.^{30,34} Accuracy could be limited to the participants' memory recall when completing the survey. Additionally, answers could reflect more the differences in weekend vs weekday dietary intake. It is important to note the post-test answers reflect dietary choices that include the previous camp day foods provided during the cooking lesson and tasting sessions.

The decrease in fast food could reflect the children's desire to choose more nutritious foods. Again, the answers could be effected by weekend vs. weekday eating patterns as the pre-test reflected Sunday and the post-test reflected Thursday, a camp day. Further research would be beneficial to involve parents by assessing home and away from home meal structure and preparation practices.

The week-long course at Arizona State University's Camp CRAVE showed improvement in participants' knowledge in nutrition. With the course-work, more children chose to read nutrition labels and showed an understanding of the daily

recommendation for fruit and vegetable servings. General perceptions of healthy foods centered on fruits and vegetables. Interestingly, participants showed a significant increase in willingness to try new fruits but had a significant decrease to try new vegetables. When given the choice of two food options, more children chose the healthier option by the end of the week. As other studies show, lessons on healthy nutrition appears to have made a positive influence on food choice.^{11,16,26,28,34}

Although the children were encouraged to answer survey questions honestly and were reassured answers were not judged or graded, the information could be skewed if a child felt compelled to give answers based on perceived expectation rather than honest experience, which may limit the accuracy of the scores. Surveys were given as a group. Children were encouraged to quietly complete each question. However, peer influence could affect a child's answer as well.

Students were exposed to cooking lessons five times at Camp CRAVE which is comparable to the six-lesson exposure given in the iCook 4-H program.¹⁶ The iCook 4-H program, however, spread these lessons over a three-month period. The Brighter Bites program followed a hands-on lesson pattern as the other studies did.¹⁷ However in this study, lessons were delivered weekly for 16 weeks. The Cooking with Kids and Cookshop Program class structure provided 11 and 10 lessons, respectively, throughout the school year.^{11,34} While all studies found similar results of children having higher self-efficacy to prepare foods and an increase in choosing healthy foods, it would be interesting to compare the long-term effects on children when exposed to hands-on lessons more often or for longer periods of time.

CONCLUSION

Arizona State University's Camp CRAVE appeared to have significantly increased the knowledge-base of participants in this study after the children completed the lessons for one week. Improved food choices and behaviors appeared to have occurred in the campers. Further research would benefit to follow up with participants to determine if the children continue to make healthier food choices. The study also aimed to improve self-efficacy in cooking. While the children did not show a significant increase in participating in at-home meal preparation after the one-week course was complete, there was a significant increase in self-efficacy to perform meal preparation tasks. As other studies have proven, nutrition education paired with hands-on cooking lessons may have a positive influence with food behavior.

REFERENCES

- ¹ Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA*. 2006;295:1549-1555.
- ² Ogden CL, Carroll MD, Curtin LR, Lamb MM, Flegal KM. Prevalence of high body mass index in US children and adolescents, 2007–2008. *JAMA*. 2010;303(3):242–249.
- ³ Ogden CL, Carroll MD, Lawman HG, Fryar CD, Kruszon-Moran D, Kit BK, Flegal KM. Trends in obesity prevalence among children and adolescents in the United States, 1988-1994 through 2013-2014. *JAMA*. 2016;315(21):2292-2299.
- ⁴ Brown, J. *Nutrition Through the Lifecycle*. Belmont, CA: Thomson Wadsworth, 2008.
- ⁵ Francis LA, Ventura AK, Marini M, Birch LL. Parent overweight predicts daughters' increase in BMI and disinhibited overeating from 5 to 13 years. *Obesity*. 2007;15(6):1544-1553.
- ⁶ Dowda, M, Ainsworth BE, Addy CL, Saunders R, Riner W. Environmental influences, physical activity, and weight status in 8- to 16-year-olds. *Journal of the American Medical Association Pediatrics*. 2001;155:711-717.
- ⁷ Strauss, RS, Knight, J. Influence of the home environment on the development of obesity in children. *Pediatrics*. 1999;103-185.
- ⁸ Whitaker, RC. Predicting obesity in young adulthood from childhood and parental obesity. *New Eng J Med*. 1997;869-873.
- ⁹ Huang J, Pokala P, Hill L, Boutelle KN, Wood C, Becerra K, Calfas K. The health and obesity: prevention and education (HOPE) curriculum project – curriculum development. *Pediatrics*. 2009;124;1438-1446.
- ¹⁰ Nathan BM. The current state of pediatric obesity treatment. *Rev Endocr Metab Disord*. 2009;10:163-165.
- ¹¹ Liquori T, Koch PD, Contento IR, Castle J. The cookshop program: outcome evaluation of a nutrition education program linking lunchroom food experiences with classroom cooking experiences. *Journal of Nutrition Education*. 1998;30:302-313.
- ¹² Reynolds KD, Franklin FA, Binkley D, Raczynski JM, Harrington KF, Kirk KA, Person S. Increasing the fruit and vegetable consumption of fourth-graders: results from the High 5 project. *Preventative Medicine*. 2000;30:309-319.

- ¹³ Baranowski T, Smith M, Hearn MD, Baranowski J, Doyle C, Resnicow K, Wang DT. Patterns in children's fruit and vegetable consumption by meal and day of the week. *Journal of American Clinical Nutrition*. 1997;16:216-223.
- ¹⁴ Krebs-Smith SM, Cook DA, Subar AF, Cleveland L, Friday J, Kahle LL. Fruit and vegetable intakes of children and adolescents in the United States. *Archives of Pediatrics and Adolescent Medicine Journal*. 1996;150:81-86.
- ¹⁵ Pan L, Freedman DS, Sharma AJ, Castellanos-Brown K, Park S, Smith RB, Blanck HM. Trends in obesity among participants aged 2-4 years in the Special Supplemental Nutrition Program for Women, Infants, and Children – United States, 2000-2014. *MMWR Morbidity Mortality Weekly Report*. 2016;65:1256-1260.
- ¹⁶ Miller A, Franzen-Castle L, Aguirre T, Krehbiel M, Colby S, Kattelman K, Olfert MD, Mathews D, White A. Food-related behavior and intake of adult main meal preparers of 9-10 year-old children participating in iCook 4-H: A five-state childhood obesity prevention pilot study. *Appetite*. 2016;101:163-170.
- ¹⁷ Sharma S, Helfman L, Albus K, Pomeroy M, Chuang R, Markham C. Feasibility and acceptability of Brighter Bites: A food co-op in schools to increase access, continuity and education of fruits and vegetables among low-income populations. *Journal of Primary Prevention*. 2015;36:281-286.
- ¹⁸ Virudachalam S, Long JA, Harhay MO, Polsky DE, Feudtner C. Prevalence and patterns of cooking dinner at home in the USA: National Health and Nutrition Examination Survey (NHANES) 2007-2008. *Public Health Nutrition*. 2013;17(5):1022-1030.
- ¹⁹ Jabs J, Devine CM, Bisogni CA, Farrell TJ, Jastran M, Wethington E. Trying to find the quickest way: employed mothers' constructions of time for food. *Journal of Nutrition Education and Behavior*. 2007;39:18-25.
- ²⁰ Smith LP, Ng SW, Popkin BM. Trends in US home food preparation and consumption: analysis of national nutrition surveys and time use studies from 1965-1966 to 2007-2008. *Nutrition Journal*. 2013;12:45.
- ²¹ Jabs J, Devine CM. Time scarcity and food choices: an overview. *Appetite*. 2006;47(2):196-204.
- ²² Kasparian M, Mann G, Serrano EL, Farris AR. Parenting practices toward food and children's behavior: Eating away from home versus at home. *Appetite*. 2017;114:194-199.
- ²³ Fan W, Lam J, Moen P, Kelly E, King R, McHale S. Constrained choices? Linking employees' and spouses' work time to health behaviors. *Social Science and Medicine*. 2015;126:99-109.

- ²⁴ Devine CM, Jastran M, Jabs J, Wethington E, Farell TJ, Bisogni CA. “A lot of sacrifices:” work-family spillover and the food choice coping strategies of low-wage employed parents. *Social Science and Medicine*. 2006;63:2591-2603.
- ²⁵ Larson NI, Neumark-Sztainer D, Hannan PJ, Story M. Family meals during adolescence are associated with higher diet quality and healthful meal patterns during young adulthood. *Journal of the American Dietetic Association*. 2007;107:1502-1510.
- ²⁶ Laska MN, Larson NI, Neumark-Sztainer D, Story M. Does involvement in food preparation track from adolescence to young adulthood and is it associated with better dietary quality? Findings from a 10-year longitudinal study. *Public Health Nutrition*. 2012;15(7):1150-1158.
- ²⁷ Martínez Steele E, Baraldi LG, Louzada ML da C, Moubarac JC, Mozaffarian D, Monteiro CA. Ultra-processed foods and added sugars in the US diet: evidence from a nationally representative cross-sectional study. *BMJ Open*. 2016;6(3):1-8.
- ²⁸ Briefel RR, Wilson A, Gleason PM. Consumption of low-nutrient, energy-dense foods and beverages at school, home, and other locations among school lunch participants and non-participants. *Journal of the American Dietetic Association*. 2009;109(2):s79-s90.
- ²⁹ Laska MN, Hearst MO, Lust K, Lytle LA, Story M. How we eat what we eat: identifying meal routines and practices most strongly associated with healthy and unhealthy dietary factors among young adults. *Public Health Nutrition*. 2014;18(12):2135–2145.
- ³⁰ Larson NI, Nelson MC, Neumark-Sztainer D, Story M, Hannan PJ. Making time for meals: meal structure and associations with dietary intake in young adults. *Journal of the American Dietetic Association*. 2009;109:72-79.
- ³¹ Utter J, Denny S, Lucassen M, Dyson B. Adolescent cooking abilities and behaviors: associations with nutrition and emotional well-being. *Journal of Nutrition Education and Behavior*. 2016;48:35-41.
- ³² Kelder S, Hoelscher DM, Barroso CS, Walker JL, Cribb P, Hu S. The CATCH Kids Club: a pilot after-school study for improving elementary students' nutrition and physical activity. *Public Health Nutrition*. 2005;8(2):133-140.
- ³³ Sharpe EK, Forrester S, Mandigo J. Engaging community providers to create more active after-school environments: results from the Ontario CATCH kids club implementation project. *Journal of Physical Activity and Health*. 2011;8(S1):S26–31.

- ³⁴ Cunningham-Sabo L, Lohse B. Impact of a school-based cooking curriculum for fourth-grade students on attitudes and behaviors is influenced by gender and prior cooking experience. *Journal of Nutrition Education and Behavior*. 2014;46:110-120.
- ³⁵ Brown BJ, Hermann JR. Cooking classes increase fruit and vegetable intake and food safety behaviors in youth and adults. *Journal of Nutrition Education and Behavior*. 2005;37(2):104-105.
- ³⁶ Nelson SA, Corbin MA, Nickols-Richardson SM. A call for culinary skills education in childhood obesity-prevention interventions: current status and peer influences. *Journal of the Academy of Nutrition and Dietetics*. 2013;113(8):1031-1036.
- ³⁷ Luepker RV, Perry CL, McKinlay SM, Nader PR, Parcel GS, Stone EJ, Webber LS, Elder JP, Feldman HA, Johnson CC, Kelder SH, Wu M. Outcomes of a field trial to improve children's dietary patterns and physical activity: The Child and Adolescent Trial for Cardiovascular Health (CATCH). *JAMA*. 1996;275(10):768-776.
- ³⁸ Edmundson E, Parcel GS, Perry CL, Feldman HA, Smyth M, Johnson CC, Layman A, Bachman K, Perkins T, Smith K, Stone E. The effects of the child and adolescent trial for cardiovascular health intervention on psychosocial determinants of cardiovascular disease risk behavior among third-grade students. *American Journal of Health Promotion*. 1996;10:217-225.
- ³⁹ Hoelscher DM, Day RS, Kelder SH, Ward JL. Reproducibility and validity of the secondary level school-based nutrition monitoring student questionnaire. *Journal of the American Dietetic Association*. 2003;103(2):186-194.

APPENDIX A.

IRB APPROVAL PAGE

EXEMPTION GRANTED

Carol Johnston
 SNHP: Nutrition
 602/827-2265
 CAROL.JOHNSTON@asu.edu

Dear Carol Johnston:

On 6/3/2016 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Evaluation of Arizona State University’s Camp CRAVE: Does a week-long cooking camp alter eating behavior, improve nutrition knowledge, and/or promote cooking in young children?
Investigator:	Carol Johnston
IRB ID:	STUDY00004461
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none"> • parental permission, Category: Consent Form; • camp release form, Category: Technical materials/diagrams; • questionnaire, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • protocol, Category: IRB Protocol; • response to reviewer, Category: IRB Protocol; • camp waiver, Category: Technical materials/diagrams;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (1) Educational settings on 6/3/2016.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,
 IRB Administrator
 cc:

Michelle Miller
 Kelly Bell

APPENDIX B.

CAMP CRAVE DAILY STRUCTURE

Camp CRAVE Daily Structure

9:00 - 9:05 a.m.	Campers Arrive / Check-In
9:15 - 10:00 a.m.	Physical Activity
10:00 - 10:05 a.m.	Healthy Snack
10:15 - 11:15 a.m.	Nutrition Lesson
11:15 - 12:05 p.m.	Cooking Skills Lesson
12:05 - 12:25 p.m.	Tasting Foods Made During Lesson
12:25 - 12:30 p.m.	Kitchen Clean-Up
12:30 p.m.	Campers Finish / Check-Out

APPENDIX C.

CAMP CRAVE BASIC CAMP WEEK

Camp CRAVE Basic Camp Week

	Monday	Tuesday	Wednesday	Thursday	Friday
Physical Activity					
Nutrition Lesson	My Plate Food Groups	Reading Recipes	Nutrition Labels	Grains and Legumes	Review of Lessons
Cooking Lesson	Ranch Dip	Pancakes	Fruit Salad	Spinach Artichoke Dip	Cornflake Chicken Fingers

APPENDIX D.
QUESTIONNAIRE

COOKING CAMP STUDENT QUESTIONNAIRE

The following questions ask about the foods and meals you eat, and what you know about nutrition and physical activity. **This is not a test.** We want to learn about what kids your age eat and know about nutrition and cooking.

The answers you give will be kept private. No one will ever know what you say unless you tell them. Your name will not be used.

Please be as honest as you can.

CATCH KIDS CLUB AFTER-SCHOOL STUDENT QUESTIONNAIRE

Camper ID: _____

1. What grade are you in? _____

2. How old are you? _____ years old

3. Are you a boy or a girl? Boy Girl

4. How do you describe yourself?

White

Black or African American

Hispanic or Latino

Asian or Pacific Islander

American Indian or Alaskan Native Other

Please circle the sentence that best describes how you feel. There is no wrong answer.

5.
 - a. I can follow a recipe by myself.
 - b. I can follow a recipe with help from someone else.
 - c. I have never followed a recipe, and I do not feel I could make it by myself.

6.
 - a. I can measure out ingredients by myself.
 - b. I can measure out ingredients with help from someone else.
 - c. I have never measured out ingredients and I do not feel I could measure them by myself.

7.
 - a. I can peel carrots by myself.
 - b. I can peel carrots with help from someone else.
 - c. I have never peeled carrots, and I do not feel I could peel them by myself.

8.
 - a. I can grate cheese by myself.
 - b. I can grate cheese with help from someone else.
 - c. I have never grated cheese, and I do not feel I could grate it by myself.

9.
 - a. I can get chicken ready for baking by myself.
 - b. I can get chicken ready for baking with help from someone else.
 - c. I have never gotten chicken ready for baking and I do not feel I could get it ready by myself.

10.
 - a. I can cut up vegetables or fruit by myself.
 - b. I can cut up vegetables or fruit with help from someone else.
 - c. I have never cut up vegetables or fruit and I do not feel I could cut them up by myself.

INSTRUCTIONS: Please CIRCLE your answer.

11. Yesterday, did you eat French fries or chips?
Chips are potato chips, tortilla chips, cheetos, corn chips, or other snack chips.
- No, I didn't eat any French fries or chips yesterday.
 - Yes, I ate French fries or chips 1 time yesterday.
 - Yes, I ate French fries or chips 2 times yesterday.
 - Yes, I ate French fries or chips 3 or more times yesterday.
12. Yesterday, did you eat any vegetables?
Vegetables are salads; boiled, baked and mashed potatoes; and all cooked and uncooked vegetables. Do not count French fries or chips.
- No, I didn't eat any vegetables yesterday.
 - Yes, I ate vegetables 1 time yesterday.
 - Yes, I ate vegetables 2 times yesterday.
 - Yes, I ate vegetables 3 or more times yesterday.
13. Yesterday, did you eat beans such as pinto beans, baked beans, kidney beans, refried beans, or pork and beans? Do not count green beans.
- No, I didn't eat any beans yesterday.
 - Yes, I ate beans 1 time yesterday.
 - Yes, I ate beans 2 times yesterday.
 - Yes, I ate beans 3 or more times yesterday.
14. Yesterday, did you eat fruit? Do not count fruit juice.
- No, I didn't eat any fruit yesterday.
 - Yes, I ate fruit 1 time yesterday.
 - Yes, I ate fruit 2 times yesterday.
 - Yes, I ate fruit 3 or more times yesterday.
15. Yesterday, did you drink fruit juice? Fruit juice is a drink, which is 100% juice, like orange juice, apple juice, or grape juice. Do not count punch, kool-aid, sports drinks, and other fruit-flavored drinks.
- No, I didn't drink any fruit juice yesterday.
 - Yes, I drank fruit juice 1 time yesterday.
 - Yes, I drank fruit juice 2 times yesterday.
 - Yes, I drank fruit juice 3 or more times yesterday.
16. Yesterday, did you eat sweet rolls, doughnuts, cookies, brownies, pies, or cake?
- No, I didn't eat any of the foods listed above yesterday.
 - Yes, I ate one of these foods 1 time yesterday.
 - Yes, I ate one of these foods 2 times yesterday.
 - Yes, I ate one of these foods 3 or more times yesterday.

17. Do you ever read the nutrition labels on food packages?
- a. Almost always or always
 - b. Sometimes
 - c. Almost never or never
18. How many total servings of fruits and vegetables should you eat each day?
- a. At least 2
 - b. At least 5
 - c. At least 9
 - d. At least 10
 - e. I don't know
19. Do you ever eat high fiber cereal?
- Examples of high fiber cereals are All-Bran, Grape-Nuts, Shredded Wheat, Raisin Bran, Fiber One, Wheat Chex, and GoLean Crunch.
- a. Almost always or always
 - b. Sometimes
 - c. Almost never or never
20. Do you ever eat whole wheat bread?
- a. Almost always or always
 - b. Sometimes
 - c. Almost never or never
21. Do you ever drink 100% fruit juice?
- a. Almost always or always
 - b. Sometimes
 - c. Almost never or never
22. Do you ever eat fruit for lunch?
- a. Almost always or always
 - b. Sometimes
 - c. Almost never or never
23. Do you ever eat vegetables for dinner?
- a. Almost always or always
 - b. Sometimes
 - c. Almost never or never
24. List foods you eat a lot that are healthy: _____
- List foods you eat a lot that are not healthy: _____

INSTRUCTIONS: Please CIRCLE one of the two foods that you would pick if you had to choose just one.

25. Would you like to try new vegetables that you have never had before?
 - a. yes
 - b. no

26. Would you like to try new fruit or juice that you have never had before?
 - a. yes
 - b. no

27. Would you like to try a new desert that you have never had before?
 - a. yes
 - b. no

28. Which breakfast item would you pick at a restaurant?
 - a. Scrambled eggs
 - b. Cinnamon bun

29. Which food would you ask for at home?
 - a. frozen yogurt
 - b. ice cream

30. Which would you choose to cook if you were going to help make dinner at home?
 - a. French fries
 - b. baked potato

31. Which would you do if you were going to eat cooked vegetables?
 - a. eat without butter
 - b. add butter

32. Which would you order if you were going to eat at a fast food restaurant?
 - a. a regular hamburger
 - b. a grilled chicken sandwich

33. How many times in the past week did you help your family cook a meal?

34. Did you eat food from a fast food restaurant in the last two days?
 - a. yes
 - b. no

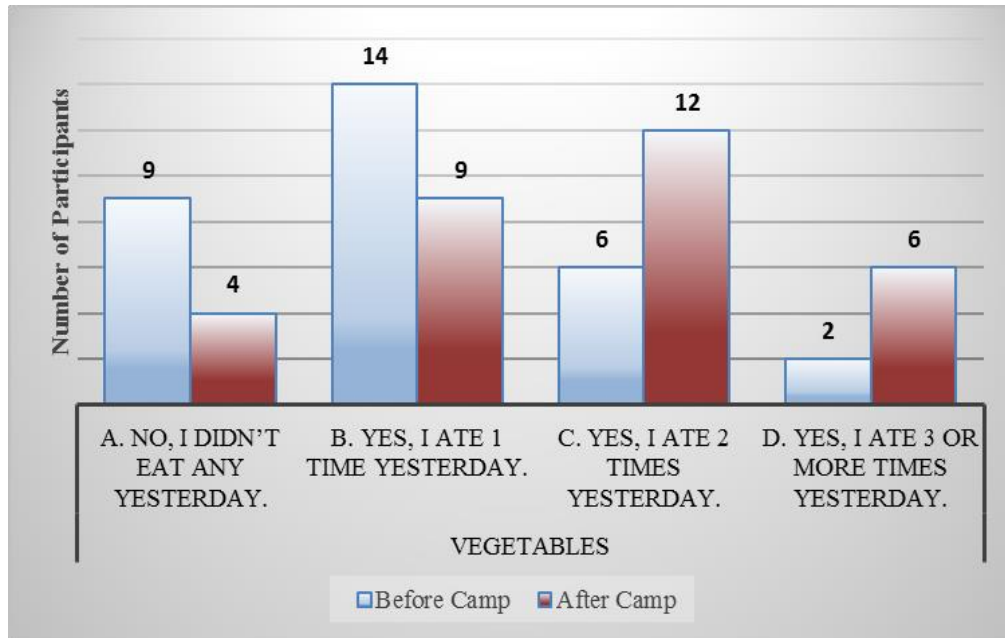
Thank you for your help!

APPENDIX E.
ADDITIONAL FIGURES, TABLES AND DATA

Table 5. Data from Questions 11-16, Question 34: Food Choices

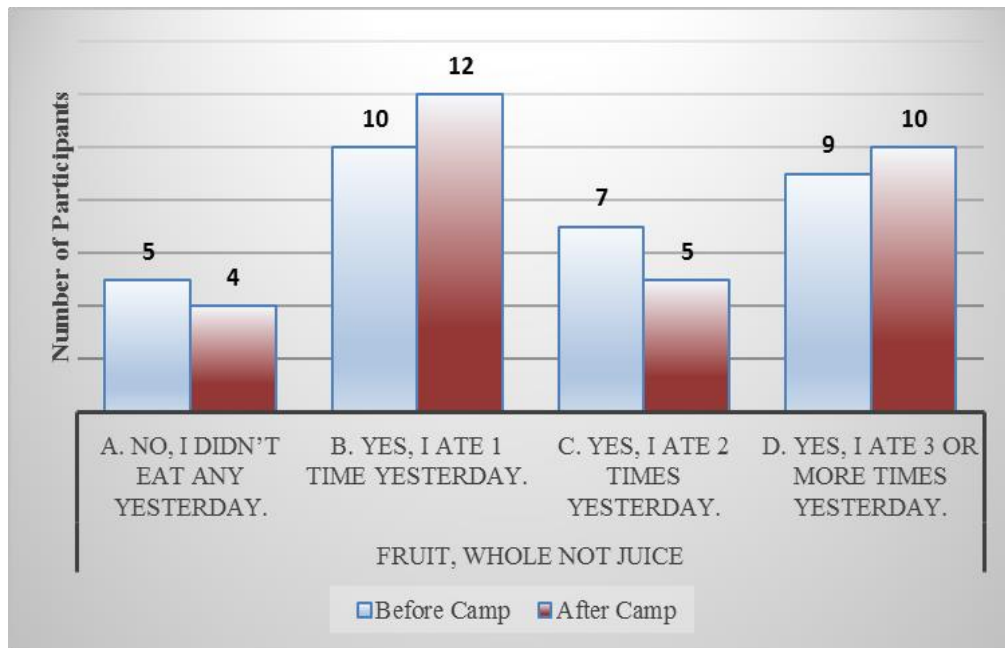
Question	Consumed Day Prior	Before Camp	After Camp	p
French Fries or Chips (11)	a. No, I didn't eat any yesterday.	19.0	24.0	0.630
	b. Yes, I ate 1 time yesterday.	10.0	7.0	
	c. Yes, I ate 2 times yesterday.	2.0	0.0	
	d. Yes, I ate 3 or more times yesterday.	0.0	0.0	
Vegetables (12)	a. No, I didn't eat any yesterday.	9.0	4.0	0.015
	b. Yes, I ate 1 time yesterday.	14.0	9.0	
	c. Yes, I ate 2 times yesterday.	6.0	12.0	
	d. Yes, I ate 3 or more times yesterday.	2.0	6.0	
Beans (13)	a. No, I didn't eat any yesterday.	27.0	25.0	0.895
	b. Yes, I ate 1 time yesterday.	2.0	5.0	
	c. Yes, I ate 2 times yesterday.	1.0	0.0	
	d. Yes, I ate 3 or more times yesterday.	1.0	0.0	
Fruit, whole not juice (14)	a. No, I didn't eat any yesterday.	5.0	4.0	0.004
	b. Yes, I ate 1 time yesterday.	10.0	12.0	
	c. Yes, I ate 2 times yesterday.	7.0	5.0	
	d. Yes, I ate 3 or more times yesterday.	9.0	10.0	
100% Fruit Juice (15)	a. No, I didn't eat any yesterday.	13.0	21.0	0.007
	b. Yes, I ate 1 time yesterday.	11.0	6.0	
	c. Yes, I ate 2 times yesterday.	4.0	3.0	
	d. Yes, I ate 3 or more times yesterday.	3.0	1.0	
Dessert (16)	a. No, I didn't eat any yesterday.	17.0	21.0	0.201
	b. Yes, I ate 1 time yesterday.	10.0	8.0	
	c. Yes, I ate 2 times yesterday.	3.0	2.0	
	d. Yes, I ate 3 or more times yesterday.	1.0	0.0	
Fast Food (34)	No, I did not eat in the last two days?	20.0	22.0	0.002
	Yes, I did eat in the last two days?	11.0	9.0	

Figure 8: Question 12 - Vegetable Consumption



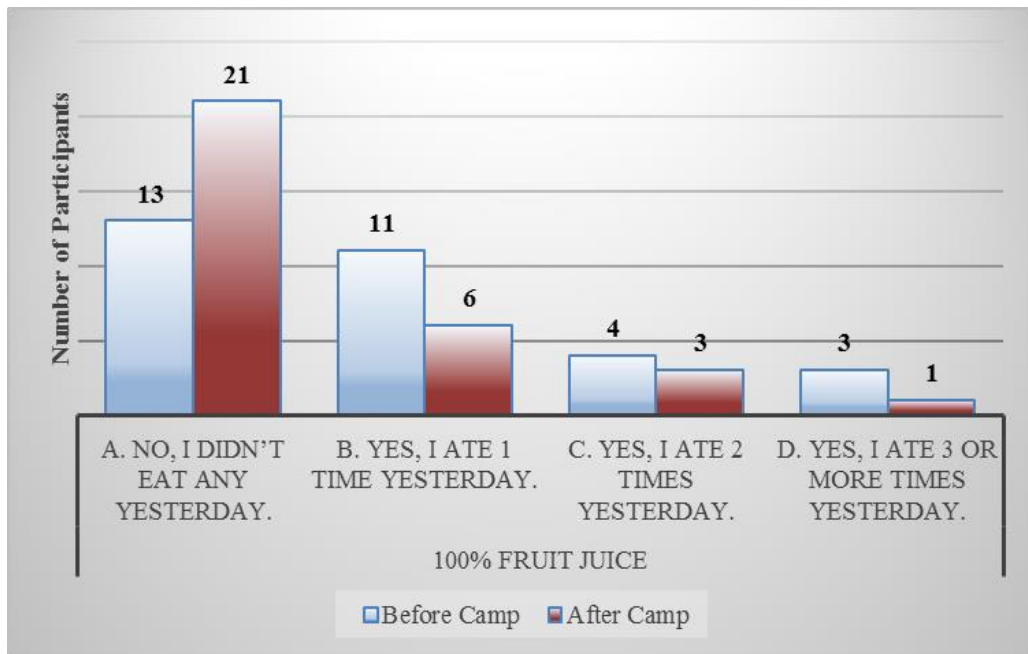
p=0.015

Figure 9: Question 14 – Whole Fruit Consumption



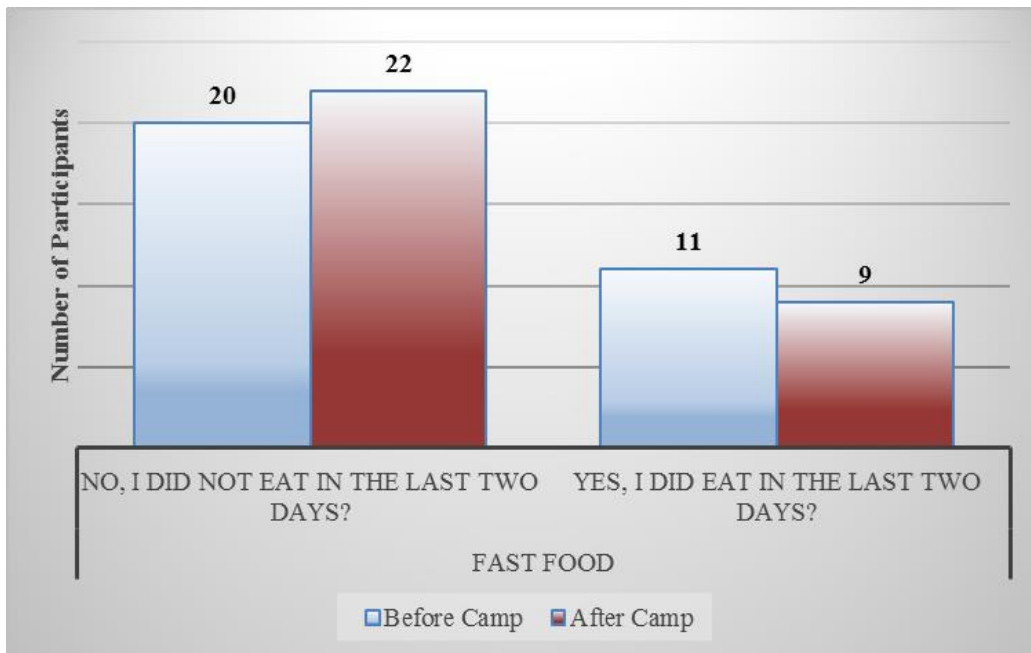
p=0.004

Figure 10: Question 15 – 100% Fruit Juice Consumption



p=0.007

Figure 11: Question 34 - Fast Food Consumption

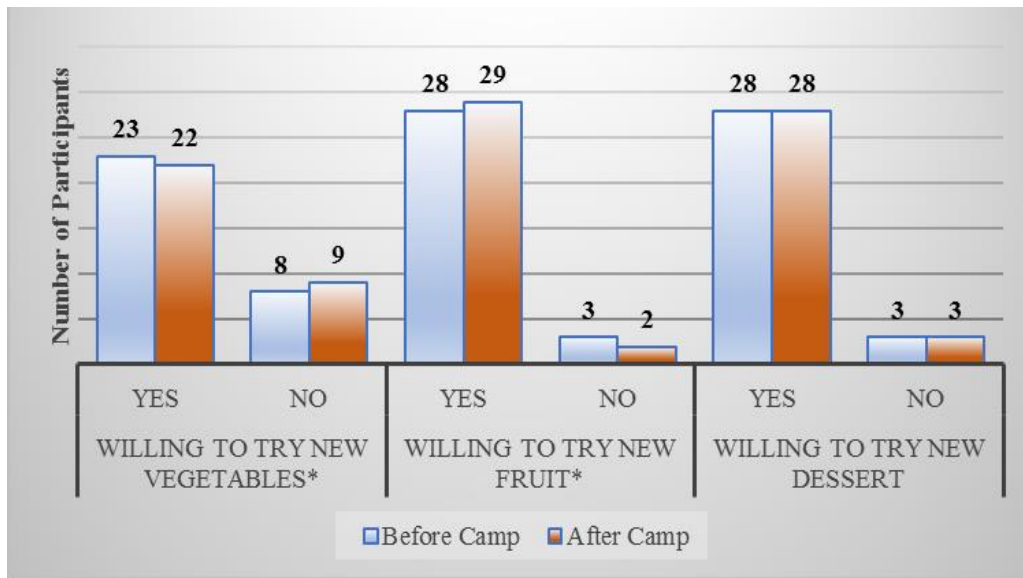


p=0.002

Table 6. Data from Questions 25-32: Willingness to Try New Foods and Food Choices

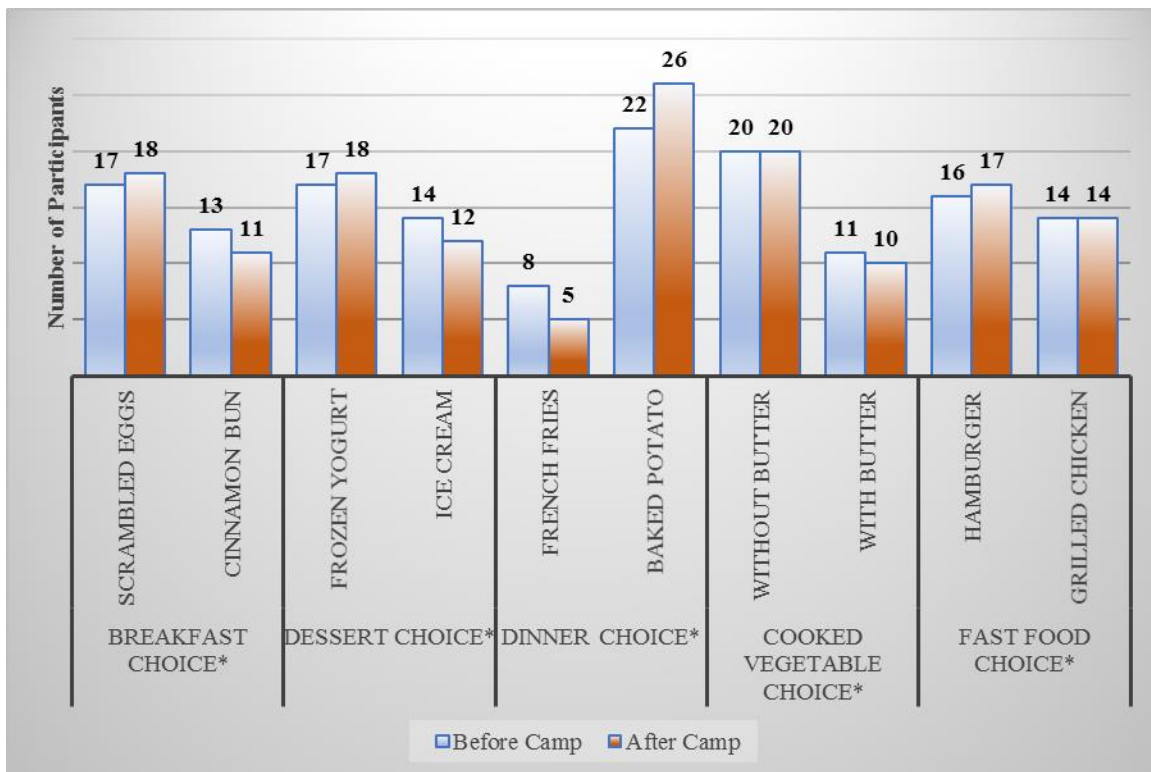
Question		Before Camp	After Camp	P
Willing to Try New Vegetables (25)*	Yes	23.0	22.0	0.000
	No	8.0	9.0	
Willing to Try New Fruit (26)*	Yes	28.0	29.0	0.046
	No	3.0	2.0	
Willing to Try New Dessert (27)	Yes	28.0	28.0	0.145
	No	3.0	3.0	
Breakfast Choice (28)*	Scrambled Eggs	17.0	18.0	0.000
	Cinnamon Bun	13.0	11.0	
Dessert Choice (29)*	Frozen Yogurt	17.0	18.0	0.000
	Ice Cream	14.0	12.0	
Dinner Choice (30)*	French Fries	8.0	5.0	0.000
	Baked Potato	22.0	26.0	
Cooked Vegetable Choice (31)*	Without Butter	20.0	20.0	0.002
	With Butter	11.0	10.0	
Fast Food Choice (32)*	Hamburger	16.0	17.0	0.003
	Grilled Chicken	14.0	14.0	

Figure 12: Questions 25-27 - Willingness to Try New Foods



* signifies significance with $p < 0.05$

Figure 13: Questions 28-32 – Food Choices



* signifies significant change $p < 0.05$

Table 7. Data from Question 33: Number of Times Cooking at Home

Number Times Cooking at Home		
p=0.221	Pre-Test	Post-Test
Count	31	31
0	8	4
1	4	6
2	9	5
3	6	3
4	3	5
5	1	3
6	0	0
7	0	3
8	0	1
9	0	0
10	0	1
Mean	1.8387	3.1935
Median	2.0000	3.0000
Mode	2.0000	1.0000
SD	1.4398	2.6002
MIN	0.0000	0.0000
MAX	5.0000	10.0000
N	31.0000	31.0000

Figure 14: Question 33 – Number of Times Cooking at Home

