THE EFFECTS OF THE USDA SUMMER FOOD SERVICE PROGRAM ON RURAL ADOLESCENTS’ NUTRITION ATTITUDES, KNOWLEDGE, BEHAVIORAL INTENTIONS AND NUTRITION BEHAVIORS

Mary Rachel Harrington
University of Kentucky, rachel.harrington@eku.edu
Author ORCID Identifier: https://orcid.org/0000-0001-8845-0812
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Mary Rachel Harrington, Student

Dr. Melinda Ickes, Major Professor

Dr. Melinda Ickes, Director of Graduate Studies
THE EFFECTS OF THE USDA SUMMER FOOD SERVICE PROGRAM ON RURAL ADOLESCENTS’ NUTRITION ATTITUDES, KNOWLEDGE, BEHAVIORAL INTENTIONS AND NUTRITION BEHAVIORS

________________________________________
DISSERTATION
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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education in the College of Education at the University of Kentucky

By
Mary Rachel Harrington
Lexington, Kentucky

Director: Dr. Melinda Ickes, Professor of Kinesiology and Health Promotion
Lexington, Kentucky
2019

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https://orcid.org/0000-0001-8845-0812
ABSTRACT OF DISSERTATION

THE EFFECTS OF THE USDA SUMMER FOOD SERVICE PROGRAM ON RURAL ADOLESCENTS’ NUTRITION ATTITUDES, KNOWLEDGE, BEHAVIORAL INTENTIONS AND NUTRITION BEHAVIORS

Rural adolescents suffer from poor nutrition, increasing their risk for obesity and other chronic diseases. The Summer Food Service Program (SFSP), an offshoot of the National School Lunch Program, provides meals to qualifying children, including low-income, rural adolescents, under the age of 18. The purpose of this study was to: 1) examine the impact of the SFSP on the nutrition-related knowledge, self-reported fruit and vegetable (SRFV) consumption, and the constructs of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control, and behavioral intentions) of rural, low-income adolescents; and 2) examine the relationship between nutrition behaviors (quality food selection and consumption) and participation in the SFSP using digital photography.

The participants (N = 78) were recruited from those enrolled in the Upward Bound (UB) Summer Program at a mid-sized university that utilized the SFSP. The UB, a federally funded program, provided the opportunity to reach high school students from low-income, rural areas to study the aforementioned effects of the SFSP. The quasi-experimental pre- post-intervention design used a survey (n = 57) to determine predictors of positive nutrition behaviors and digital photography (n = 43) to determine actual food selection and consumption of those enrolled in the SFSP. A nutrition quality scale (0-6, with 6 indicating higher quality) was developed in order to categorize food items within food groups according to their nutritional value, and aided in determining quality of foods selected and consumed.

Paired samples t-test showed a significant increase in knowledge ($t(56) = -8.09, p = .000$) and SRFV consumption ($t(56) = -3.20, p = .002$) from pre- to post-intervention. Regression analysis demonstrated that all constructs of the Theory of Planned Behavior (TPB) were significant ($F(4, 52) = 14.56, p < .001$ with an $R^2$ of .53) for predicting behavior intentions, with perceived behavioral control (PBC) being the most salient predictor of intentions to increase fruit and vegetable consumption. A one-way repeated measures MANOVA was not significant for the comparison of pre- and post- survey scores for knowledge, SRFV consumption, and the constructs of the TPB, $F (4, 53) = .604, p = .660$. Digital photography showed a significant increase in consumption from
week 1 (baseline) to week 5 (program completion) for fruit \( t(42) = -2.04, p = .048 \) and milk \( t(42) = -3.13, p = .003 \) at lunch, for milk \( t(42) = -3.01, p = .003 \) at supper, and for milk overall (all three meals combined) \( t(42) = -3.08, p = .004 \). Vegetable consumption decreased significantly from week 1 to week 5 \( t(42) = 2.47, p = .018 \) at supper and overall (all three meals combined) \( t(42) = 2.65, p = .011 \). Two proportion z tests showed a statistically significant decrease in the selection of food items at quality level 2 from week 1 (.34) to week 5, \( z = 3.11, p = .002 \), and statistically significant increases in the selection of quality level 3 (.20), \( z = -2.15, p = .031 \), and quality level 5 (.17), \( z = -3.33, p < .000 \), item. Two proportion z tests showed a statistically significant decrease in the consumption of food items at quality level 5 from week 1 (.62) to week 5, \( z = 2.94, p = .003 \). However, the analysis showed no consistent increase in the quality of foods selected or consumed from week 1 to week 5.

Opportunities for shaping adolescent nutrient intake and eating behaviors during and outside of enrollment in the SFSP exist. Reinforcing positive attitudes, subjective norms and perceived behavioral control while participants are enrolled in the SFSP may help to increase nutrition behavioral intentions and therefore, nutrition behaviors. Opportunities also exist for offering healthier food options for those participating in the SFSP. SFSP participants are a captive, impressionable group, and providing a supportive social and physical environment, and high nutritional quality choices in the SFSP more often may provide the potential for behavior change that may lead to an increase in healthy nutritious habits for adolescents from rural areas.

KEYWORDS: adolescent, USDA, food preferences, digital photography, Theory of Planned Behavior, Summer Food Service Program
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By
Mary Rachel Harrington

Melinda Ickes
Director of Dissertation

Melinda Ickes
Director of Graduate Studies

Studies 4/18/19
Date
DEDICATION

To Brad, Ellen and Luke
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“I can do all things through Christ who strengthens me.” (Philippians 4:13).

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TABLE OF CONTENTS

ACKNOWLEDGMENTS ........................................................................................................ iii

LIST OF TABLES ............................................................................................................. xi

LIST OF FIGURES .......................................................................................................... xii

CHAPTER 1: INTRODUCTION ......................................................................................... 1
  Statement of the Problem ................................................................................................. 1
  Theoretical Framework ..................................................................................................... 5
  Purpose Statement .......................................................................................................... 6
  Research Questions and Corresponding Hypotheses ....................................................... 6
    Manuscript 1 Research Questions ............................................................................... 7
    Manuscript 2 Research Questions ............................................................................... 8
  Significance to Health Promotion .................................................................................. 10
  Delimitations .................................................................................................................. 11
  Limitations ...................................................................................................................... 12
  Operational Definitions .................................................................................................. 13
  Nutrition-Related Definitions ....................................................................................... 14
  Summary ........................................................................................................................ 15

CHAPTER 2: REVIEW OF THE LITERATURE .................................................................. 16
  Purpose and Literature Review Criteria ......................................................................... 17
  Nutrition in Adolescence ................................................................................................. 18
    Growth, Energy, Macronutrients and Micronutrients ................................................... 18
    Other Nutrition-Related Concerns ............................................................................... 22
    Nutrition in Adolescents Living in Rural Poverty Areas .............................................. 24
  The USDA National School Lunch Program (NSLP) and the Summer Food Service
  Program (SFSP) ............................................................................................................. 27
  The Upward Bound Program ......................................................................................... 32
  Theoretical Framework .................................................................................................. 36
  Gaps in the Literature .................................................................................................... 37
  Summary ........................................................................................................................ 38

CHAPTER 3: DISSERTATION METHODS ....................................................................... 39
  Introduction ..................................................................................................................... 39
CHAPTER 5: MANUSCRIPT 2

The Effect of the USDA Summer Food Service Program on Participants’ Observed Nutrition Behaviors

Abstract

Introduction

Purpose

Research Design

Study Population

The Intervention

Measures

Surveys

Digital Photography

Data Collection Procedures

Participation

Survey

Digital Photography

Survey Analysis

Analysis of Digital Photographs

Summary

CHAPTER 4: MANUSCRIPT 1

Using the Theory of Planned Behavior to Assess the Impact of the USDA Summer Food Service Program on Fruit and Vegetable Consumption among Rural Teens

Abstract

Introduction

Methods

Study Population

Description of the Intervention

Measures

Data Collection Procedures

Data Analysis

Results

Discussion

Implications for Research and Practice

CHAPTER 5: MANUSCRIPT 2

The Effect of the USDA Summer Food Service Program on Participants’ Observed Nutrition Behaviors

Abstract

Introduction

Purpose

Research Design

Study Population
Description of the Intervention ................................................................. 98
Data Collection Procedures ........................................................................ 99
Data Analysis .............................................................................................. 101
Results ....................................................................................................... 103
Food groups ............................................................................................... 103
Quality of the selection of foods selected ................................................. 104
Consumption of the selected of foods ....................................................... 105
Discussion ................................................................................................. 106
Strengths and Limitations ......................................................................... 111
Implications ............................................................................................... 113

CHAPTER 6: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS ..... 122
Summary of Results .................................................................................... 122
Results for Manuscript 1 ........................................................................... 123
Results for Manuscript 2 ........................................................................... 124
Contributions to Literature ....................................................................... 125
Strengths ..................................................................................................... 127
Limitations .................................................................................................. 127
Implications for Researchers and Health Promotion Professionals .......... 128
Future Research ......................................................................................... 131
Conclusion .................................................................................................. 132

APPENDICES ............................................................................................. 133
APPENDIX A .............................................................................................. 133
APPENDIX B .............................................................................................. 142
APPENDIX C .............................................................................................. 144
APPENDIX D .............................................................................................. 146
APPENDIX E .............................................................................................. 148
APPENDIX F .............................................................................................. 151
APPENDIX G .............................................................................................. 152
APPENDIX H .............................................................................................. 153
APPENDIX I .............................................................................................. 154
APPENDIX J .............................................................................................. 155
APPENDIX K .............................................................................................. 156
APPENDIX L .............................................................................................. 163
LIST OF TABLES

Table 3. 1 Data Collection Timeline.............................................................................................................. 61

Table 4. 1 Demographic Information for Study Sample.................................................................................... 87
Table 4. 2 SFSP Offer Versus Serve (OVS) Requirements.................................................................................... 88
Table 4. 3 Summary of Means, Standard Deviations and Paired-Sample t-test for Independent Variables ................................................................................................................................. 89
Table 4. 4 Means, Standard Deviation, and Correlations of Model Variables .................................................... 90
Table 4. 5 Predictors of Behavioral Intentions to Increase Fruits and Vegetables ........................................... 91

Table 5. 1 Demographic Information................................................................................................................ 116
Table 5. 2 SFSP Offer Versus Serve (OVS) Requirements.................................................................................... 117
Table 5. 3 Paired-Sample t-test Comparing Week 1 and Week 5 Food Group Consumption for Each Meal .................................................................................................................................................. 118
Table 5. 4 Results of Two Proportion z-Test and Descriptive Statistics for Selection and Consumption Based on Quality Score ........................................................................................................................................ 119
Table 5. 5 Top Ten Foods Selected, Quality Scores and the Percent Consumed at Week 1 and Week 5 ................................................................................................................................................ 120
LIST OF FIGURES

Figure 5. 1 Top 10 Foods Selected with Their Quality Score ........................................... 121
CHAPTER 1: INTRODUCTION

Statement of the Problem

Adolescence can be a complicated and challenging period in human growth. Developmental specialists in the United States use the age span of 10-19 as a working definition of adolescence and more than 12% (almost 42 million of people in the U. S.) fall into this age range (United States Census Bureau, 2015). The dramatic physiological and psychological changes that occur during this period greatly influence nutritional needs. Despite advances in clinical and preventive medicine, adolescents in the U.S. continue to have significant health and nutritional concerns (Boyle & Holben, 2012). And although there is a wide range of nutritional needs for this age group, there are general recommendations which can guide adolescents in making healthy food choices. These guidelines, set by the corresponding physical maturation that has taken place in the adolescent, are mostly extrapolated from the adult recommendations, and include high fiber, lean protein, and low saturated fat and trans fat (USDA, 2017). Even with these published guidelines, most Americans, including adolescents, fail to meet the recommendations for fruits and vegetables and exceed the recommendations for high fat, high calorie foods (Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010). Diets that are consistently high in fat and low in fiber increase risks of chronic diseases such as obesity, heart disease, cancer, diabetes, and stroke (Edelstein, 2010). The prevalence of overweight adolescents has continued to increase substantially over the last decade while intakes of fruits, vegetables, and whole grains (foods that are high in fiber and low in fat) remain low (Boyle & Holben, 2012).
In rural areas, including rural Kentucky, high school students have subpar nutrition, with low intakes of fruits, vegetables, and whole grains; and high intakes of sugar and fat (Schoenberg, Howell, Swanson, Grosh, & Bardach, 2013). In general, residents living in rural areas are more likely to experience poorer nutrient intake than are their urban counterparts (Schoenberg et al., 2013). In fact, research shows that living in rural areas is by itself a risk factor for children and adolescents being overweight or obese (Lutfiyya, Lipsky, Wisdom-Behounek, & Inpanbutr-Martinkus, 2007). Thirty-three percent of adolescents in Kentucky in grades 9-12 are classified as overweight (CDC, 2016). Kentuckians living in rural, Appalachian portions of the state suffer higher rates of obesity and obesity-related diseases (Schoenberg et al., 2013) than those living in other areas of the state. Some point to the regional and cultural barriers that may prevent rural residents, especially those living in Appalachian Kentucky, from consuming more healthy foods (J. L. Brown & Wenrich, 2012; Schoenberg et al., 2013).

Some nutrition programs have been established with the intent to increase nutritional status in adolescents. The most well-known nationwide program is the National School Lunch Program (NSLP) which provides healthy meals to over 32 million school-aged children and adolescents each day (J.F.W. Cohen, Richardson, Parker, Catalano, & Rimm, 2014). The Summer Food Service Program (SFSP) was created in 1968 as an off-shoot of the successful NSLP to ensure that children, under 18 years of age, will have access to nutritious meals when school is not in session during summer vacations (USDA, 2016d). The SFSP operates in a community and must have a local sponsor that either contracts for foodservices or prepares its own food. Many community centers (schools, churches, libraries) act as both the sponsor and the provider. There are
two main types of sites. Open sites are located in areas where 50% or more of the children are in families where the household income is below 185% of the federal poverty guidelines (Boyle & Holben, 2012). Any child, under the age of 18, living in the open site’s area may participate, free of charge in the SFSP. Enrolled sites are those which follow the same income guidelines as above, but the sponsors must document the participants’ household incomes in order to claim the reimbursement. Unfortunately, only one in six of the low-income children who rely on the NSLP during the school year participate in the SFSP (Boyle & Holben, 2012). Although research shows a decrease in food insecurity (limited or uncertain ability to acquire or consume an adequate quality or sufficient quantity of food in socially acceptable ways; Boyle & Holben, 2012) for students participating in the NSLP (Engle & Tinto, 2008; Hopkins & Gunther, 2015; Nord & Romig, 2006) and an increase in nutritional quality of meals (Gordon, Crepinsek, Briefel, Clark, & Fox, 2009; Johnson, Podrabsky, Rocha, & Otten, 2016), “there is little to no research available on the nutritional adequacy of the SFSP meals, consumption of the SFPS meals, or the health of SFSP participants” (Hopkins & Gunther, 2015, p. 10145) and there is little to no research available on the long-term nutritional habits of the low-income populations that this program serves (Hopkins & Gunther, 2015). Therefore, research supporting the benefits and impact of the SFSP on participants’ nutrition is warranted.

Although not a nutrition intervention, Upward Bound (UB) is a national, federally funded program which aims to increase enrollment of low-income, first generation students in post-secondary education. UB provides academic instruction, tutoring, counseling, mentoring, and cultural enrichment (United States Department of Education,
Eastern Kentucky University (EKU) is home to one of the hundreds of UB programs across the United States and one of fifteen programs in Kentucky. At EKU, the UB program serves rural adolescents in six targeted counties in Appalachian Kentucky. The UB program at EKU is unique in that it utilizes the USDA SFSP and provides an opportunity to increase the nutritional health of its participants. Therefore, UB offers an opportunity to capture students who may not otherwise participate in the SFSP. The UB program at EKU also collaborates with graduate students at EKU who provide basic nutrition education to the UB participants. There is formal nutrition education provided in the form of a lecture, short lessons, and cooking classes. There are also opportunities for informal nutrition education in the form of casual conversations about food and healthy behaviors amongst the staff and participants during field trips and planned, recreational activities. Neither the use of the SFSP with UB students nor the use of nutrition education with UB students has yet to be evaluated for its nutritional influence at EKU UB or elsewhere. UB participants at EKU provide an ideal audience of rural, low-income, potentially first generation college students for the SFSP and nutrition education, and therefore, the perfect assembly to study the effects of the SFSP coupled with basic nutrition education on rural adolescents.

This study attempts to address the need for both the aforementioned formal and informal nutrition education along with environmental support (the use of the USDA SFSP) to provide the potential for behavior change that may lead to an increase in healthy nutritious habits for adolescents from rural, Appalachian Kentucky. The overall goals of the intervention were to increase the quality of food intake in this population and to improve their confidence in continuing the healthy nutrition behaviors post-intervention.
Theoretical Framework

The Theory of Planned Behavior (TPB) which posits that the most important factor used to predict a person’s behavior is their intention to perform the behavior, was used to guide this study. The TPB describes that an individual’s intention to perform a given behavior is a function of their attitude toward performing the behavior (whether the person is in favor of doing it), their beliefs about what relevant others think they should do (subjective norm), and their perception of the ease or difficulty of performing the behavior (perceived behavioral control). By changing these three ‘predictors’ one can increase the chance that the person will intend to do a desired action and thus increase the likelihood of the person actually doing it (Francis et al., 2004). Attitude is, in part, determined by behavioral beliefs which are personal views that link the behavior to a positive or negative outcome (Ajzen, n.d). Subjective norms are influenced by normative beliefs (one’s perception of the behavioral expectations that important, valued individuals and groups have for him/her) (Ajzen, n.d) along with one’s motivation to comply with the behavior. Motivation to comply is influenced by external variables such as demographics, personality traits, and other individual differences. Perceived control is affected by control beliefs which are the perception of the existence of factors that can impact behavioral performance and perceived power which is concerned with the strength of the facilitating or inhibiting factors (Simons-Morton, McLeroy, & Wendel, 2011).

At the foundation of the TPB is the expectation that intention to engage in a behavior leads to actual performance of the behavior, and that intentions and behaviors are the result of the interaction of model components (Glanz, Lewis, & Rimer, 1997).
The TPB has been used to predict a variety of health behavior changes including nutrition behaviors (Blanchard et al., 2009; Riebl et al., 2015; Tsorbatzoudis, 2005a, 2005b). Many interventions work through participants’ attitudes, subjective norms and perceived behavioral control with the aim of enhancing these so as to increase the likelihood of compliance with the desired behavior. Therefore the TPB can be useful in designing strategies to help people adopt healthy behaviors. In the present study, the constructs of this theory were assessed to determine which construct was the most salient predictor of intention to change nutrition behaviors among rural youth. The results allow a deeper understanding of the influences of an individual’s intention, and therefore can aid in future interventions which aim to improve nutrition behavioral intentions and ultimately behaviors.

**Purpose Statement**

The purpose of this study was to examine the impact of the Summer Food Service Program, enhanced with basic nutrition education, on the nutrition-related attitudes, subjective norms, perceived behavioral control, behavioral intentions, and behaviors (the quality of food selected and consumed), of rural, low-income adolescents participating in the Upward Bound program housed at Eastern Kentucky University.

**Research Questions and Corresponding Hypotheses**

In order to achieve these goals, there are a number of research questions that were explored through the preparation of two separate manuscripts, as detailed in Chapters 4 and 5. See Appendix A for the research matrix which details for each manuscript the research questions and hypotheses, independent and dependent variables, scales, and data analyses.
Research questions and hypotheses by manuscript are as follows:

**Manuscript 1 Research Questions**

**RQ1:** What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ knowledge about the importance of eating fruits and vegetables?

H1: Participants will have a significant improvement in their knowledge about the importance of eating fruits and vegetables (pre- to post-).

**RQ2:** What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ attitudes about eating fruits and vegetables?

H2: Participants will have a significant improvement in their attitudes about the importance of eating fruits and vegetables (pre- to post-).

**RQ3:** What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ subjective norm in relation to eating fruits and vegetables?

H3: Participants will have a significant improvement in positive subjective norms in relation to eating fruits and vegetables.

**RQ4:** What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ perceived behavioral control in relation to eating fruits and vegetables?

H4: Participants will have a significant improvement in their perceived behavioral control in relation to eating fruits and vegetables (pre- to post-).

**RQ5:** What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ intentions to positively change their fruit and vegetable consumption?
H5: Participants will have a significant improvement in their intentions to positively change their fruit and vegetable consumption.

**RQ6:** What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ self-reported fruit and vegetable consumption?

H6: Participants will have a significant improvement in their self-reported fruit and vegetable consumption.

**RQ7:** Which of the constructs of the Theory of Planned Behavior (attitudes, subjective norms, and perceived behavioral control) significantly predict the degree of change in intentions to increase fruit and vegetable consumption in high school students participating in the USDA SFSP? Which is the most salient predictor?

H7: All constructs of the Theory of Planned Behavior (attitudes, subjective norms, and perceived behavioral control) will significantly predict the degree of change in intentions to increase fruit and vegetables consumption.

**Manuscript 2 Research Questions**

**RQ8:** Does participating in the USDA SFSP increase food group consumption over a five week period?

**RQ8.1:** Does participating in the USDA SFSP increase fruit consumption over a five week period?

H8.1: Participants will show a significant increase in observed fruit consumption over a five week period of enrollment in the USDA SFSP.

**RQ8.2:** Does participating in the USDA SFSP increase vegetable consumption over a five week period?
H8.2: Participants will show a significant increase in observed vegetable consumption over a five week period of enrollment in the USDA SFSP.

RQ8.3: Does participating in the USDA SFSP increase milk consumption over a five week period?

H8.3: Participants will show a significant increase in observed milk consumption over a five week period of enrollment in the USDA SFSP.

RQ8.4: Does participating in the USDA SFSP increase grain consumption over a five week period?

H8.4: Participants will show a significant increase in observed grain consumption over a five week period of enrollment in the USDA SFSP.

RQ8.5: Does participating in the USDA SFSP increase meat/meat alternative consumption over a five week period?

H8.5: Participants will show a significant increase in observed meat/meat alternative consumption over a five week period of enrollment in the USDA SFSP.

RQ9: Does participating in the USDA SFSP increase the quality of the selection of foods over a five week period?

H9: Participants will show a significant increase in observed quality of the selection of foods over a five week period of enrollment in the USDA SFSP.

RQ10: Does participating in the USDA SFSP increase the consumption of quality foods over a five week period?

H10: Participants will show a significant increase in observed consumption of quality foods over a five week period of enrollment in the USDA SFSP.
The associated hypotheses for this study were tested through outcome data collected on the pre- and post-surveys, as well as digital photography comparisons of plate waste during the first week (baseline) and during the fifth week (program completion) of the intervention detailed in subsequent chapters of this dissertation. The participants were assessed for baseline levels of knowledge, attitudes, subjective norms, perceived behavioral control, behavioral intentions, and nutrition behaviors on the first day of the UB summer residential session at EKU (pre-test). The participants were also assessed five weeks post-intervention, during the last week of the UB summer residential session at EKU. Plate waste studies were conducted using digital photography during the first and fifth weeks of the summer program to assess observed nutritional behavior change as related to the SFSP requirements.

**Significance to Health Promotion**

Health education seeks to improve the health of individuals, groups, and communities with the skills and resources necessary to make positive, quality health decisions (Cottrell, Girvan, & McKenzie, 2012). Health promotion, on the other hand, is a broader term defined by the *Report of the 2000 Joint Committee on Health Education and Promotion Terminology* as a “planned combination of educational, political, environmental, regulatory, and organizational mechanisms that support action and conditions of living conducive to the health of individuals, groups and communities” (2001, p. 89). Nutrition and healthy food intake are well-documented components of healthy behaviors. Targeting a nutritionally at-risk population using existing resources is a way to include cost-effective, nutrition education in a supportive environment. Given that the UB participants are in a somewhat controlled environment, and that all follow the
SFSP requirements, the conditions provided the opportunity for the researcher to determine the effect of policy (in this case, the SFSP requirements) and environment (participants will eat in the same location for three meals a day for five weeks) on nutrition behaviors. The idea of environmental and policy changes to improve health behaviors reinforces and supports the definition of health promotion as stated above (Joint Committee on Terminology, 2001). The use of theory to explore nutrition knowledge, attitudes, and behavioral intentions can aid health promotion experts in developing sound interventions (Riebl et al., 2015; Simons-Morton et al., 2011). This study contributes to the literature addressing the use of the Theory of Planned Behavior, and provides supportive evidence for the use of theory-based practices. There is a gap in the literature regarding the nutrition behaviors of high school students participating in the USDA SFSP. This research explored the potential positive influence that the USDA SFSP, coupled with basic nutrition education and a supportive environment, on improving nutrition-related behaviors for an at-risk population. This study attempted to determine the influence that SFSP requirements and policies have on behavior. It also explored the possible influence of a structured environment (university campus with limited access to outside foods for these participants) on nutrition behaviors.

**Delimitations**

Delimitations are the conscious choices a researcher makes about the literature review, methodologies, and study population to create boundaries for a study (Baltimore County Public Schools, 2010). These are the limitations that the researcher deliberately imposes (Rudestam, 2014). A delimitation of the literature reviewed for this study was that it did not include publications unrelated to the demographics of the population, adult
statistics (unless generalizable to all rural, low-income residents) or pre-school aged children. Certain special nutritional concerns for teens (i.e. vegetarianism, eating disorders, and teen athletes) were also left out of the literature review due to the lack of connection to the study. Although participation in the study was voluntary, all students enrolled in the EKU UB summer program received the intervention. Because the study used intact sampling there was no random sampling of the participants or random assignment of participants to treatment. Maintenance of a behavior is generally recognized to be between six and twelve months after the change has occurred (Nilsen, 2010). For the purposes of the timeline for this study, the decision was made to eliminate a longitudinal follow up survey.

Limitations

Limitations are those aspects of a study that are out of the control of the researcher and can impact the methods, analysis, and conclusions of the study (Baltimore County Public Schools, 2010; Rudestam, 2014). A limitation with the literature review is that not much information can be found on the effects of the USDA NSLP or the USDA SFSP and especially the effects that pertain to high school students only.

The study was quasi-experimental, and not random. The small population size (78) and limited time, may have led to more difficulty in generalization of the results. With self-reported responses, there may have been some bias in that the participants may have had a tendency to respond in a certain way, perhaps to consciously or unconsciously please the surveyor. Although the survey process was intended to encourage honesty, understanding the question, interpreting the scales, and the inability to answer introspectively may have influenced responses (Nardi, 2006). There was potential for
some missing data regarding the plate-waste study, particularly of whole fresh fruits. The absence of leftover peels and cores was expected if the participants took the whole fruit out of the dining facility. Missing fruit was assumed to have been 100% consumed (Swanson, 2008).

Although the participants were in a controlled environment for breakfast, lunch, and dinner, there was often the opportunity for them to consume snacks and other foods in between meals from vending machines on campus or from food brought from home. Therefore, the study focused on the food groups required by the SFSP. There was limited funding and time for the study and therefore incentives or the opportunity for completion of a follow up survey were not given.

**Operational Definitions**

*Behavioral Beliefs* – personal views that link behavior to expected positive or negative outcome, which creates an attitude toward behavior (Ajzen, n.d).

*Normative Beliefs* – one’s perception of the behavioral expectations that important, valued individuals and groups have for him/her that contribute to subjective norm (Ajzen, n.d).

*Subjective Norm* – made up of one’s normative beliefs and one’s motivation to comply with the perceived social pressures to or not to engage in behaviors (Ajzen, n.d).

*Control Beliefs* – perception of the existence of factors that can impact behavioral performance; these perceived factors can promote or hinder behaviors (Ajzen, n.d).

*Perceived Behavioral Control* – made up of control beliefs and perceived power of each factor that can contribute to or hinder the enactment of a behavior; this may represent actual control therefore can be used as a predictor for behavior (Ajzen, n.d).
*Intention* – precedes actual behavior; indicator of readiness to perform behavior (Ajzen, n.d.).

*Food Component* – one of the food groups that comprise a reimbursable breakfast, lunch or supper in the SFSP (Kentucky Department of Education, 2012).

*Food Item* – a specific food offered within the food components comprising the reimbursable meal (KDOE, 2012).

**Nutrition-Related Definitions**

*Added Sugar* – Saccharides added to foods during processing or preparation (Schiff, 2018).

*Natural Sugar* – Saccharides found in foods from photosynthetic processing such as lactose in milk, fructose in fruit, and glucose in vegetables.

*Dietary fat* – Lipids found in foods (Sizer, 2016)

*Saturated fats* – Fatty acids that have no double bonds. Fats high in saturated fatty acids are usually solid at room temperature. Major sources include animal products such as meats and dairy products, and tropical oils such as coconut or palm oils (DHHS, 2015).

*Trans fats* – Unsaturated fatty acids that are structurally different from the unsaturated fatty acids that occur naturally in plant foods. Sources of trans fatty acids include partially hydrogenated vegetable oils used in processed foods such as desserts, microwave popcorn, frozen pizza, some margarines, and coffee creamer (DHHS, 2015).

*Sodium* – A major mineral and electrolyte which helps to maintain fluid balance in the body. Too much sodium in the diet has been linked to hypertension and cardiovascular disease (Schiff, 2018)
Fiber – The indigestible parts of plant foods; includes cellulose, hemicellulose, pectin, gums, mucilage, and lignin. They aid in digestions and can help reduce chronic disease risk (Sizer, 2016).

Whole grains – Grains and grain products made from the entire grain seed, usually called the kernel, which consists of the bran, germ, and endosperm (DHHS, 2015).

Summary

Adolescents experience nutritional risks. Adolescents living in rural areas are even more likely to experience poor nutrient intake than are their urban counterparts (Schoenberg et al., 2013). This study sought to determine if an intervention using the USDA Summer Food Service Program (SFSP), coupled with basic nutrition education, increased attitudes, knowledge, subjective norms, perceived behavioral control, behavior intentions and actual behaviors as they related to nutrition in a low-income, rural, adolescent population.

The Theory of Planned Behavior (TPB) served as the theoretical framework in the study, guiding the design, the research questions, and hypotheses. The theory provided constructs that aided in better understanding the intentions of adolescents in relation to their food choices. The study explored the effects of offering the Summer Food Service Program as an intervention to improve the nutrition of this population.
CHAPTER 2: REVIEW OF THE LITERATURE

Nutrition during adolescence can be complicated. Although adolescence is described as a relatively small age range, the differences in physical maturation during this decade, ages 10-19 years old (United States Census Bureau, 2015), causes the nutritional needs to vary greatly among this population. And despite advances in clinical and preventive medicine, adolescents in the U.S. continue to have significant health and nutritional concerns (Boyle & Holben, 2012). Although there is a wide range of nutritional needs for this age group, there are general recommendations which can guide adolescents in making healthy food choices. These guidelines, mostly extrapolated from the adult recommendations, include high fiber, lean protein, and low saturated fat and trans fat (USDA, 2017). However, most Americans, including adolescents, fail to meet the recommendations for fruits and vegetables and exceed the recommendations for high fat, high calorie foods (Banfield, 2016; Krebs-Smith et al., 2010). Diets that are consistently high in fat and low in fiber, increase risks of chronic diseases such as obesity, heart disease, cancer, diabetes, and stroke (Centers for Disease Control and Prevention, 2013; Edelstein, 2010). In fact, the prevalence of overweight adolescents has continued to increase substantially over the last decade while intakes of fruits, vegetables, and whole grains (foods that are high in fiber and low in fat) remain low (Banfield, 2016; Boyle & Holben, 2012).

In general, residents living in rural areas are more likely to experience poorer nutrient intake than are their urban counterparts (Schoenberg et al., 2013). In these areas, including rural Kentucky, high school students have subpar nutrition, with low intakes of fruits, vegetables, and whole grains; and high intakes of sugar and fat (Schoenberg et al.,
2013). In fact, research shows that living in a rural area is by itself a risk factor for children and adolescents being overweight or obese (Lutfiyya et al., 2007). Thirty-three percent of adolescents in Kentucky in grades 9-12 are classified as overweight (CDC, 2016). Kentuckians living in rural, Appalachian portions of the state suffer higher rates of obesity and obesity-related diseases (Schoenberg et al., 2013) than those living in other areas of the state. Some point to the regional and cultural barriers that may prevent rural residents, especially those living in Appalachian Kentucky, from consuming more healthy foods (Brown & Wenrich, 2012; Schoenberg et al., 2013).

**Purpose and Literature Review Criteria**

The purpose of this review was to examine existing literature regarding the potential impact of the Summer Food Service Program (SFSP) on low-income, rural adolescent nutrition, and health. The Theory of Planned Behavior (TPB), general adolescent nutrition recommendations and needs, national guidelines, national programs targeting adolescent nutrition, digital photography, and the Upward Bound Program were investigated. The review was conducted using the following data bases through EBSCOhost through the University of Kentucky's library system. Databases included Academic Search Complete ERIC (U.S. Dept. of Education), MEDLINE/PubMed (NLM), ProQuest Dissertation & Theses: Global, ProQuest Education Journals, Proquest Social Science Journals, and EBSCOhost, and Psychology and Behavioral Sciences Collection. Article selection, with few exception, included those with publication dates between 2005 and 2018. Additional online sources from reputable health-related institutions and organization were included. Search terms included a combination of the following keywords and terms: adolescents, adolescence, teens; nutrition; National
Nutrition in Adolescence

Growth, Energy, Macronutrients and Micronutrients

Adolescence is a period of time that has often been described as a tumultuous stage in human growth and development. It certainly is a time of rapid changes in physical, cognitive, and social development. Adolescence is commonly used to describe the transition stage between childhood and adulthood. There is no one scientific definition of adolescence or set age boundary, however, many researchers and developmental specialists in the U.S. use the age span of 10-19 as a working definition of adolescence. More than 12% (almost 42 million) of people in the United States fall into this age range (United States Census Bureau, 2015). Yet, adolescence is much more than chronological age. During this period of time there is a wide variability of norms. Changes do not occur simultaneously and therefore an adolescent may be at several age levels at the same time: chronological, physical, psychological, and social (Brown, 2016; Pipes, 1989). Adolescents experience a growing independence in behavior. They show an increase in the capacity for abstract thought, an interest in moral reasoning, as well as a struggle with the sense of identity (Levy, Kaplan, & Patrick, 2004). Peers and social pressures dominate this era, and adolescents will challenge the status quo as well as the adults in their lives. This phase is often viewed negatively as a time of rebellion. However, challenging social norms can produce many positive outcomes and lead to growth of not only the teen but of society at large.
Among the many exciting transformations that occur in adolescence are the changes in the nutritional needs of the teen. Due to the variation and rapid changes in psychological and physiological development that transpire during adolescence, determining the nutritional needs can be a challenge; thus, nutritional needs should be described by the degree of physical maturation and not chronological age (Brown, 2016). As adolescents mature, they spend less time with family and more time with their peer group. They also often begin to govern their own food intake and become influenced by a variety of outside factors, such as peer and media influences, appetite and food availability, cost, convenience, personal and cultural beliefs, and body image. As adolescents move toward independence and autonomy, the family’s impact on eating habits diminishes (Boyle & Holben, 2012).

Due to the rapid changes physically and otherwise, certain nutritional concerns for adolescents develop. Adolescents often gain as much as 50% of their ideal adult body weight and about 15% of their ultimate adult height during this period (Byrd-Bredbenner, 2014). Body composition changes drastically in females during puberty, with an average lean body mass falling from 80 to 74 percent and body fat increasing from 16 to 26 percent (Frisch, 1983; Shils & Shike, 2006). During peak growth adolescent males gain an average of 20 pounds per year, and body fat decreases to an average of 12% (Brown, 2016). These rapid rates of growth and changes in body composition significantly increase the adolescent’s need for energy, protein, vitamins, and minerals. Most of the dietary recommendations for adolescents are extrapolated from adult recommendations and are published in the Dietary Reference Intakes (DRIs) (DHHS, 2015). Energy needs, which are influenced by growth, physical activity levels, and metabolic rate vary greatly
during adolescence and are estimated to be anywhere from 1400 kcals/day for an inactive female in early adolescence to more than 3200 kcals/day for an active male still in his growth spurt (Stephenson & Schiff, 2015). On average about one-fourth of a teenager’s total daily energy intake comes from snacks (Sizer, 2016), and therefore those snacks should be nutrient and perhaps energy dense. Protein needs are estimated to be slightly higher during adolescence than in adults (0.85g/kg body weight for adolescents versus 0.80g/kg body weight for adults) (Otten, Hellwig, & Meyers, 2006). Recommendations for protein are highest during peak growth periods. Carbohydrate recommendations are the same for adolescents and adults, with the recommendation being 45-65% of calories with less than 10% of the calories coming from added sugars. The DRIs recommend 26 grams of fiber per day for adolescent females and 31 grams for adolescent males or 14gms/1000 calories (DHHS, 2015). National data indicate that both females and males are consuming well below these recommendations (National Health and Nutrition Examination Survey, 2017). It is recommended that adolescents and adults consume 20-35% of their calories from dietary fat and data suggests that adolescents fall toward the high end of the recommendation and receive approximately 33% of their calories from fat (Banfield, 2016; NHANES, 2017).

There are also micronutrients of particular concern during adolescence. While both males and females require additional iron to support the increase in lean body mass, females also need additional iron to support menstruation (Sizer, 2016). Male adolescents require 8-11 mg of iron each day whereas female adolescents require 8-15 mg per day (National Institutes of Health, 2017). It is estimated that up to 11% of adolescents are deficient in iron (Brown, 2016). Calcium is another specific nutrient of
concern. During the teen years, bone growth is more rapid (about half of peak bone mass is accrued during this time) (Bonjour, Guéguen, Palacios, Shearer, & Weaver, 2009), and calcium intake must be high to support development. Unfortunately, among U.S. adolescents, low calcium intakes have reached crisis proportions (Baur & Mitchell, 2014). On average, U.S. adolescents consume only 1 cup of milk each day (4.5 cups is recommended to meet calcium needs of 1300 mg/day) (Sebastian, Goldman, Enns, & LaComb, 2010) with 19% reporting drinking no milk on any given day (CDC, 2017).

Vitamin D, a fat-soluble vitamin, plays an essential role in the absorption of calcium and phosphorus. Low levels of Vitamin D in adolescents have been related to elevated systolic blood pressure, high fasting blood glucose levels, hypertriglyceridemia, low HDL levels, higher body mass indices, and metabolic syndrome (Reis, von Mühlens, Miller, Michos, & Appel, 2009). Data from the National Health and Nutrition Examination Survey (NHANES) suggests that Vitamin D levels have decreased in adolescents during the past few decades (Ginde, Liu, & Camargo, 2009). Most adolescents do not consume diets that comply with the Dietary Guidelines for Americans (NHANES, 2017), and therefore, their diets are low in many of the vitamins and minerals. On average, adolescents have inadequate intakes of folate, Vitamins A, B₆, C, and E, and zinc, magnesium, and phosphorus along with the aforementioned iron, calcium, and Vitamin D. Teen diets often exceed the current recommendations for total and saturated fat, cholesterol, sodium, and added sugar (Banfield, 2016; Brown, 2016). Only 17% of adolescent males and 14% of adolescent females met the recommendations for vegetables, while 24% of males and 20% of females met the recommendations for
fruit in 2013 (CDC, 2017; Kann et al., 2014). The intake of whole grains is also insufficient to meet recommendations (CDC, 2017, NHANES, 2017).

**Other Nutrition-Related Concerns**

Adolescents frequently enjoy recent freedoms that often begin during this stage of life. With many school, social, and job activities, a teen may fall into irregular eating habits (DeBruyne, Pinna, & Whitney, 2015). This newfound independence tends to affect their nutritional habits for the worse, and teenagers may miss out on nutrients they need. Snacking, skipping meals, and eating foods that are cheap and quick are common behaviors among teens (Brown, 2016). One particular concern is the decline in participation in the family meal. Adolescents who frequently eat meals with their families eat more fruits, vegetables, grains, and calcium-rich foods and drink fewer soft drinks than those who seldom eat with their families (Utter et al., 2013). Only about one-third of 15 to 17 year olds report eating meals with their family at least six days per week (Larson, et al., 2013). Family meals can provide an opportunity for parents to model healthy eating habits, introduce new foods, and demonstrate good attitudes about nutrition that may extend into adulthood for the teen (Fulkerson, Larson, Horning, & Neumark-Sztainer, 2014).

Peer influences increase as the adolescents’ independence increases. It is suggested that youths spend approximately 1.5 to 3 hours a day in unstructured leisure activities (Larson, 2001) and more than twice as much time with their peers than with their parents during weekends (Pipes, 1989). The peer group defines what is socially acceptable in terms of learning, dress, entertainment idols, language, and food and drink choices. Consumption patterns and habits are often defined by the peer group as eating
becomes an important form of recreation, socializing and entertainment with friends. When dining in environments other than the home, the majority of adolescents do not make food choices primarily in terms of health and nutrition (Boyle & Holben, 2012). One study found that teens may be more likely to consume fruit and vegetables, but also soft drink and snack foods, if their friends consume these foods (Wouters, Larsen, Kremers, Dagnelie, & Geenen, 2010). On the other hand, adolescents are concerned with personal control, including control over their food choices. Adolescents usually want their food choices to meet the approval of their peer group and in general, the peer group typically has a negative influence on the eating habits of adolescents (Fitzgerald, Heary, Kelly, Nixon, & Shevlin, 2013).

Another area of nutritional concern for the adolescent is meal skipping. Many adolescents begin to skip meals, especially breakfast, during this period of life. Almost 14% of U.S. high school students did not regularly eat breakfast in 2015 (Robert Wood Johnson Foundation, 2017). Teenagers that do eat breakfast have higher intakes of Vitamins A, C, and B₂ (riboflavin), as well as calcium, iron, and zinc (DeBruyne et al., 2015). Often due to meal skipping, few teens choose sufficient whole grain, milk, fruits, and vegetables; and consume too many sugar sweetened beverages each day. These practices may contribute to weight gain and higher disease risks in adulthood (Hoertel, Will, & Leidy, 2014; Hur & Reicks, 2012; Poti, Duffey, & Popkin, 2014; Shils & Shike, 2006).

The increase in the prevalence of overweight and obesity among adolescents is concerning. The number of obese teens has almost doubled in the past twenty years (Brown, 2016). Current rates show that 14% of U.S. high school students are obese.
This compares to 19% of high school students in Kentucky that are obese (Robert Wood Johnson Foundation, 2017). Risk factors for the development of obesity include having at least one overweight or obese parent; low socioeconomic status; being African-American, Hispanic, or American Indian; and being diagnosed with a condition that limits mobility (Nader et al., 2006). Other behavioral risk factors include lack of physical activity and consuming diets high in total calories, added sugars and fats (Brown, 2016). Unfortunately, many overweight and obese teens can expect to remain overweight into adulthood (Singh, Mulder, Twisk, Van Mechelen, & Chinapaw, 2008). The health implications of adolescent obesity range from psychosocial to medical and include hypertension, dyslipidemia, insulin resistance, type 2 diabetes, sleep apnea, hepatic diseases, body image distortion and lowered self-esteem (Kelly et al., 2013). Studies show that obese adolescents are more likely to suffer from premature mortality from chronic diseases such as heart disease, strokes, diabetes and hypertension (Reilly & Kelly, 2011).

**Nutrition in Adolescents Living in Rural Poverty Areas**

Although most Americans fail to meet the recommendations for fruits and vegetables, and exceed the recommendations for high fat, high calorie foods, residents living in rural areas are more likely than their urban counterparts to practice these behaviors (Schoenberg et al., 2013). These habits can lead to an increase in overweight and obesity, metabolic syndrome, and other chronic diseases (Krebs-Smith et al., 2010).

Kentucky continues to rank as one of the most obese states across all age groups with 33% of adults and 19% of adolescents in grades 9-12 being classified as obese (CDC, 2016). Kentuckians living in rural, Appalachian portions of the state suffer even
higher rates of obesity and obesity-related diseases (Schoenberg et al., 2013). In 2005, 62.5% of adults in Kentucky were overweight or obese, as compared to 58.5% for the United States (CDC, 2014). Residents of the eastern Appalachian portion of Kentucky have among the highest rates in the U.S., with an estimated 63-76% of these residents classified as overweight or obese. Rates of diabetes and cardiovascular disease in Appalachian counties in Kentucky are also among the highest in the state and in the U.S. (CDC, 2014).

There are regional and cultural barriers that may prevent rural residents, especially those living in Appalachian Kentucky, from consuming more healthy foods. Some of these obstacles include the traditional food preferences of meats and high fat foods over fruits and vegetables (Schoenberg et al., 2013) and the resistance to change due to these ingrained traditions (Brown & Wenrich, 2012). Schoenberg et al. (2013) found through the use of focus groups and key informants in Appalachian Kentucky, that people living in this area understand the challenges, especially the community, cultural, and societal barriers, they face in maintaining healthy diets. The authors also found that like many Americans, Appalachian families are increasingly experiencing time constraints associated with extracurricular activities, the need to commute significant distances for jobs, and women working outside the home. Rural residents oftentimes experience all of the stresses and strains of modern life without the accompanying benefits of convenient healthy lifestyle items (i.e. salad bars, fruit stands, and local gyms for physical activity) (Schoenberg, Hatcher, & Dignan, 2008).

The role of the environment in making healthy food choices has been well-documented, with differences seen even within the same county. In rural counties, lower
socioeconomic status parts of town were more likely than higher socioeconomic status areas to offer high calorie, lower cost and nutritionally limited foods (Hosler, 2009). Neighborhood residents who have better access to supermarkets and limited access to convenience stores and fast foods tend to have healthier diets and lower levels of obesity. Residents of low-income, minority, and rural neighborhoods are most often affected by poor access to supermarkets and healthy food (Larson, Story, & Nelson, 2009).

More than six million U.S. adolescents live in a rural area. (United States Census Bureau, 2015). Rural adolescents are more likely to live in poverty and face more barriers to accessing health services than do their urban counterparts (National Rural Health Association, 2006). Youth in rural areas, compared to youth in urban areas, are more likely to be overweight or obese, to spend more time watching television or videos, and to live with someone who smokes (Gamm, Hutchison, Dabney, & Dorsey, 2003). On the other hand, rural children are more likely than other children to share a meal with their family every day of the week (Gamm et al., 2003).

Due to the high number of teens in Eastern Kentucky on free or reduced lunch (approximately 69% of students in Kentucky compared to 55% of students nationwide) (Kentucky Division of Nutrition and Health Services, 2016; USDA, 2016b), food insecurity is a likely problem. Food insecurity is a leading public health challenge throughout the U.S. with approximately 50 million people nationwide suffering from food insecurity (i.e. they were uncertain of having, or unable to acquire, enough food because they had insufficient money or other resources) (Gundersen, 2013). Some of the health concerns associated with food insecurity for children and adolescents are: higher risks of some birth defects (Carmichael, Yang, Herring, Abrams, & Shaw, 2007), anemia
(Eicher-Miller, Mason, Weaver, McCabe, & Boushey, 2009; Skalicky et al., 2006), lower nutrient intakes (Cook et al., 2004), greater cognitive problems (Howard, 2011), higher levels of aggression and anxiety (Whitaker, Phillips, & Orzol, 2006), higher probability of being hospitalized and poorer general health (Cook et al., 2006), higher probability of mental health issues (Alaimo, Olson, & Frongillo, 2002), higher probability of asthma (Kirkpatrick, McIntyre, & Potestio, 2010), higher probability of behavioral problems (Huang, Matta Oshima, & Kim, 2010), and more instances of oral health problems (Muirhead, Quiñonez, Figueiredo, & Locker, 2009). Adolescents who live with food insecurity also have an increased risk for developing iron deficiency compared with food-secure children (Gundersen, 2013).

The USDA National School Lunch Program (NSLP) and the Summer Food Service Program (SFSP)

Nutrition interventions have the potential to serve this population of rural adolescents well and to improve their nutritional status. One such intervention is the United States Department of Agriculture National School Lunch Program (NSLP). The NSLP, a federally assisted school meal program was established in 1946 to help improve the nutritional status of American school-age children (Stephenson & Schiff, 2015). Children, aged 17 years old and younger, from families living at or below 130 percent of the federal poverty level or whose families are enrolled in the National Supplemental Nutrition Assistance Program (SNAP) can receive a free meal at a school that participates in the NSLP (Nnakwe, 2012). Those living in families with income between 130-185 percent of the poverty level are eligible for reduced-price meals and children from families over 186 percent of the poverty level pay full price (Nnakwe, 2012). Public
school districts and independent private, nonprofit schools that participate in the NSLP receive reimbursement money and donated commodities for each meal served in accordance with specific nutrition guidelines (Boyle & Holben, 2012). These guidelines, established by Congress and revised in the Healthy, Hunger-Free Kids act of 2010 (HHFKA) are set to improve the nutrient content of school meals (Stephenson & Schiff, 2015). These newest standards increase the number of fruits and vegetables included in the meals, emphasize whole grain rich foods, serve only low-fat and nonfat milk, limit calories, and reduce saturated fat and sodium to ensure that the meals are in line with the U.S. Dietary Guidelines (Pope, Nizielski, & McCook, 2016). For the first time in the history of the NSLP, the HHFKA also established standards, called Smart Snacks, for any a la carte (competitive) foods sold at the school (USDA, 2016c) (Appendix B). Overall, the NSLP has historically had a positive impact on intake (Johnson, Podrabsky, Rocha, & Otten, 2016), however, research has indicated that the percentage of participation in NSLP declines as students advance academically (Boyle & Holben, 2012). Approximately 66% of elementary school students participate in the NSLP. That number drops to 55% of middle school students, and only 40% of high school students (Boyle & Holben, 2012). The decrease in participation may be due, in part, to peer influences, competitive foods, and a perceived lack of time to eat.

The Community Eligibility Provision (CEP) is an option for schools in low-income areas. This option may encourage students, especially those in high school to participate in the NSLP. The CEP allows the nation’s highest poverty schools to serve breakfast and lunch at no cost to all students enrolled in the participating school without collecting household applications. The school food service is reimbursed using a formula
based on the percentage of students who are eligible and based on their participation in other programs such as the Supplemental Nutrition Assistance Program (SNAP) and Temporary Assistance for Needy Families (TANF; USDA, 2017).

The USDA Summer Food Service Program (SFSP), established in 1968, is a federally-funded, state-administered program that serves children and teens 17 years of age and younger during the summer months when school is not in session (Boyle & Holben, 2012; Nnakwe, 2012). The SFSP reimburses providers who serve free, healthy meals to children and teens in low-income areas. Three main groups are involved in the administration of the program: state agencies, sponsors, and sites. State agencies administer the program; sponsors enter into “contracts” with the state agencies to run the program; and sites are places in which the children and teens receive meals (USDA, 2016d). Many community centers (schools, churches, libraries) act as both the sponsor and the site. The sponsor and site responsibilities include everything from procuring nutritious meals, serving the meals, ensuring that the meals contain all of the required components, as well as record keeping, staff and participant training, and other administrative tasks (USDA, 2016d). There are two main types of sites. Open sites are located in areas where 50% or more of the children are in families where the household income is below 185% of the federal poverty guidelines (Boyle & Holben, 2012). Any child, under the age of 18, living in the open site’s area may participate, free of charge in the SFSP. Enrolled sites are those which follow the same income guidelines as above, but the sponsors must document the household incomes in order to claim the reimbursement. Unfortunately, only one in six of the low-income children who rely on the NSLP during the academic year participate in the SFSP (Boyle & Holben, 2012).
There are more than 2,200 SFSP sites in Kentucky that provide almost 2.5 million breakfasts, lunches and snacks to children annually (KDOE, 2012). In Kentucky, the state agency for all SFSP is the School and Community Nutrition section of the Department of Education (KDOE, 2012). Like the NSLP, the SFSP also requires certain meal components in order to be considered reimbursable by the USDA. These standards ensure that participants receive well-balanced, nutritious meals that provide the kinds and amounts of food necessary to meet their nutrient and energy needs. A food component is defined as one of the food groups that comprise a reimbursable breakfast, lunch or supper in the SFSP, whereas a food item is a specific food offered within the food components comprising the reimbursable meal (KDOE, 2012). In order for the breakfast meal to be reimbursable, it must contain the following components: one serving of milk, one serving of a vegetable or fruit or a full-strength juice, and one serving of grain. A meat or meat alternative at breakfast is optional. For a lunch or supper meal to be reimbursable it must contain the following components: one serving of milk, two or more servings of vegetables and/or fruits, one serving of grain, and one serving of meat/meat alternate. Snacks can also be reimbursable if they contain two food items from two different components. All grain products must be whole-grain or enriched. Unlike the NSLP, there are no restrictions on the fat content of the milk or yogurt served and yogurt is considered a meat alternative, not a milk (KDOE, 2012) (Appendix C). SFSP sponsors are responsible for serving meal patterns with required food components and their minimum serving sizes in order for the meal to be eligible for reimbursement by the USDA (USDA, 2016d).
There are, however, some options for SFSP sponsors. The sponsors can choose self-preparation (prepared on site by trained volunteers or staff) or vended meals (meals purchased already prepared from an approved, licensed vendor); congregate feeding (meals provided in a group setting) or family style (food is presented at the table and the child choses how much they want; this option is for camps and closed enrollment sites only); or offer versus serve (in which there are choices of food items within components offered that the participant can choose) (USDA, 2016d). Offer versus serve (OVS) allows participants to decline some foods offered in a reimbursable meal at a SFSP site. Any site may opt to use the OVS. The purpose of OVS is to increase consumption and reduce waste based on the assumption that participants will choose the foods that they prefer (USDA, 2016d). The OVS however, has different reimbursement requirements than the standards listed above. For an OVS breakfast meal, the following four components must be offered: fruit and vegetable, grain, milk, and meat/meat alternative or an additional item from the fruit and vegetable group. A participant must select at least three items, in any combination from the components, as long as those items are not the same (i.e. cannot select two cereal, but could select a cereal and a bagel). Therefore unlike the traditional SFSP meal, a participant may choose a fruit, a grain, and a meat, but not a milk for breakfast. For an OVS lunch or supper meal the following five components must be offered: meat/meat alternative, two fruit and vegetable components, grain, and milk. A participant must select at least three different components (not just different items that are allowed at breakfast; Appendix D). However, even with the flexibility of the OVS, the requirements for the SFSP are higher than the average intakes of adolescents. Banfield, et al. found that U.S. children and adolescents, across all age
and ethnic groups were not meeting the minimum federal guidelines for good health (2016). The authors also concurred with previous research (Khalil, Johnson-Down, & Egeland, 2010) showing an inverse relationship between age and dietary quality (Banfield, 2016). It is important to note that audits from the state agency occur during the first year of operation and then once every three years. These audits evaluate documentation and the auditors actually watch a meal being served (Appendix E). The sponsor of the site must complete a review form during the first four weeks of operation of a SFSP every year (Appendix F). However, neither of these evaluations include health behaviors, consumption, or long term nutritional benefits.

**The Upward Bound Program**

Higher education is considered one of the main paths for opportunity and economic progress in the U.S. (Blackwell & Pinder, 2014). There were over 4.5 million low-income, first generation students enrolled in college in 2008 (Engle & Tinto, 2008). These students are more likely to leave higher education after the first year than their peers who do not have these risk factors (Tate et al., 2015). After six years, only 11% of low-income, first generation students had earned bachelor’s degrees compared to 55% of their more advantaged peers (Engle & Tinto, 2008). On the other hand, the low-income, first generation students were more than seven times likely to earn bachelor’s degrees if they started in 4-year institutions (only 25% of this population did). Most of these students began, and ended, their post-secondary education at public two-year institutions (Engle & Tinto, 2008). Low-income, first generation students experience some common barriers. They disproportionately come from ethnic and racial minority backgrounds, have lower levels of academic preparation, are less likely to received financial support
from parents, and are more likely to have obligations outside of college (Engle & Tinto, 2008). In a small qualitative study, it was found that first-generation college students were not encouraged by their families to attend college but their inner drive motivated them to achieve a better way of life (Blackwell & Pinder, 2014). Suggestions for policymakers and administrators to increase success in college for low-income, first-generation students are to improve academic preparation for college, provide additional financial aid, increase transfer rates to four-year colleges, ease the transition to college, encourage engagement on college campuses, and promote entry and re-entry for working adults.

In order to address some of these issues, President Lyndon B. Johnson, in 1964, signed the Economic Opportunity Act as part of the “War on Poverty.” This legislation gave rise to the Office of Economic Opportunity and its Special Programs for Students from Disadvantaged Backgrounds (commonly known as the TRIO programs). Upward Bound (UB) was the first program that came into existence as part of this statute (McElroy & Armesto, 1998). There are now seven TRIO programs which currently fall under the U.S. Office of Higher Education (USDOE, 2011). UB provides “opportunities for participants to succeed in their precollege performance and ultimately in their higher education pursuits” (USDOE, 2016, p. 1). UB serves high school students who are low-income first generation (LIFG). The goal of the program is to “increase the rate at which participants complete secondary education and enroll in and graduate from institutions of postsecondary education” (USDOE, 2016, p. 1).

Eastern Kentucky University (EKU), located in Madison County, houses one of the fifteen UB programs in the state. EKU’s UB target area is comprised of six high
schools in six counties in eastern Kentucky. These counties and high schools include Casey County High School, Estill County High School, Lee County High School, Lincoln County High School, Powell County High School, and Wolfe County High School. According to U.S. census data (2016), there is a high percentage (37%) of families in the target area living below 150% of the poverty level compared to 23% in Kentucky and 19% nationwide, and 23 of the 100 poorest counties in the United States are in Kentucky (including Casey, Estill, Lee, and Wolfe which are all in EKU UB’s target area) (2015). In 2016, the New York Times named six eastern Kentucky counties (including Lee County) among the ten hardest places to live in the country (Hasson, 2016). The Appalachian region is recognized for persistent poverty, high unemployment rates, and desolate living conditions. Unsurprisingly, all six counties in the target area were designated “distressed” for fiscal year 2016 (Appalachian Regional Commission, 2016). High poverty rates, lack of post-secondary opportunities, and rampant drug abuse have been cited as some of the contributors to the bleak outlook on life of individuals in this region (Estep, 2014). Other social issues persist in the target area as well. Single parent households, teen births, and youth incarcerations all occur at rates higher (and often much higher) in the target area than the Kentucky average ("Kentucky Kids Count 2015 County Data Book," 2017).

Traditionally, nutrition education is not part of the UB program. However, beginning in June 2014, the EKU UB program began to use the USDA SFSP as a means of recuperating money spent on food for the summer UB participants. At that time, the UB program partnered with the EKU Department of Family and Consumer Sciences (FCS) which offers classes needed for students to complete their Masters of Public
Health (MPH) with a Concentration in Public Health Nutrition degree. The collaboration created between UB and FCS became mutually beneficial. This partnership developed a comprehensive practicum experience for the MPH student while providing nutrition education to UB students. MPH students at EKU are required to complete 240 hours of observation and participation in selected programs at local, state or the federal level (called the MPH Practicum) in their area of concentration (Eastern Kentucky University, 2014). The partnership has continued for five consecutive summers (2014 through 2018) and has been deemed financially successful. UB received over $32,000 in food reimbursements from the USDA in the first three years (T. Stewart, personal communication, April 20, 2017) for following all of the guidelines as a SFSP sponsor and site.

Almost 93% of the students in the target area were eligible Free or Reduced Lunch for the 2015-16 school year. This compares to approximately 69% of students in Kentucky and 55% of students nationwide (KYNHS, 2016; USDA, 2016b). All schools in the EKU UB targeted area participate in the CEP as described above. Therefore all students enrolled in these high schools have the opportunity to participate in the NSLP. Therefore, enrollment in the SFSP at EKU UB provides an opportunity to increase the nutritional health of its participants and offers an opportunity to capture students who may not otherwise participate in SFSP. However, there has not been any formal evaluation of the effects of the SFSP on participants’ nutritional knowledge, attitudes about nutrition, or nutritional behavioral intentions. Upward Bound participants at EKU provide an ideal audience of rural, low-income, potentially first generation college
students for nutrition education and therefore, the perfect assembly to study the effects of the SFSP coupled with basic nutrition education on rural adolescents.

**Theoretical Framework**

The Theory of Planned Behavior (TPB) describes that an individual’s intention to perform a given behavior is a function of their attitude toward performing the behavior, their beliefs about what relevant others think they should do (subjective norm), and their perception of the ease or difficulty of performing the behavior (perceived behavioral control; Ajzen, 1985). Further, the TPB explains that the attitudes associated with intentions are likely to be influenced by personal factors (personality, demographics, and environmental; Simons-Morton et al., 2011) and behavioral beliefs (beliefs about the consequences of participating in the behavior or not participating in the behavior) and the positive or negative judgement about the features of the behavior (Francis et al., 2004). Subjective norms are a person’s own perception of the social pressure to perform or not perform the behavior. It includes how other people would like them to behave and the positive or negative judgements about beliefs in the behavior (Francis et al., 2004). Perceived behavioral control can be described as an “overall assessment of conditional aspects of the behavior that would enable or inhibit engaging in the behavior” (Simons-Morton et al., 2011, p. 110). Two beliefs make up the perceived behavioral control: perceived control beliefs which is the subjective evaluation of the likelihood of factors that would facilitate or inhibit the behavior and the importance of each; and perceived power which is the estimation of the importance of the environmental conditions. Intent is likely to be influenced by perceptions of control, and behavior is likely influenced by environmental conditions (Simons-Morton et al., 2011). Perceived behavioral control is,
simply put, the extent to which a person feels able to control the behavior along with self-efficacy (how difficult will it be to perform the behavior and how confident the person is in his or her ability to perform the behavior; Francis et al., 2004).

**Gaps in the Literature**

Although there have been research investigations to support the success of the NSLP (CDC, 2013; Dunifon & Kowaleski-Jones, 2003; Fox et al., 2004; Johnson et al., 2016) and the SFSP (A. Gordon et al., 2003; Nord & Romig, 2006) on reducing food insecurity and to justify the continuance of the programs, there appears to be a lack of research on the nutritional behaviors of the NSLP and SFSP participants. Specifically, there is a gap in how these programs may affect a participants’ knowledge, attitudes, subjective norms, and perceived behavioral control about nutrition as well as their behavioral intentions regarding food choices.

There is also the lack of a nutrition education component in the NSLP and the SFSP (Byker, Pinard, Yaroch, & Serrano, 2013). Although there have been some programs and incentives intended to provide resources and technical support to help schools improve healthy eating and physical activity patterns (Bergman, 2010; Boyle & Holben, 2012) to participants in the NSLP, there is not a national nutritional program attached to the SFSP. While some SFSP sites may promote other activities for SFSP attendees, there are no national or state incentives for providing nutrition education. Due to the lack of required nutrition education standards in the SLSP, there does not exist any studies to determine if these programs would have an impact, if they were, in fact encouraged or even required.
Summary

This literature review provides information related to adolescent nutrition, common nutrition concerns for rural adolescents in particular, the study population (Upward Bound participants) and the USDA NSLP and its off-shoot, the SFSP. This information justifies the need to study the effects that mandatory participation in the SFSP may have on nutritional behavioral intentions and explores the potential effects that nutrition education, along with the SFSP may have on low-income, rural adolescents’ food choices and habits.
CHAPTER 3: DISSERTATION METHODS

Introduction

The study focused on the overall effects of the USDA Summer Food Service Program (SFSP), coupled with nutrition education on rural, low-income high school adolescents, who are also potentially first generation college students. The study examined the impact of the SFSP, enhanced with nutrition education, on the nutrition behaviors, knowledge, attitudes, subjective norms, perceived behavioral control, and behavioral intentions of rural, low-income adolescents participating in the Upward Bound Summer Program housed at Eastern Kentucky University. Promoting good nutrition and providing participants with the knowledge, skills, and resources to make positive, nutritious choices to ideally improve their health behaviors was an intention of the intervention.

Research Design

A quasi-experimental design was used involving one-group pre- and post-intervention data collection. Quasi-experimentation is used when individuals are not randomly assigned because the investigator uses naturally formed groups (Creswell, 2013). Participants were surveyed (pre-intervention) on June 9, 2018, prior to the first nutrition education session, on the first day of the Eastern Kentucky University (EKU) Upward Bound (UB) Summer Program. Participants were exposed to the intervention for five weeks, and surveyed again on July 12, 2018 (post-intervention) the last day of the UB Summer Program. Participants also allowed digital photographs of their food and beverages for two breakfast meals, two lunch meals, and two supper meals during the first week of the UB Summer Program (baseline), and again during the final week of the
summer program for two breakfast meals, two lunch meals and two supper meals (program completion) in order to capture behaviors related to food selection and food consumption.

Although the quasi-experimental design used in this study offers many advantages, it also presents some disadvantages or weaknesses. If changes and/or improvements in the participants are seen from pre-intervention to post-intervention, the intervention is generally deemed successful (Baumgartner, Strong, & Hensley, 2005), however, the changes could partially be due to threats of validity of history (things that happen while conducting the study that affect the posttest); maturation (the changes that occur in the participants or external factors that affect posttest); and selection (bias may result if the group in this study is not truly representative of all rural youth). All of these potential threats to validity have been noted and were minimized as much as possible. The absence of random assignment in quasi-experimental study also serves as a weakness due to the fact that there is lack of full experimental control (Campbell & Stanley, 2015). A control group for this study was not possible given the nature of the population being studied. All of the participants in the EKU UB program, aged 14-17, participated in the USDA SFSP. However, given that the SFSP had never been evaluated for its effect on nutrition knowledge, attitudes, and behaviors, this study supports future programming and research, which could include a randomized controlled trial. Quasi-experimental studies intend to demonstrate if a program has had an intended effect on participants (Campbell & Stanley, 2015).
Study Population

The Upward Bound (UB) program is part of the nationwide TRIO programs (a series of programs for students from disadvantaged backgrounds) that was signed by President Johnson in 1964 (McElroy & Armesto, 1998). Upward Bound serves high school students who are low-income first generation (LIFG) and provides opportunities for participants to succeed in their precollege performance and ultimately in their higher education pursuits (USDOE, 2016). The goal of the program is to increase the rate at which participants complete secondary education and enroll in and graduate from postsecondary institutions. EKU houses one of the fifteen UB programs in Kentucky (USDOE, 2016). EKU’s UB target area is comprised of six high schools in six rural counties in eastern Kentucky. According to U.S. census data (2016), there is a high percentage (37%) of families in the target area living below 150% of the poverty level compared to 23% in Kentucky and 19% nationwide, and 23 of the 100 poorest counties in the U.S. are in Kentucky, including Casey, Estill, Lee, and Wolfe counties which are all in EKU UB’s target service area (2015). These counties were chosen by the EKU UB as targets for ease of transportation and other logistics as well as the fact that they comprise six of the counties in EKU’s regional stewardship area.

Therefore, the target population for the study was low-income, rural, high school students from eastern Kentucky. Intact sampling was used in which all students participating in the EKU UB Summer Program received the intervention. With intact sampling there is no random sampling of the participants or random assignment of participants to treatment (Baumgartner et al., 2005). All study participants \( n = 57 \) for surveys and \( n = 43 \) for digital photography) were part of the UB Program on EKU’s main
campus during the summer of 2018. All participants were high school students, aged 14 – 17 years old and from one of six rural counties in Kentucky. It is assumed that the participants come from low-income families (due to the fact that the majority of the residents of the targeted counties are at or below 185% of the federal poverty guidelines) and are potential first generation college students, however, an application process for the admittance into the UB program is in place. In this application the potential participant submitted an income verification statement and/or a claim of being a potential first generation college student. All participants lived on campus for the five week UB Summer Program. They returned to their respective home counties each weekend.

Seventy-eight students met the eligibility requirements for the study. Fifteen did not consent and six left before the completion of the study. Therefore fifty-seven UB students participated in the survey portion of the study. Fourteen of the 57 survey participants has missing data (photos) for the digital photography portion of the study and therefore 43 UB students participated in the digital photography portion of data collection. Those excluded due to missing data or lack of consent were typical of the population studied. Of the 57 survey participants, 37% were male (n = 21); 63% female (n = 36); 98% were white (n = 56); 2% were black (n = 1); 2% were Hispanic (n = 1) 2% were multi-racial (n = 1). Participants could select more than one race/ethnicity. The mean age was 16.2 years (SD = 0.826). Sixteen percent of participants (n = 9) were rising high school sophomores, 46% (n = 26) were rising high school juniors and 39% (n = 22) were rising high school seniors. Forty-six percent (n = 26) had never participated in the UB summer program before this study and 54% (n = 31) were returning to the UB program for the second year (n = 17) or third year (n = 14). The following describes the
numbers and percentages of the study population from each participating county: Casey, 9% \((n = 5)\); Estill, 11% \((n = 6)\); Lee, 11% \((n = 6)\); Lincoln, 37% \((n = 21)\); Powell, 20% \((n = 10)\); and Wolfe, 16% \((n = 9)\). Of the 43 digital photography participants, 42 were white, with one self-reporting identifying with being both white and black, and most were female (58%; \(n = 25\)). The mean age was 16.2 \((SD = 0.87)\) years, and about half were high school juniors (44%; \(n = 19\)). More than half (61%; \(n = 26\)) of the participants were second (35%; \(n = 15\)) or third (26%, \(n = 11\)) year UB members and had therefore been exposed to the SFSP the previous year(s), however, there were no significant differences seen in the groups at baseline and therefore the groups were combined for analysis.

In general, according to the U.S. Census Bureau (2015), the demographics of the six targeted counties for the EKU UB program (Casey, Estill, Lee, Lincoln, Powell, and Wolfe) are as follows: Total population of the six counties is 80,541 with 50.2% male, 97.3% white, 1.2% black, and a median age of 40.3 years. The high school students eligible for UB follow similar demographics with an exception of gender (approximately 37% of UB students are male) and the obvious exception of age. There is a total of approximately 3810 high school students in the targeted counties (4.7% of the total population of these counties combined). Lincoln County has the highest population of the six counties (30.3% of all 6 counties) and houses the largest high school (1057 students, or 27.7% of high school students in the 6 counties). These numbers were mirrored in the 2018 UB Summer Program with the majority of participants (37%) coming from Lincoln County. Lee and Wolfe counties have the smallest high school populations with 316 (8% of high school student population of the six counties) and 347 (9% of the high school student population of the six counties) respectively, however,
Each county had a higher number enrolled in the UB Summer Program, 11% \((n = 6)\) for Lee County and 16% \((n = 9)\) for Wolfe County for a total of 27% of students participating in this UB program. This disproportionate number of UB students from Lee and Wolfe Counties is actually appropriate when one considers that Lee and Wolfe Counties have some of the worst adult chronic health statistics in Kentucky and in the U.S. (KY Behavioral Risk Factor Survey, 2017). Appendix G highlights some of the adult chronic disease rates for the UB targeted service area. A map and a table of the county and UB student statistics based on demographics can be seen in Appendices H and I.

**Inclusion Criteria:** Participants enrolled in the UB program, were 14-17 years old when the program began, and in their sophomore, junior, or senior year of high school. Participants and their parents agreed to consent for participation in the study.

**Exclusion Criteria:** Those under 14 years or over 17 years at the start of the program, non-UB participants, those who are not members of the EKU UB program, and participants or their parents who did not agree to consent for participation in the study.

Upward Bound participants at EKU provided an ideal audience of rural, low-income, potentially first generation college students for nutrition education and therefore, the perfect assembly to study the effects of the SFSP coupled with basic nutrition education on rural adolescents.

**The Intervention**

The intervention was two-fold. First, it included participation in and mandatory adherence to the SFSP requirements for three meals each day, for 4-5 days each week for five weeks. The EKU UB summer residence program includes off-campus field trips. On
those specified days, the SFSP guidelines were not followed. The original purpose for
enrollment in the USDA SFSP for EKU UB in 2014 was to recuperate some of the cost
that the program spent on feeding its participants. In order to be considered reimbursable
by the USDA, the SFSP has meal pattern requirements. These standards ensure that
participants receive well-balanced, nutritious meals that provide the kinds and amounts of
food necessary to meet their nutrient and energy needs (KDOE, 2012). In the standard
SFSP, for the breakfast meal to be reimbursable, it must contain: one serving of milk,
one serving of a vegetable or fruit or a full-strength juice, and one serving of grain. A
meat or meat alternative at breakfast is optional. For a lunch or supper meal to be
reimbursable it must contain: one serving of milk, two or more servings of vegetables
and/or fruits, one serving of grain, and one serving of meat/meat alternate. Snacks can
also be reimbursable if they contain two food items from two different components. All
grain products must be whole-grain, enriched or fortified. Unlike the USDA National
School Lunch Program (NSLP), there are no restrictions on the fat content of the milk or
yogurt served and yogurt is considered a meat alternative in the SFSP (KDOE, 2012)
(Appendix C). SFSP sponsors (in this study, EKU UB in partnership with EKU Dining
Services) are responsible for serving meal patterns with required food components and
their minimum serving sizes in order for the meal to be eligible for reimbursement by the
USDA (USDA, 2016d).

There are some options for SFSP sponsors. One of these options, which EKU UB
chose to follow, is an offer versus serve (OVS) option. The OVS allows for choices of
food items within components that the participant can select (USDA, 2016d) and also
allows participants to decline some foods offered. The intent of OVS is to increase
consumption and reduce waste, assuming that participants will choose the foods that they prefer. The OVS however, has different reimbursement requirements than the standards listed above. For an OVS breakfast meal, the following *four components* (food groups) must be offered: fruit and vegetable, grain, milk, and meat/meat alternative or an additional item from the fruit and vegetable group. A participant must select at least *three items* (foods), in any combination from the components, as long as those items are not the same (i.e. cannot select two cereals, but could select a cereal and a bagel). Therefore unlike the traditional SFSP meal, a participant may choose a fruit, a grain, and a meat, but not a milk for breakfast. For an OVS lunch or supper meal the following *five components* must be offered: meat/meat alternative, two fruit and vegetable components, grain, and milk. A participant must select at least *three different components* (not just different items that are allowed at breakfast; Appendix D).

The study utilized a research assistant (RA) who was a current Master of Public Health (MPH) student at EKU. This graduate student provided a necessary human resource to aid the EKU UB program with successful participation in the SFSP. The RA assisted with checking UB participants’ meals to ensure compliance with the SFSP OVS requirements, recorded all meals eligible for reimbursement, assisted with the application process for the SFSP, helped train other staff on the SFSP reimbursement requirements, and worked closely with EKU Dining Services to ensure that the requirements of the SFSP were being offered to participants on a daily basis at every meal. See Appendix J for the MPH EKU UB Intern Job Description.

The second portion of the intervention included participant attendance at one, 1-hour mandatory nutrition education session (Appendix K). This session was taught by
the same RA described above. This lesson, given on the first day of the EKU UB Summer program, included an introduction to the US Dietary Guidelines (DHHS, 2015), the basic food groups as identified in MyPlate (USDA, 2016a), and the purpose and requirements of the SFSP (KDOE, 2012). The educational session emphasized the importance of fruit, vegetable and whole grain consumption; encouraged the consumption of low-fat dairy products and fresh, whole foods over processed foods; discouraged consumption of sugar-sweetened beverages; as well as emphasized the importance of an active, healthy lifestyle and the prevention of chronic diseases. There was also an optional short (20-30 minute) nutrition sessions (part of an EKU UB program called “College Hacks”) that participants could choose to attend (Appendix L) as well as a two-part (1-hour each) cooking class that was optional for UB participants (Appendix M). Attendance at the optional sessions rewarded participants with a “ticket.” These tickets could be combined with others earned throughout the five week summer session for attendance at various activities. The tickets were traded in at the end of the five weeks for a special dinner with the UB staff. Attendance at the optional College Hacks was 20 participants (28% of study population). Attendance at the two cooking classes was 11 (15%) and the same students attended both cooking class sessions.

See Chapters One, Four and Five for a detailed list of research questions and associated hypotheses.

Measures

Surveys

Study participants completed pre- and post-intervention surveys. The instrument used was a survey previously tested for reliability and validity, driven by the Theory of
Planned Behavior (TPB) (Blanchard et al., 2009); nutrition knowledge questions modified from a Reliability of a Dietary Questionnaire (Turconi et al., 2003); and nutrition behavioral (participants self-reported behavior) questions extracted from the 2017 Standard High School Youth Risk Behavior Survey (CDC, 2017). The survey did not include qualitative data. The full survey can be found in Appendix N.

**Piloting the Survey.** The survey was pilot tested with 10 low-income high school students for readability, understanding, and ease of answering. Based on pilot results, some survey questions were modified for simplicity, clarity and ease. A few words were changed (for example, “contribute” was changed to “lead to”) to lower the reading level. Two nutrition professionals and a health promotion professor also reviewed the survey for accuracy, clarity, and ease. Appendix O displays all of the questions and comments regarding pilot testing.

**Demographics.** Participants were asked their age, gender, and race/ethnicity, home county, length of time in the UB program (indicating experience with SFSP), and academic standing. The post-survey asked the participant if they had attended any of the optional nutrition events.

**Knowledge.** To assess nutrition knowledge, fifteen questions were modified from the Reliability of a Dietary Questionnaire by Turconi et al. (2003). The modifications included changing the questions from multiple choice answers to true/false; modifying the questions to match the nutrition education sessions; and making adjustments to use American versus European food terminology. The original questionnaire was tested for internal reliability using Chronbach’s alpha ($\alpha = 0.56$) and test-retest reliability using Pearson’s correlation, $r(68) = .80$, $p \leq .01$. Reliability coefficients have shown some...
limitations in their use for true/false questions (Burton, 2004) and perhaps a more useful measure of test reliability is to be found in the standard error of measurement, or SEM which was calculated to be an appropriate .22 (Szafran, 2011) for the adapted items used in this study. Knowledge questions focused on the topics taught in the nutrition educational sessions and included: the US Dietary Guidelines (DHHS, 2015), the basic food groups as identified in MyPlate (USDA, 2016a), and the purpose and requirements of the SFSP (KDOE, 2012) with a focus on food groups and serving sizes. Knowledge questions were given a summative score of 0-15, with greater scores indicating higher nutrition knowledge.

**Attitude.** Participants were asked four questions to assess attitudes about nutrition (Blanchard et al., 2009) using 7-point, semantic, differential adjective scales that tested both instrumental (i.e. harmful-beneficial; bad-good) and affective (boring-fun; unenjoyable-enjoyable) aspects of attitude. The descriptive options were worded extremely harmful/bad (1 on the scale), quite harmful/bad (2 on the scale), slightly harmful/bad (3 on the scale), neutral (4 on the scale), slightly beneficial/good (5 on the scale), quite beneficial/good (6 on the scale), and extremely beneficial/good (7 on the scale). The survey statement was “During the next week, for me to eat 5 servings of fruits and vegetables each day will be…” Based on a summative score of 4-28, with higher scores indicating more positive attitudes. Internal reliability for both the instrumental questions ($\alpha = .81$) and the affective questions ($\alpha = .89$) were deemed satisfactory (University of Virginia, 2018), and in fact a bit higher than the validated scale that was used (Blanchard et al., 2009).
**Subjective Norm.** Subjective norm was measured using nine items from Blanchard et al. (2009) rated on 7-point scales that ranged from 1 (strongly disagree) to 7 (strongly agree). The following stem question: “During the next week, most people important to me [(1) think I should, (2) approve of me, and (3) support me] eating 5 servings of fruits and vegetables each day,” was modified, based on piloting the survey and previous literature (Francis et al., 2004; Ickes & Sharma, 2012; Pawlak, Malinauskas, & Rivera, 2009; Tsorbatzoudis, 2005a). The statement “people important to me” was differentiated into three different questions for each of the verbs (for a total of nine subjective norm questions) using “my parents/relatives,” “my friends,” and “my teachers.” Based on a summative score of 9-63, with higher scores indicating a stronger subjective norm. Internal reliability for the questions was deemed good at $\alpha = .90$ and higher than the original coefficient of reliability on the original scale (Blanchard et al., 2009).

**Perceived Behavioral Control.** Six items, modified from Blanchard et al. (2009) were used to measure perceived behavioral control. These items were (1) “During the next week at Upward Bound/home, how confident are you that you can eat 5 servings of fruits and vegetables each day?” rated from 1=not at all confident to 7=extremely confident; (2) “During the next week at Upward Bound/home, for me to eat 5 servings of fruits and vegetables each day will be… rated from 1 = extremely difficult to 7=extremely easy; and (3) “During the next week at Upward Bound/home, if I wanted to I could easily eat 5 servings of fruits and vegetables each day” rated 1=strongly disagree to 7=strongly agree. A summative score of 6-42, with higher scores indicating a higher perceived behavioral control was used. Internal reliability for the questions were deemed good at $\alpha = .89$, higher than the original scale by Blanchard et al. (2009).
**Behavior Intention.** Behavior intention was assessed using the following two questions: (1) “During the next week, I intend to eat 5 servings of fruits and vegetable each day,” rated 1=strongly disagree to 7=strongly agree; and (2) “During the next week, my goal is to eat 5 servings of fruits and vegetables (insert a number from 0 to 7) days per week.” Due to the different scaling format for this question, the items were converted to z scores before aggregation and internal reliability for the questions were deemed good at $\alpha = .74$ which was the same as the original scale by Blanchard et al. (2009). A summative score of 2-15, with higher scores indicating greater intention, was used in the current study.

**Self-Report Fruit and Vegetable Consumption.** Participants answered six questions related to fruit and vegetable consumption that were taken from the Youth Risk Behavior Surveillance System (YRBSS) Standard High School Questionnaire (CDC, 2017). The survey included questions to determine fruit and vegetable intake frequency: “During the past 7 days, how many times did you eat/drink (100% fruit juice, whole fruit, green salad, non-fried potatoes, carrots, and other vegetables).” Participants were given a response scale of 1 (“I did not eat/drink…during the past 7 days”); 2 (“1 to 3 times during the past 7 days”); 3 (“4 to 6 times during the past 7 days”); 4 (“1 time per day”); 5 (“2 times per day”); 6 (“3 times per day”); or 7 (“4 or more times per day”). A summative scale score of 6-42, with higher scores indicating higher fruit and vegetable consumption, was calculated.

**Digital Photography**

**Actual Behavior.** A unique opportunity to examine and determine actual behavior was made using digital photography to capture food selection and consumption by tracking plate waste as described by Swanson (2008).
Nutrition Quality Score. To aid in evaluating the quality of the foods selected and consumed a nutrition quality score was developed. Each menu item, available for participants to choose on collection days, was nutritionally analyzed and given a quality score based on its nutritional value. The following six criteria were used: total fat less than 35% of calories; saturated fat less than 10% of calories; zero trans-fat; fiber at least 14g for each 1000 calories; sugar <10% of calories; and sodium ≤ 1mg per calorie. Each food item was given a score of 1 if it met the nutritional criteria and 0 if it did not meet the criteria. A scale of 0-6 was then applied for each food item. The criteria were adapted from the Snack Smart standards of the NSLP (USDA, 2016b) and the Dietary Guidelines for Americans (DHHS, 2015). Nutrition information on the individual food items was obtained from the university dining facility website (Aramark Corporation, 2018) and from the USDA Nutrient Data Base (2018). The quality score of food items offered during the intervention can be seen in Appendix P.

Data Collection Procedures

Protection of human subjects. The investigator, research assistant, and faculty advisor completed the Collaborative Institutional Training Initiative (CITI) and Institutional Review Board (IRB) approval from both the University of Kentucky and Eastern Kentucky University was given to ensure compliance with all ethical considerations in the handling of informed consent, participant interaction, data collection, and analysis. Participants completed an IRB approved assent form and their parents/guardians completed an IRB approved consent form.

Participation. Participation in the study was optional and did not preclude a student from continuing in the EKU UB Summer Program. The initial invitation to participate in
the study (Appendix Q) was sent to the EKU UB summer program participants \( n = 78 \) and their parents in May 2018. The consent (Appendix R) and assent (Appendix S) forms were delivered via U.S. Postal Service with a packet of approximately 10 other forms that had to be completed and signed before the participant could be included in the UB Summer Program. Some of these other forms were consent to medical treatment, authorized transportation, the UB summer handbook of student policies, procedures, and behavior expectations, and a general calendar of events. The consent and assent forms were paper-based and were returned by the participant and/or their parent or guardian no later than June 9, 2018 in order to be included in the study. The consent and assent forms explained the purpose of the study, the importance of participating, and any potential risk for participation (this survey subjected the participant to no more risk of harm than one would experience in everyday life), and what the study included (participation in the SFSP, nutrition education, and having some of their meals photographed before and after consumption). Fifteen potential subjects failed to consent and therefore a total of 63 UB students agreed to participate in the study. Six consenting participants left the program before its completion and were eliminated from the study. The non-consenting and eliminated participants were typical participants with no outstanding or unusual differences from others that continued in the study. A total of 57 participants completed the survey. Fourteen participants had missing before or after meal photographs on one or more of the collection days and were eliminated from that portion of the study. A total of 43 participants completed the digital photography portion of the study.

**Survey.** The pre-survey was given on the first day of the UB Summer Program, before the initial nutrition education session which was also given at a later time on the same
day. The participants were sent to a computer lab where they were asked to open a link to the survey and complete the pre-intervention survey. Those who did not consent were sent to the same room but given the opportunity to enjoy another quiet activity, such as reading or drawing. The post-survey was given on the last day of the UB Summer program using the same procedure as described above. The surveys were generated using Qualtrics Labs, Inc. software, Version 12.018 of the Qualtrics Research Suite, 2009. Each participant was given a unique code that was typed in as first item on the surveys. The code allowed for confidentiality while also allowing the PI to match the pre-survey with the post-survey. Data was managed and stored on the Qualtrics site through the UK account of the PI. A master list of the codes was stored on an Eastern Kentucky University secured, password protected server. The PI, using an additional password, was the only person with access to these codes.

**Digital Photography.** Digital cameras were used during the first week (baseline) and the last week (program completion) of the summer program to track plate waste (Swanson, 2008) and as a way to measure nutrition behaviors. The study aimed to determine if the SFSP and the nutrition education positively changed food choices and/or increased the participants’ consumption of nutritious foods. The digital photography was used for two breakfast meals, two lunch meals, and two supper meals during the first week of the UB Summer Program, and again during the final week of the summer program for two breakfast meals, two lunch meals and two supper meals. Average consumptions for each first week meal (breakfast, lunch, and supper) were compared to the average consumption of each fifth week meal (breakfast, lunch, and supper). Participants passed through a “check” station that ensured that each meal included all of the food group components.
required to qualify for a reimbursable meal according to the USDA SFSP OVS (USDA, 2016d). If a participant did not have all of the required components, they were asked to return to the serving line to pick a food item or items needed for them to complete the necessary requirements for reimbursement.

At the check point, participants had their plate labeled with the same number identifier that was given to them during the pre-survey. The plates were photographed by one of two research assistants using standard smart phone digital cameras. To ensure proper comparisons of before- and after-consumption, the plates were placed in one of two marked areas on a table and mounted cameras, approximately 16 inches above the area, with a camera angle of approximately 45°, took a photograph. Two marked regions for placement of the meal plates were fixed to the table to support the camera tripods to ensure optimal visibility of the meal in the digital photographs. Two “photo stations” were used to prevent time delays and allowed participants to pass through more quickly. After finishing their meals, the participants brought their plates and all waste back to the “photo stations” where the plate and any beverages were photographed in the same manner as before. The research assistants were trained to take a photograph without comment or question unless there was a missing item in the after-consumption picture (such as fruit peels or cores) in which case, the RAs asked if the fruit was to be taken with the participant for later consumption. The photographs were downloaded to the PI’s secure-password protected, office computer. The digital photography method has been deemed a reliable method for estimating food consumption (Swanson, 2008; D. Williamson et al., 2004; D. A. Williamson et al., 2003). For a detailed description of the data collection timeline, see Table 3.1
**Data Analysis**

Statistical analysis was completed with SPSS 24 (IBM, 2016) using a significance or alpha level of .05 and 95% confidence intervals (CI) for all hypothesis testing. The demographic variables included gender, age, academic standing, ethnicity, previous UB SFSP participation, and county of residence.

**Survey Analysis**

The SFSP and the mandatory nutrition education acted as the independent variable for the following dependent variables: nutrition knowledge, attitudes about nutrition, subjective norms, perceived behavioral control, self-reported fruit and vegetable consumption, and behavioral intention. Summary scores for each variable were calculated. A paired sample *t*-test was conducted to compare the means of the paired observations between the pre- and post-test surveys to test the hypotheses that each variable: knowledge, attitudes, subjective norm, perceived behavioral control, self-reported fruit and vegetable consumption, and intention to change behavior will increase from baseline to post-intervention.

In order to better understand changes relative to baseline, a new variable was created for each of the dependent variables by subtracting the summary variable scores of the pre-test from the summary scores of the post-test to get a change score for each variable. This process was conducted for all of the dependent variables (knowledge, attitude, subjective norms, perceived behavioral control, self-reported fruit and vegetable consumption, and behavior intention). These new variables, referred to from here on as a change score, were tested for normality using histograms to visually assess distribution. Box-plots of each dependent variable were also visually assessed. There were normal
distributions for all variables. Independent samples $t$-test were conducted using the new variables to determine if there was a difference in the dependent variables for those with previous experience in the UB program. Independent samples $t$-test were also performed for the same reason on those who chose to attend one or more of the optional nutrition events. Multiple regression was used to further explore the relationships between and among variables. Prior to the regression analysis, assumptions were tested. The data met the assumptions of regression including normal distribution, multicollinearity, and homoscedasticity. After correlation coefficients established relationships between and among variables, the relationships were further explored with multiple regression models.

Analysis using one-way repeated measures multivariate analysis of variance (MANOVA) to determine statistical significant difference in knowledge, self-reported fruit and vegetable consumption, and the TPB constructs (attitude, subjective norms, perceived behavioral control) over time (pre-survey to post-survey) was conducted. Before proceeding with MANOVA, assumptions were tested. The assumptions of independence of variance and adequate sample size were met. The data were tested for outliers using regression and Mahalanobis distance. This assumption was met. The assumption of linear relationships between the dependent variables (knowledge, self-reported fruit and vegetable consumption, attitudes, subjective norms, and perceived behavioral control) were tested and met using scatterplot matrices. Testing for multivariate normality was explored with the Shapiro-Wilkes test and did not meet the assumption and therefore Pillai’s Trace was used in the interpretation of the data. The data were examined for multicollinearity and the assumption was met using Pearson’s correlation.
Analysis of Digital Photographs

Analysis of the photographic data began with two analysts comparing each before and after picture to visually estimate the percentage of each item consumed to the nearest 10% increment. Based on previous research using digital photography (Swanson, 2008; D. Williamson et al., 2004), and to ensure interrater reliability, the estimate of the percentage consumed for each food item by analyst 1 was subtracted from the estimate by analyst 2. If there was an observational difference of more than 50%, the PI reevaluated the photo and the average of the two closest estimates were retained for analysis. If the difference in estimation amounts was less than 50%, the 2 original estimations were averaged to give the final average estimation of consumption for each item on the tray (Swanson, 2008). There were cases of items seen in pre-consumption photos with no evidence of those items in post-consumption photos (such as fruit peels or cores). It was assumed that these items were being taken out of the dining facility to be consumed at a later time. They were included in both the selection and consumption analysis.

Statistical analysis was completed with SPSS 24 (IBM, 2016) using a significance or alpha level of .05 and 95% confidence intervals (CI) for all hypothesis testing.

Food group analysis

Food items were categorized into food groups based on the required components of the SFSP OVS and comparisons of food groups (fruit, vegetable, milk, grain, and meat/meat alternative) were used to analyze the quantities of the foods eaten. To test the hypothesis that consumption of all food groups would increase from pre-intervention to post-intervention, paired-samples t-test were conducted to compare quantities of food groups eaten (vegetable, fruit, milk, grain, and meat/meal alternatives) at each meal and
at each meal combined (a sum of each food group for all three meals). Missing data on any of the collection days were eliminated from the analysis.

**Analysis of the quality of selected foods**

All food items were categorized by their quality as described above on a 0-6 scale, with higher scores indicating higher quality. During week 1, 49 different food items were offered at breakfast, lunch, and/or supper (many food items, such as milk were offered at every meal). Fifty different food items were offered during week 5. To determine frequency of selection, the number of times each food item was selected was compared to the number of times each food item was offered. A percent was calculated (number of times the food item was selected compared to the number of times the food item could have been selected). It was hypothesized that there would be a significant increase in the quality of the selection of foods over the five week period. A two-proportion z-test was performed to examine the relation between the percent selected at each quality level in week 1 to their corresponding quality level in week 5. Prior to conducting the z-test, assumptions were tested. Sample size, independent data points, normal distribution were all met.

**Analysis of the consumption of the selected foods**

It was hypothesized that there would be an increase in the consumption of quality foods over the five week period. A standard of 80% consumed of each item was used as a definition of “consumed” based on previous research (Burrows, Martin, & Collins, 2010; Buzby & Guthrie, 2002; Schwartz, Henderson, Read, Danna, & Ickovics, 2015; Sjöberg, Hallberg, Höglund, & Hulthen, 2003; Smith & Cunningham-Sabo, 2014; Upton,
Upton, & Taylor, 2013). In other words, it was important to determine not just which foods the participants chose, but how much of those selected foods were consumed.

To determine frequency of consumption, the number of times each food item was consumed was compared to the number of times each food item was selected. A percent was calculated (number of times the food item was consumed compared to the number of times the food item was selected). A two-proportion z-test was performed to examine the relation between the percent consumed at each quality level in week 1 to their corresponding quality level in week 5. Prior to conducting the z-test, assumptions were tested. Sample size, independent data points, normal distribution were all met.

**Summary**

The research design of the study involved two different approaches to provide a greater understanding of the effects of the SFSP on the nutrition behavior intentions and actual behaviors of low-income, rural adolescents. Survey methods and digital photography were the methods of data collection used and are outlined more specifically in chapters 4 and 5.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeline</th>
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</thead>
<tbody>
<tr>
<td>Study proposed to and approved by doctoral committee</td>
<td>November 15, 2017</td>
</tr>
<tr>
<td>IRB Approval</td>
<td>May 3, 2018</td>
</tr>
<tr>
<td>Recruitment for study began (Consent forms sent)</td>
<td>May 4, 2018</td>
</tr>
<tr>
<td>Consent forms returned</td>
<td>June 9, 2018</td>
</tr>
<tr>
<td>Pre-survey</td>
<td>June 9, 2018 (4:30 – 5:30pm)</td>
</tr>
<tr>
<td>Nutrition Education 1</td>
<td>June 9, 2018 (6:30-7:30 pm)</td>
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<tr>
<td>Intervention</td>
<td>June 9 – July 11, 2018</td>
</tr>
<tr>
<td>Digital photography data collection 1 breakfast, lunch, and supper</td>
<td>June 12 and 14, 2018</td>
</tr>
<tr>
<td>Digital photography data collection 2 breakfast, lunch, and supper</td>
<td>July 9 and 11, 2018</td>
</tr>
<tr>
<td>Post-survey</td>
<td>July 12, 2018</td>
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CHAPTER 4: MANUSCRIPT 1

Using the Theory of Planned Behavior to Assess the Impact of the USDA Summer Food Service Program on Fruit and Vegetable Consumption among Rural Teens

Primary proposed journal: American Journal of Health Behavior

Secondary proposed journals: Journal of Nutrition Education and Behavior and Journal of the Academy of Nutrition and Dietetics

Abstract

Objective: The purpose of this study was to examine the impact of the Summer Food Service Program (SFSP) on the nutrition–related knowledge, attitudes, subjective norms, perceived behavioral control, self-reported fruit and vegetable (SRFV) consumption, and behavioral intentions of rural, low-income adolescents using the Theory of Planned Behavior (TPB). Methods: The quasi-experimental pre- post-intervention design used a survey to determine predictors of positive nutrition behaviors and changes in SRFV consumption. The participants (n = 57) were recruited from those enrolled in the Upward Bound (UB) Summer Program, a federally funded program, which serves high school students who are low-income potential first generation college students. Participants followed the standards of the SFSP for five weeks and were provided with a mandatory nutrition education session along with optional nutrition education events. Results: Paired samples t-test showed a significant increase in knowledge (t(56) = -8.09, p = .000) and SRFV intake (t(56) = -3.20, p = .002) from pre- to post-intervention. Regression analysis demonstrated that all constructs of the TPB were significant (F(4, 52) = 14.56, p < .001 with an R² of .53) for their effects on behavior intentions with perceived behavioral control (PBC) being the most salient predictor of intentions to increase fruit and vegetable consumption. MANOVA was not significant for the comparison of pre-
and post-survey scores for knowledge, self-report fruit and vegetable consumption, and the constructs of the TPB, $F(4, 53) = .604, p = .660$. **Conclusions:** Opportunities for shaping adolescent nutrient intake and eating behaviors during and outside of enrollment in the SFSP exist. Reinforcing positive attitudes, subjective norms and perceived behavioral control may help to increase nutrition behavioral intentions and therefore nutrition behaviors. Providing resources that reinforce behavioral control may increase the likelihood of practicing good nutrition behaviors when making ones’ own food choices.

**Key words:** adolescent, USDA, food preferences, digital photography, Theory of Planned Behavior, Summer Food Service Program
Introduction

Adolescence can be a complicated and challenging period in human growth. The dramatic physiological and psychological changes that occur during this period greatly influence nutritional needs. Despite advances in clinical and preventive medicine, adolescents in the United States continue to have significant health and nutritional concerns. Published nutritional guidelines include high fiber, lean protein, and low saturated fat and trans fat foods (USDA, 2017). However, most Americans, including adolescents, fail to meet the standards for fruit and vegetable intake and exceed the recommendations for high fat, high calorie foods (Krebs-Smith et al., 2010). Diets that are consistently high in fat and low in fiber increase risks of chronic diseases such as obesity, heart disease, cancer, diabetes, and stroke (Edelstein, 2010).

In rural areas especially, high school students have subpar nutrition, with low intakes of fruits, vegetables, and whole grains; and high intakes of sugar and fat (Schoenberg et al., 2013). In fact, research shows that living in a rural area is by itself a risk factor for children and adolescents being overweight or obese (Lutfiyya et al., 2007). Therefore, nutrition programs have been established with the intent to increase nutritional status in low-income, often rural, adolescents. The most well-known nationwide program is the National School Lunch Program (NSLP) which provides healthy meals to over 32 million school-aged children and adolescents each day (Cohen, Richardson, Parker, Catalano, & Rimm, 2014). The Summer Food Service Program (SFSP) was created in 1968 as an off-shoot of the successful NSLP to ensure that children, under 18 years of age, will have access to nutritious meals when school is not in session during summer breaks (USDA, 2016b). Although research shows a decrease in food insecurity (limited
or uncertain ability to acquire or consume an adequate quality or sufficient quantity of food in socially acceptable ways; Boyle & Holben, 2012) for students participating in the NSLP (Engle & Tinto, 2008; Hopkins & Gunther, 2015; Nord & Romig, 2006) and an increase in nutritional quality of meals (Gordon, Crepinsek, Briefel, Clark, & Fox, 2009; Johnson, Podrabsky, Rocha, & Otten, 2016), “there is little to no research available on the nutritional adequacy of the SFSP meals, consumption of the SFPS meals, or the health of SFSP participants” (Hopkins & Gunther, 2015, p. 10145). One recent study looked at the nutritional impact of the SFSP when coupled with a summer electronic benefits card and found a significant increase in the participants’ fruit, vegetable and whole grain consumption compared to those who did not receive the electronic benefits (Collins et al., 2018); however, the SFSP alone was not investigated for its nutritional impact or its potential effect on behavior intentions. This is the first study of its kind to examine the effect of the SFSP on intentions to positively change nutrition behavior.

In order to understand the factors that may impact the effects of the SFSP on a low income, adolescent population, this study utilized the Theory of Planned Behavior (TPB). The TPB posits that the most important factor used to predict a person’s behavior is their intention to perform the behavior, and is a function of their attitude toward performing the behavior (whether the person is in favor of doing it), their beliefs about what relevant others think they should do (subjective norm), and their perception of the ease or difficulty of performing the behavior (perceived behavioral control). By changing these three predictors, one can increase intentions to perform a desired behavior and thus increase the likelihood of the actual behavior change (Francis et al., 2004). The TPB has been used to predict a variety of health behavior changes, including nutrition
behaviors (Blanchard et al., 2009; Riebl et al., 2015; Tsorbatzoudis, 2005a, 2005b), however, it has not been used to evaluate the impact of the SFSP on the nutrition related behaviors of rural, low-income adolescents. Nutrition knowledge along with self-reported fruit and vegetable consumption, although not constructs of the TPB, were added to the study to determine their relationship with behavior intentions. Therefore, the purpose of this study was to examine the impact of the SFSP on the nutrition–related knowledge, attitudes, subjective norms, perceived behavioral control, self-reported fruit and vegetable consumption, and behavioral intentions of rural, low-income adolescents. The constructs of the TPB were investigated further to determine the most salient predictor of intentions to increase fruit and vegetable consumption.

**Methods**

A quasi-experimental design was used involving one-group pre- and post-intervention surveys. Participants were surveyed (pretest), exposed to the intervention for five weeks, and surveyed again at the end of the program (posttest). A control group for this study was not possible given the nature of the population being studied.

**Study Population**

The Upward Bound (UB) program is part of the nationwide TRIO programs (a series of programs for students from disadvantaged backgrounds) that was signed by President Johnson in 1964 (McElroy & Armesto, 1998). UB serves high school students who are low-income potential first generation college students and provides opportunities for participants to succeed in their precollege performance and ultimately in their higher education pursuits (USDOE, 2016). The goal of the program is to increase the rate at which participants complete secondary education and enroll in and graduate from
postsecondary institutions. The study population consisted of all participants enrolled in the UB program at a medium sized mid-east university. This UB program has a target area that is comprised of six high schools in six rural counties in eastern Kentucky.

According to U.S. census data, there is a high percentage (37%), of families in the target area living below 150% of the poverty level compared to 23% in Kentucky and 19% nationwide (2016).

Intact sampling was used. All study participants \((n = 57)\) were low-income high school students, aged 14–17 years. The participants were mostly white (98%; \(n = 56\)) and female (63%; \(n = 36\)). The mean age was 16.2 (\(SD = .83\)) years, and about half were high school sophomores (46%; \(n = 26\)). It is important to note that more than half (54%; \(n = 31\)) of the participants were second (30%; \(n = 17\)) or third (24%, \(n = 14\)) year UB members and had therefore been exposed to the SFSP the previous year(s). The complete demographics are shown in Table 4.1.

**Description of the Intervention**

All participants lived on campus for the five week UB Summer Program. They returned to their respective home counties each weekend. The intervention was two-fold. First, it included participation in, and mandatory adherence to, the SFSP requirements for three meals each day, for 4-5 days each week for five weeks. This UB summer residence program includes off-campus field trips and on those specified days, the SFSP guidelines were not followed. Offer versus serve (OVS) is an option for SFSP host sites and it is the option that was used in this study. The OVS option allows for choices of food items within components (food groups) that the participant can select (USDA, 2016b), and also allows participants to decline some foods offered with the intent of increasing
consumption and reducing waste. This idea is based on the assumption that participants will choose the foods that they prefer and therefore consume the foods chosen. The standards for the SFSP OVS are seen in Table 4.2. All meals were checked to ensure compliance with the SFSP OVS requirements.

The second portion of the intervention included attendance at one, 1-hour mandatory nutrition education session. This session was taught by a graduate student studying public health nutrition and was given on the first day of the UB Summer program. The lesson included an introduction to the US Dietary Guidelines (DHHS, 2015), the basic food groups as identified in MyPlate (USDA, 2016a), and the purpose and requirements of the SFSP (KDOE, 2012). The educational session emphasized the importance of fruit, vegetable and whole grain consumption; encouraged the consumption of low-fat dairy products, and fresh, whole foods over processed foods; discouraged consumption of sugar-sweetened beverages; and emphasized the importance of an active, healthy lifestyle and the prevention of chronic diseases. There was also an optional short (30 minute) nutrition session (part of an UB program called “College Hacks”) that participants could choose to attend as well as a two-part (1-hour each) cooking class that was optional for UB participants.

Measures

Study participants completed pre- and post- intervention surveys. The instrument used included a survey previously tested for reliability and validity, driven by the Theory of Planned Behavior (TPB) (Blanchard et al., 2009); nutrition knowledge questions, modified from a Reliability of a Dietary Questionnaire (Turconi et al., 2003); and self-
reported nutrition behavioral questions, extracted from the 2017 Standard High School Youth Risk Behavior Survey (CDC, 2017).

**Demographics.** Participants were asked their age, gender, and race/ethnicity, home county, length of time in the UB program (indicating experience with SFSP), and academic standing. The post-survey asked the participant if they had attended any of the optional nutrition events.

**Knowledge.** To assess nutrition knowledge, fifteen questions were modified from the Reliability of a Dietary Questionnaire by Turconi et al. (2003). The modifications included changing the questions from multiple choice answers to true/false; modifying the questions to match the nutrition education sessions; and making adjustments to use American versus European food terminology. The original questionnaire was tested for internal reliability using Chronbach’s alpha ($\alpha = 0.56$) and test-retest reliability using Pearson’s correlation, $r(68) = .80$, $p \leq .01$. Reliability coefficients have shown some limitations in their use for true/false questions (Burton, 2004) and perhaps a more useful measure of test reliability is to be found in the standard error of measurement, or SEM which was calculated to be an appropriate .22 (Szafran, 2011) for the adapted items used in this study. Knowledge questions focused on the topics taught in the nutrition educational sessions and included: the US Dietary Guidelines (DHHS, 2015), the basic food groups as identified in MyPlate (USDA, 2016a), and the purpose and requirements of the SFSP (KDOE, 2012) with a focus on food groups and serving sizes. Knowledge questions were given a summative score of 0-15, with greater scores indicating higher nutrition knowledge.
**Attitude.** Participants were asked four questions to assess attitudes about nutrition (Blanchard et al., 2009) using 7-point, semantic, differential adjective scales that tested both instrumental (i.e. harmful-beneficial; bad-good) and affective (boring-fun; unenjoyable-enjoyable) aspects of attitude. The descriptive options were worded extremely harmful/bad (1 on the scale), quite harmful/bad (2 on the scale), slightly harmful/bad (3 on the scale), neutral (4 on the scale), slightly beneficial/good (5 on the scale), quite beneficial/good (6 on the scale), and extremely beneficial/good (7 on the scale). The survey statement was “During the next week, for me to eat 5 servings of fruits and vegetables each day will be…” Based on a summative score of 4-28, with higher scores indicating more positive attitudes. Internal reliability for both the instrumental questions ($\alpha = .81$) and the affective questions ($\alpha = .89$) were deemed satisfactory (University of Virginia, 2018), and in fact a bit higher than the validated scale that was used (Blanchard et al., 2009).

**Subjective Norm.** Subjective norm was measured using nine items from Blanchard et al. (2009) rated on 7-point scales that ranged from 1 (strongly disagree) to 7 (strongly agree). The following stem question: “During the next week, most people important to me [(1) think I should, (2) approve of me, and (3) support me] eating 5 servings of fruits and vegetables each day,” was modified, based on piloting the survey and previous literature (Francis et al., 2004; Ickes & Sharma, 2012; Pawlak et al., 2009; Tsorbatzoudis, 2005a). The statement “people important to me” was differentiated into three different questions for each of the verbs (for a total of nine subjective norm questions) using “my parents/relatives,” “my friends,” and “my teachers.” Based on a summative score of 9-63, with higher scores indicating a stronger subjective norm.
Internal reliability for the questions was deemed good at $\alpha = .90$ and higher than the original coefficient of reliability on the original scale (Blanchard et al., 2009).

**Perceived Behavioral Control.** Six items, modified from Blanchard et al. (2009) were used to measure perceived behavioral control. These items were (1) “During the next week at Upward Bound/home, how confident are you that you can eat 5 servings of fruits and vegetables each day?” rated from 1=not at all confident to 7=extremely confident; (2) “During the next week at Upward Bound/home, for me to eat 5 servings of fruits and vegetables each day will be…” rated from 1 = extremely difficult to 7=extremely easy; and (3) “During the next week at Upward Bound/home, if I wanted to I could easily eat 5 servings of fruits and vegetables each day” rated 1=strongly disagree to 7-strongly agree. A summative score of 6-42, with higher scores indicating a higher perceived behavioral control was used. Internal reliability for the questions were deemed good at $\alpha = .89$, higher than the original scale by Blanchard et al. (2009).

**Behavior Intention.** Behavior intention was assessed using the following two questions: (1) “During the next week, I intend to eat 5 servings of fruits and vegetable each day,” rated 1=strongly disagree to 7=strongly agree; and (2) “During the next week, my goal is to eat 5 servings of fruits and vegetables (insert a number from 0 to 7) days per week.” Due to the different scaling format for this question, the items were converted to z scores before aggregation and internal reliability for the questions were deemed good at $\alpha = .74$ which was the same as the original scale by Blanchard et al. (2009). A summative score of 2-15, with higher scores indicating greater intention, was used in the current study.
**Self-Report Fruit and Vegetable Consumption.** Participants answered six questions related to fruit and vegetable consumption that were taken from the Youth Risk Behavior Surveillance System (YRBS) Standard High School Questionnaire (CDC, 2017). The survey included questions to determine fruit and vegetable intake frequency: “During the past 7 days, how many times did you eat/drink (100% fruit juice, whole fruit, green salad, non-fried potatoes, carrots, and other vegetables).” Participants were given a response scale of 1 (“I did not eat/drink…during the past 7 days”); 2 (“1 to 3 times during the past 7 days”); 3 (“4 to 6 times during the past 7 days”); 4 (“1 time per day”); 5 (“2 times per day”); 6 (“3 times per day”); or 7 (“4 or more times per day”). A summative scale score of 6-42, with higher scores indicating higher fruit and vegetable consumption, was calculated.

**Data Collection Procedures**

The study was approved by the Institutional Review Boards (IRB) of both the PI’s place of study and the university where the study took place.

Participants and their parents completed IRB assent and consent forms. Participation in the study was optional and did not preclude a student from continuing in the UB Summer Program or the SFSP. The initial invitation to participate in the study was sent to all UB summer program participants \((n = 78)\) and their parents in May 2018. The consent and assent forms were delivered via U.S. Postal Service with a packet of approximately 10 other forms that had to be completed and signed before the participant could be included in the UB Summer Program. The consent and assent forms were paper-based and were returned by the participant and/or their parent or guardian prior to the intervention. Fifteen potential subjects failed to assent or consent and therefore a total
of 63 UB participants were enrolled in the study. Six of the assenting and consenting participants left the summer program before its completion and were eliminated from the study.

The pre-survey was given on the first day of the UB Summer Program, before the initial nutrition education session which was also given at a later time on the same day. The post-survey was given on the last day of the UB Summer program. The surveys were generated using Qualtrics Labs, Inc. software, Version 12,018 of the Qualtrics Research Suite, 2009. Each participant was given a unique code that was typed in as the first item on the surveys. The code granted confidentiality while also allowing the researcher to match the participants’ pre-survey with their post-survey.

A total of 57 participants completed the study and are included in the analysis reported here.

**Data Analysis**

The analysis was completed with SPSS 24 (IBM, 2016) using a significance or alpha level of .05 and 95% confidence intervals (CI) for all hypothesis testing. The demographic variables included gender, age, academic standing, ethnicity, previous UB SFSP participation, and county of residence (Table 4.1). The SFSP and the mandatory nutrition education acted as the independent variable for the following dependent variables: nutrition knowledge, attitudes about nutrition, subjective norms, perceived behavioral control, self-reported fruit and vegetable consumption, and behavioral intention.

Summary scores for each variable were calculated. Paired samples t-test were conducted to compare the means of the paired observations between the pre- and post-test
surveys to test the hypotheses that each variable: knowledge, attitudes, subjective norm, perceived behavioral control, self-reported fruit and vegetable consumption, and intention to change behavior would increase from baseline to post-intervention.

In order to better understand changes relative to baseline, a new variable was created for each of the dependent variables by subtracting the summary variable scores of the pre-test from the summary scores of the post-test to get a change score for each variable. This process was conducted for all of the dependent variables (knowledge, attitude, subjective norms, perceived behavioral control, self-reported fruit and vegetable consumption, and behavior intention). These new variables, referred to from here on as a change score, were tested for normality using histograms to visually assess distribution. Box-plots of each dependent variable were also visually assessed. There were normal distributions for all variables. Independent samples t-test were conducted using the new variables to determine if there was a difference in the dependent variables for those with previous experience in the UB program. Independent samples t-test were also performed for the same reason on those who chose to attend one or more of the optional nutrition events. Multiple regression was used to further explore the relationships between and among variables. After correlation coefficients established relationships between and among variables, the relationships were further explored with multiple regression models.

Analysis using one-way repeated measures multivariate analysis of variance (MANOVA) to determine statistical significant difference in knowledge, self-reported fruit and vegetable consumption, and the TPB constructs (attitude, subjective norms, perceived behavioral control) over time (pre-survey to post-survey) was conducted. Before proceeding with MANOVA, assumptions were tested. The assumptions of
independence of variance and adequate sample size were met. The data were tested for outliers using regression and Mahalanobis distance. This assumption was met. The assumption of linear relationships between the dependent variables (attitudes, subjective norms, and perceived behavioral control) were tested and met using scatterplot matrices. Testing for multivariate normality was explored with the Shapiro-Wilkes test and did not meet the assumption and therefore Pillai’s Trace was used in the interpretation of the data. The data were examined for multicollinarity and the assumption was met using Pearson’s correlation.

Results

Independent samples t-tests were conducted to compare variables (knowledge, attitudes, subjective norms, perceived behavioral control, behavioral intentions, and self-reported fruit and vegetable consumption as well as the change scores in these variables) for those participants with prior experience in the UB Summer Program (n = 31) and those who were attending the program for the first time (n = 26). There were no significant differences for any of the variables between those who had experience in the UB summer program and those who were attending their first year. Therefore the sample was combined in the following data analysis.

Among the full sample, paired samples t-tests were conducted to compare pre- and post-survey variables, including the constructs of the Theory of Planned Behavior. There was a significant difference in the scores for pre-knowledge \((M = 11.18, SD = 1.68)\) and post-knowledge \((M = 12.91, SD = 1.76)\); \(t(56) = -8.09, p = .000; d = 1.00\). The effect size was found to exceed Cohen’s (1988) convention for a large effect \((d = .80)\). There was also a significant difference in the scores for pre-self-reported fruit and vegetable
consumption ($M = 13.96, SD = 4.23$) and post-self-reported fruit and vegetable consumption ($M = 16.80, SD = 5.42$); $t(56) = -3.20, p = .002; d = .58$. There was not a significant difference in the scores for the following: pre-attitude ($M = 21.78, SD = 3.82$) and post-attitude ($M = 22.46, SD = 3.29$); $t(56) = -1.00, p = .317; d = .19$; pre-subjective norms ($M = 50.09, SD = 9.99$) and post-subjective norms ($M = 52.28, SD = 8.70$); $t(56) = -1.18, p = .243; d = .22$; pre-perceived behavioral control ($M = 30.63, SD = 8.21$) and post-perceived behavioral control ($M = 31.88, SD = 8.21$); $t(56) = -.729, p = .469; d = .15$; and pre-behavioral intention ($M = 10.89, SD = 3.23$) and post-behavioral intention ($M = 10.93, SD = 3.41$); $t(56) = -.055, p = .956; d = .01$. However, when perceived behavioral control was divided into “at Upward Bound” versus “at home” there was significance in the perceived behavioral control at home from pre-intervention “confidence” ($M = 4.37, SD = 1.10$) to post-intervention “confidence” ($M = 5.16, SD = 1.75$); $t(56) = -2.46, p = .02; d = .54$; from pre-intervention “find easy” ($M = 4.68, SD = 1.79$) to post-intervention “find easy” ($M = 5.32, SD = 1.64$); $t(56) = -2.11, p = .04; d = .37$; and from pre-intervention “could easily” ($M = 5.07, SD = 1.91$) to post-intervention “could easily” ($M = 5.82, SD = 1.43$); $t(56) = -2.51, p = .02; d = .44$. There were no significant differences for perceived behavioral control while at the Upward Bound Program. An item-by-item comparison and the summary of these results can be found in Table 4.3.

An independent samples $t$-test was also performed to compare variables (knowledge, attitudes, subjective norms, perceived behavioral control, behavior intention and self-reported fruit and vegetable consumption) for those participants who attended at least one of the optional nutrition education sessions ($n = 22$) to those participants who did not ($n = 35$) at both pre-survey (to determine baseline differences) and again for the
change in the scores from pre- to post-survey. There was a significant effect for self-reported fruit and vegetable consumption at pre-test for those who chose to participate in one or more of the optional nutrition events \((M = 12.45, SD = 3.08)\) than for those who did not participate in one or more of the optional nutrition events \((M = 14.91, SD = 4.60)\), \(t(55) = 2.21, p = .031, d = .62\) which is a medium effect (J. Cohen, 1988). There was also a significant effect in the change scores for self-reported fruit and vegetable consumption for those who participated in one or more of the optional nutrition events \((M = 6.05, SD = 6.26)\) than for those who did not participate in one or more of the optional nutrition events \((M = .83, SD = 6.23)\), \(t(55) = -3.07, p < .00, d = .83\) which is a large effect (J. Cohen, 1988). There too, was a significant effect in the change scores for perceived behavioral control for those who participated in one or more of the optional nutrition events \((M = 5.90, SD = 13.09)\) than for those who did not participate in one or more of the optional nutrition events \((M = -1.69, SD = 12.06)\), \(t(55) = -2.20, p = .03, d = .60\) which is a medium effect (J. Cohen, 1988). There were no significant differences in knowledge, attitudes, subjective norms, or behavioral intention for those that attended an optional nutrition class compared to those who did not attend.

A correlation matrix was calculated from the variables representing the constructs of the TPB (attitude, subjective norms, perceived behavioral control, and behavior intentions) among the full sample to determine bivariate level significance. There was a significant strong positive correlation between change in perceived behavioral control and change in behavioral intentions, \(r(55) = .64, p < .001\). There were significant moderate positive relationships between change in attitude and change in behavior intentions, \(r(55) = .542, p < .001\) and change in subjective norms and change in behavior intentions, \(r(55)\)
= .531, $p < .001$. There were also moderate positive correlations between change in perceived behavioral control and change in attitude $r(55) = .499, \ p < .001$, and change in perceived behavioral control and change in subjective norms $r(55) = .403, \ p < .001$.

There was a weak significant positive correlation between change in attitude and change in subjective norms $r(55) = .377, \ p < .001$. The correlations can be found in Table 4.4.

In order to further explore the variables, multiple regression analysis was conducted to evaluate how well the changes from pre-survey to post-survey for the constructs of the TPB (attitude, subjective norms, and perceived behavioral control) predicted intentions to change nutritional behavior. Due to the significant effect for a change in perceived behavioral control for those that attended at least one optional nutrition event, attendance was included as a control variable in the model. The results of the regression indicated that the four predictors explained over half of the variance ($R^2 = .53$), which was significant, $F(4, 52) = 14.56, \ p < .001$. Three variables, attitude ($\beta = .237, \ p = .041$); subjective norms ($\beta = .253, \ p = .022$); and perceived behavioral control ($\beta = .421, \ p < .001$) demonstrated significant effects on intentions to change nutrition behavior with perceived behavioral control being the most salient predictor, even when controlling for attendance at one or more optional nutrition events. The adjusted $R$ square value was $.492$ indicating that approximately half of the variance in the intentions to change nutrition behavior was explained by the model. According to Cohen (1988), this is a medium effect. Results of the regressions can be seen in Table 4.5.

A one-way repeated measures multivariate analysis of variance (MANOVA) was conducted to determine statistical significance for knowledge, self-reported fruit and vegetable consumption, and the TPB constructs (attitude, subjective norms, perceived
behavioral control) over time (pre-survey and post-survey). MANOVA was not significant for the comparison of pre- and post-survey scores for the constructs of the TPB, $F(4, 53) = .604, p = .660$.

**Discussion**

The Theory of Planned Behavior (TPB): attitude, subjective norms, and perceived behavioral control, along with knowledge and self-reported fruit and vegetable consumption, and their effects on behavior intentions were examined in a sample of low-income, rural adolescents who were enrolled in the USDA Summer Food Service Program (SFSP). While other studies have looked at the TPB and nutrition behaviors in adolescents (Hackman & Knowlden, 2014), to our knowledge, this is the first study that reports the potential effects of the SFSP on behavioral intention to improve nutrition.

Overall results showed an increase in knowledge and self-reported fruit and vegetable consumption over the five weeks of participation in the SFSP. While some studies have shown a change in behavior based on interventions that included education aimed to increase knowledge (McAleese & Rankin, 2007; Philippou, Middleton, Pitos, Andreou, & Petrou, 2017; Vaitkeviciute, Ball, & Harris, 2015), many others demonstrate that knowledge alone will not likely change behavior (McDermott et al., 2015; Riebl et al., 2015; Simons-Morton et al., 2011). And although knowledge about nutrition increased significantly from pre- to post-intervention in this study, it did not have a significant correlation on intentions to change behaviors lending support to the belief that more than education should be part of nutrition interventions for this population. It often takes multiple exposures and a variety of activities, along with environmental and social support to improve the likelihood of positive behavior change (Cruwys, Bevelander, & Hermans,
2015; Draper, Grobler, Micklesfield, & Norris, 2015; McKenzie, Neiger, & Thackeray, 2013; Patrick et al., 2006; Schnettler et al., 2018; Story, Neumark-Sztainer, & French, 2002; Zarychta, Mullan, & Luszczynska, 2016). The SFSP can provide both environmental support in the form of healthy food choices and social support in the form of peers and leaders who can model healthy nutrition behaviors.

Interestingly, although there was not an overall significant increase in perceived behavioral control over time, there were significant differences when participants were asked about perceived behavioral control while at home. The participants in this study followed the SFSP requirements during the week and returned home on the weekends during the five-week intervention. When asked about their confidence, ease of eating, and agreement with ease in eating five servings of fruits and vegetables each day while at home, participants showed an increase in perceived behavioral control indicating that the use of the SFSP in this program may lead to improved nutrition behaviors while at home. This concept is important because coupling the SFSP with an audience in a captive environment, may increase participants’ ability to make positive nutritious choices outside of a regimented program. Participants did not show a significant effect in any of those survey items when asked about them while at the Upward Bound program. Participants, therefore, reported more perceived behavioral control while at home, perhaps indicating that the SFSP may have influence beyond the confines of SFSP program.

It might seem appropriate to assume that participants who had previous exposure to the UB Summer Program and therefore the SFSP would have higher baseline knowledge, attitudes, subjective norms, perceived behavioral control, or behavior intentions. However, results did not show any significant differences between participants
with previous experience and those enrolled in the UB Summer Program for the first time. One explanation for this may be that all constructs, including knowledge, were relatively high at baseline for all participants, making significant changes more difficult. Also, all of the participants are enrolled in the NSLP during the academic year and are therefore familiar with many of the USDA standards for these programs. This idea demonstrates the need to capitalize on the potential positive combined influence that both the NSLP and the SFSP have on the low-income populations that these programs serve. Currently only one in six adolescents enrolled in the NSLP participate in the SFSP (Nnakwe, 2012). Encouraging more to enroll and participate in SFSP may result in a synergistic effect on positive nutrition behaviors.

It might also seem reasonable to expect a difference in knowledge, self-reported fruit and vegetable consumption, and the constructs of the TPB for participants who voluntarily attended one of the optional nutrition events, and this was the case for a change from pre- to post-intervention in perceived behavioral control which showed significant differences between the two groups. It therefore appears that efforts to increase this construct, may help to increase the likelihood of positive nutrition behavior changes. In fact, those attending the optional events actually demonstrated real-time control over their environment which facilitated their participation in the optional activities. The change from pre- to post-intervention in self-reported fruit and vegetable intake also showed significant effects between those who chose to attend an optional nutrition event and those who did not. Those who voluntarily attended the optional nutrition events may already have an interest in health and nutrition and may be well aware of the benefits of fruits and vegetables (Cooper, Barale, Funaiole, Power, & Combe,
However, it also suggests that future interventions should require all participants to attend nutrition sessions with varying intensities that include both educational and interactive activities in order to increase the likelihood of positively changing behaviors.

Regression analysis using the change in scores from pre- to post-intervention indicated that a change in attitude, a change subjective norms, and a change in perceived behavioral control all showed significant effects on the intentions to positively change nutrition behaviors, even when controlling for participation in an optional nutrition event. A change in perceived behavioral control was the strongest predictor, which is consistent with other studies that used the TPB to predict adolescent nutrition behaviors (Hackman & Knowlden, 2014). Although perceived behavioral control was the most salient predictor, attitudes about fruit and vegetable consumption and social pressures (subjective norms) to increase fruit and vegetable consumption also showed a likelihood to increase intentions to positively change nutrition behaviors in this study. Similar to previous findings in the literature on the TPB (Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Blanchard et al., 2009; Hackman & Knowlden, 2014; Pawlak et al., 2009; Riebl et al., 2015; Simons-Morton et al., 2011), this study showed that all constructs will aid in predicting health behavioral intentions, reinforcing the need to use theory to guide intervention design, implementation, and evaluation.

Because this is the first study of its kind to focus on behavior intentions of low-income adolescents enrolled in the SFSP, there are important considerations. First, interventions aimed at increasing fruit and vegetable consumption in this population should focus on strategies to increase teens’ perception of control. This might include identifying and removing barriers to perceived control such as cost, availability, and ease.
of preparation of healthy food options. Second, it is also widely accepted that teens are influenced by their peers, and with subjective norms being a significant predictor in this study, it demonstrates that peers can be a positive influence on low-income, adolescent nutrition behaviors, and therefore should also be considered when planning interventions. Third, teens’ attitudes about nutrition can influence their intentions and since attitudes are personal subjective evaluations about the positive or negative outcomes of the behavior, (I. Ajzen, 1985), interventions that include aiding in the formation of positive associations with healthy nutrition behaviors is warranted. And finally, while increasing knowledge of the importance of positive nutrition behaviors may increase during and after a nutrition intervention, knowledge alone is unlikely to change behavior intentions. Therefore using interventions that do more than provide education such as activities to improve, attitudes, subjective norms and perceived behavioral control (McKenzie et al., 2013) is recommended.

A few studies have reported an increase in food consumption for those participating in the NSLP (Boyle & Holben, 2012; Engle & Tinto, 2008; Johnson et al., 2016; Stephenson & Schiff, 2015), and an increase in the quality of food consumed (A. Gordon et al., 2003; A. R. Gordon et al., 2009; Johnson et al., 2016). However, very few studies have looked at the nutritional quality of the SFSP (Hopkins & Gunther, 2015) and the potential nutritional benefits of those participating in the SFSP (Collins et al., 2018). No studies have reported the effects of either the NSLP or the SFSP on intentions to change nutrition behaviors. This study demonstrated that the SFSP may have a positive influence on nutrition behaviors even when participants are not required to follow the guidelines (when they are outside of a confined, regimented, environment). Participants
in the SFSP are a captive audience and interventions aimed at SFSP participants which expose them to opportunities that will increase their perceived behavioral control (i.e. the OVS SFSP as seen in this study), attitudes and subjective norms may be beneficial. Using the SFSP, a federally funded program, to not only increase quantity and quality of food eaten in low-income participants, but using the constructs of the TPB as an opportunity to positively change nutrition behaviors seems appropriate. The one required nutrition session in this study mostly focused on knowledge and may not be adequate for changing behavior. However, combining the nutrition knowledge session with more interactive intervention strategies (such as the optional cooking classes and the optional small group nutrition discussion session in this study) aimed at improving the constructs of the TPB may provide the opportunity to positively improve nutrition behavior. Combining the SFSP, which increases quantity and quality of food, with the types of programs and activities in this study shows promise in reaching low-income adolescents.

The strengths of this study lay in the ability to capture data from a rural, low-income adolescent population participating in the SFSP. This captive audience allowed for much control over their food choices, gave the researchers access to the participants over a five-week period, and provided a 90% study completion rate. In addition, validated measures of the constructs of the TPB were used which can contribute to the literature in this area. Limitations of the study included the fact that intact sampling was used and therefore there was no random assignment of participants to treatment, and the small sample size, even with a high completion rate, may lead to more difficulty in generalization of the results. With self-reported responses, there may have been some bias in that the participant may have a tendency to respond in a certain way, perhaps to
consciously or unconsciously please the surveyor. The online survey process was intended to encourage honesty, however, understanding the question and interpreting the scales may have influenced responses (Nardi, 2006).

**Implications for Research and Practice**

The present study demonstrates that attitudes, subjective norms, and perceived behavioral control are significant predictors of intentions to improve fruit and vegetable consumption in a low-income adolescent population. Given that many low-income adolescents are eating according to the standards of the NSLP or the SFSP while in school or in a specific program like the one studied here, opportunities for shaping their nutrient intake and eating behaviors during enrollment and even outside the confines of a program, exist. Participants with positive perceived behavioral control showed a greater intent to eat more fruits and vegetables. Therefore, providing resources that reinforce behavioral control may increase the likelihood of practicing good nutrition behaviors when making ones’ own food choices. Providing teens with a wide range of healthy foods, providing access to those healthy foods, and eliminating the cost barrier often associated with the purchase of healthy foods may increase their perceived behavioral control and therefore increase their intentions to consume more healthy options.

Subjective norms also had a positive association with intentions to eat fruits and vegetables, demonstrating that peers, family, and authority figures may provide a positive influence for behavior change. And although there has been increasing attention paid to the role that families, especially rural families, play in affecting dietary habits, (Swanson, Studts, Bardach, Bersamin, & Schoenberg, 2011), influencing the decisions of adolescent peers could positively influence the nutrition habits of entire groups of
adolescents. Influencing the social norms may impact the subjective norms and therefore influence more positive behaviors in teens. Celebrity endorsements, authority figure role modeling, and peer educators may aid in creating a culture where eating fruits and vegetables is the norm.

Promoting good nutrition and providing participants with the skills and resources to make positive, nutritious choices will ideally improve their health behaviors, and subsequently, the health outcomes of rural adolescents participating in this program and other SFSPs. Given that the SFSP had never before been evaluated for its effect on nutrition knowledge, attitudes, and behaviors, this study can support future programming and research, which could include a randomized controlled trial, if deemed appropriate and feasible. Future studies should evaluate long-term effects of participation in a summer program like the one studied here on nutrition behaviors for participants while in high school and also after high school graduation. A recommendation for a 6-week follow up and then continuing follow up every 12 months may help to determine long-term compliance with intentions to change nutrition behaviors. In addition, studies should explore nutrition behaviors outside of fruit and vegetable consumption, to include quality food choices and consumption of all food groups. Evaluating SFSP compliance with the Dietary Guidelines for Americans (DHHS, 2015) would also be prudent which could help inform the value and importance of the SFSP and national recommendations.
Table 4. 1 Demographic Information for Study Sample

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$M = 16.2$</td>
<td>$SD = 0.826$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$n = 57$ (100%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M = 16.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD = 0.826</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Standing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
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<td>15.8</td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td>26</td>
<td>45.6</td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td>22</td>
<td>39.0</td>
<td></td>
</tr>
<tr>
<td>*Ethnicity</td>
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<td></td>
</tr>
<tr>
<td>African American</td>
<td>1</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
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<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>56</td>
<td>98.2</td>
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</tr>
<tr>
<td>Multiracial</td>
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<td></td>
</tr>
<tr>
<td>Participated in Upward Bound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer Program?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>31</td>
<td>54.3</td>
<td></td>
</tr>
<tr>
<td>1 year prior</td>
<td>17</td>
<td>29.8</td>
<td></td>
</tr>
<tr>
<td>2 years prior</td>
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<td>24.6</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>26</td>
<td>45.6</td>
<td></td>
</tr>
<tr>
<td>County of Residence</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Casey</td>
<td>5</td>
<td>8.8</td>
<td></td>
</tr>
<tr>
<td>Estill</td>
<td>6</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>Lee</td>
<td>6</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>Lincoln</td>
<td>21</td>
<td>36.8</td>
<td></td>
</tr>
<tr>
<td>Powell</td>
<td>10</td>
<td>17.5</td>
<td></td>
</tr>
<tr>
<td>Wolfe</td>
<td>9</td>
<td>15.8</td>
<td></td>
</tr>
</tbody>
</table>

*Participants could mark more than one ethnicity category.
Table 4. 2 SFSP Offer Versus Serve (OVS) Requirements

**Breakfast Meal Patterns**
Sites must serve at least four food items from any component. Participant must select at least three food items.

<table>
<thead>
<tr>
<th>Component</th>
<th>Serving</th>
<th>Food Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>milk</td>
<td>1 cup</td>
<td>Fluid milk</td>
</tr>
<tr>
<td>fruit or vegetable</td>
<td>½ cup</td>
<td>Juice,¹ and/or vegetable</td>
</tr>
<tr>
<td>grain/bread</td>
<td>1 slice</td>
<td>Bread or</td>
</tr>
<tr>
<td></td>
<td>1 serving</td>
<td>Cornbread or biscuit or roll or muffin or</td>
</tr>
<tr>
<td></td>
<td>¾ cup</td>
<td>Cold dry cereal or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Hot cooked cereal or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Pasta or noodles or grains</td>
</tr>
</tbody>
</table>

meat or meat alternate or one additional item from the fruit and vegetable or grains component

**Lunch or Supper Meal Pattern**
Sites must serve at least five food items from four different components (2 from fruits/vegetables). Participants must select at least three different food components.

<table>
<thead>
<tr>
<th>Component</th>
<th>Serving</th>
<th>Food Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>milk</td>
<td>1 cup</td>
<td>Fluid milk</td>
</tr>
<tr>
<td>fruits/vegetables</td>
<td>¾ cup</td>
<td>Juice,¹ fruit and/or vegetable</td>
</tr>
<tr>
<td>grain/bread²</td>
<td>1 slice</td>
<td>Bread or</td>
</tr>
<tr>
<td></td>
<td>1 serving</td>
<td>Cornbread or biscuit or roll or muffin or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Hot cooked cereal or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Pasta or noodles or grains</td>
</tr>
<tr>
<td>meat/meat alternate</td>
<td>2 oz</td>
<td>Lean meat or poultry or fish² or</td>
</tr>
<tr>
<td></td>
<td>2 oz</td>
<td>Alternate protein product or</td>
</tr>
<tr>
<td></td>
<td>2 oz</td>
<td>Cheese or</td>
</tr>
<tr>
<td></td>
<td>1 large</td>
<td>Egg or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Cooked dry beans or peas or</td>
</tr>
<tr>
<td></td>
<td>4 Tbsp</td>
<td>Peanut or other nut</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or seed butter or</td>
</tr>
<tr>
<td></td>
<td>1 oz</td>
<td>Nuts and/or seeds⁴ or</td>
</tr>
<tr>
<td></td>
<td>8 oz</td>
<td>Yogurt⁵</td>
</tr>
</tbody>
</table>

¹Fruit or vegetable juice must be full-strength
²Breads and grains must be made from whole-grain or enriched meal or flour. Cereal must be whole-grain or enriched or fortified.
³Breads and grains must be made from whole-grain or enriched meal or flour. Cereal must be whole-grain or enriched or fortified.
⁴A serving consists of the edible portion of cooked lean meat or poultry or fish.
⁵Nuts and seeds may meet only one-half of the total meat/meat alternate serving and must be combined with another meat/meat alternate to fulfill the lunch or supper requirement.
⁶Yogurt may be plain or flavored, unsweetened or sweetened.
⁷Two items from the fruit/vegetable group must be offered at lunch and supper for OVS
Table 4. Summary of Means, Standard Deviations and Paired-Sample t-test for Independent Variables

<table>
<thead>
<tr>
<th></th>
<th>Pre-Survey</th>
<th>Post-Survey</th>
<th>Range</th>
<th>t-test</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>11.18</td>
<td>12.91</td>
<td>0-15</td>
<td>-8.09</td>
<td>&lt;.00*</td>
</tr>
<tr>
<td>SD</td>
<td>1.68</td>
<td>1.76</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Attitude</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>21.78</td>
<td>22.46</td>
<td>4-28</td>
<td>-1.01</td>
<td>.32</td>
</tr>
<tr>
<td>SD</td>
<td>3.82</td>
<td>3.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During the next week, for me to eat 5 servings of fruits and vegetables each day will be…</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>harmful/beneficial</td>
<td>5.79</td>
<td>6.18</td>
<td>1-7</td>
<td>-1.962</td>
<td>.06</td>
</tr>
<tr>
<td>good</td>
<td>5.68</td>
<td>6.02</td>
<td>1-7</td>
<td>-1.555</td>
<td>.13</td>
</tr>
<tr>
<td>boring/fun</td>
<td>5.07</td>
<td>5.04</td>
<td>1-7</td>
<td>.148</td>
<td>.88</td>
</tr>
<tr>
<td>unenjoyable/enjoyable</td>
<td>5.23</td>
<td>5.23</td>
<td>1-7</td>
<td>.000</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Subjective Norms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>50.09</td>
<td>52.28</td>
<td>9-63</td>
<td>-1.81</td>
<td>.24</td>
</tr>
<tr>
<td>SD</td>
<td>9.99</td>
<td>8.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During the next week, my parents and relatives/friends/teachers, think/approve/support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent/relatives think</td>
<td>5.25</td>
<td>5.46</td>
<td>1-7</td>
<td>-.75</td>
<td>.46</td>
</tr>
<tr>
<td>Friends think</td>
<td>4.47</td>
<td>4.40</td>
<td>1-7</td>
<td>.22</td>
<td>.83</td>
</tr>
<tr>
<td>Teachers think</td>
<td>5.12</td>
<td>5.23</td>
<td>1-7</td>
<td>-.34</td>
<td>.74</td>
</tr>
<tr>
<td>Parents/relatives approve</td>
<td>6.18</td>
<td>6.56</td>
<td>1-7</td>
<td>-1.90</td>
<td>.07</td>
</tr>
<tr>
<td>Friends approve</td>
<td>5.75</td>
<td>5.96</td>
<td>1-7</td>
<td>-.85</td>
<td>.40</td>
</tr>
<tr>
<td>Teachers approve</td>
<td>5.86</td>
<td>6.23</td>
<td>1-7</td>
<td>-1.38</td>
<td>.17</td>
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<tr>
<td>Parents/relatives support</td>
<td>6.05</td>
<td>6.39</td>
<td>1-7</td>
<td>-1.61</td>
<td>.11</td>
</tr>
<tr>
<td>Friends support</td>
<td>5.49</td>
<td>5.95</td>
<td>1-7</td>
<td>-1.94</td>
<td>.06</td>
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<tr>
<td>Teachers support</td>
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<td>6.14</td>
<td>1-7</td>
<td>-.870</td>
<td>.39</td>
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<td><strong>Perceived Behavioral Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>30.63</td>
<td>31.88</td>
<td>6-42</td>
<td>-.73</td>
<td>.47</td>
</tr>
<tr>
<td>SD</td>
<td>8.21</td>
<td>8.21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating 5 servings of fruits and vegetables during the next week at Upward Bound Summer Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not confident/confident</td>
<td>5.23</td>
<td>4.98</td>
<td>1-7</td>
<td>.84</td>
<td>.41</td>
</tr>
<tr>
<td>Difficult/easy</td>
<td>5.30</td>
<td>4.98</td>
<td>1-7</td>
<td>1.08</td>
<td>.29</td>
</tr>
<tr>
<td>I could easily disagree/agree</td>
<td>5.98</td>
<td>5.61</td>
<td>1-7</td>
<td>1.36</td>
<td>.18</td>
</tr>
<tr>
<td><strong>Eating 5 servings of fruits and vegetables during the next weekend at home</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not confident/confident</td>
<td>4.37</td>
<td>5.16</td>
<td>1-7</td>
<td>-2.46</td>
<td>.02*</td>
</tr>
<tr>
<td>Difficult/easy</td>
<td>4.68</td>
<td>5.32</td>
<td>1-7</td>
<td>-2.11</td>
<td>.04*</td>
</tr>
<tr>
<td>I could easily disagree/agree</td>
<td>5.07</td>
<td>5.82</td>
<td>1-7</td>
<td>-2.51</td>
<td>.02*</td>
</tr>
<tr>
<td><strong>Behavioral Intentions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>10.89</td>
<td>10.93</td>
<td>6-42</td>
<td>-.06</td>
<td>.99</td>
</tr>
<tr>
<td>SD</td>
<td>3.23</td>
<td>3.41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During the next week I plan/it is my goal to eat 5 servings of fruits and vegetables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>plan</td>
<td>5.09</td>
<td>5.07</td>
<td>1-7</td>
<td>.06</td>
<td>.96</td>
</tr>
<tr>
<td>goal</td>
<td>5.81</td>
<td>5.86</td>
<td>1-8</td>
<td>.16</td>
<td>.88</td>
</tr>
<tr>
<td><strong>Self-Reported Fruit/Vegetable Intake</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>13.96</td>
<td>16.80</td>
<td>6-42</td>
<td>-3.20</td>
<td>&lt;.00*</td>
</tr>
<tr>
<td>SD</td>
<td>4.23</td>
<td>5.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During the past 7 days how many times did you eat/drink…</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% fruit juice?</td>
<td>2.28</td>
<td>1.38</td>
<td>1-7</td>
<td>2.42</td>
<td>.02*</td>
</tr>
<tr>
<td>fruit?</td>
<td>2.95</td>
<td>1.5</td>
<td>1-7</td>
<td>-3.00</td>
<td>.00*</td>
</tr>
<tr>
<td>green salad?</td>
<td>1.65</td>
<td>.83</td>
<td>1-7</td>
<td>-4.48</td>
<td>&lt;.00*</td>
</tr>
<tr>
<td>potatoes?</td>
<td>2.47</td>
<td>3.14</td>
<td>1-7</td>
<td>-2.46</td>
<td>.02*</td>
</tr>
<tr>
<td>carrots?</td>
<td>1.75</td>
<td>1.01</td>
<td>1-7</td>
<td>-.46</td>
<td>.65</td>
</tr>
<tr>
<td>other vegetables?</td>
<td>2.95</td>
<td>3.51</td>
<td>1-7</td>
<td>-1.86</td>
<td>.07</td>
</tr>
</tbody>
</table>

*p < .05  Note:  M = Mean. SD = Standard Deviation
Table 4.4 Means, Standard Deviation, and Correlations of Model Variables

<table>
<thead>
<tr>
<th>Measure</th>
<th>M</th>
<th>SD</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. *Change in Behavior Intentions</td>
<td>.04</td>
<td>4.83</td>
<td></td>
</tr>
<tr>
<td>2. Change in Attitude</td>
<td>.68</td>
<td>5.12</td>
<td>.542***</td>
</tr>
<tr>
<td>3. Change in Subjective Norm</td>
<td>2.19</td>
<td>14.02</td>
<td>.513***</td>
</tr>
<tr>
<td>4. Change in Perceived Behavioral Control</td>
<td>1.25</td>
<td>12.90</td>
<td>.641***</td>
</tr>
</tbody>
</table>

*Changes in scores from pre-survey to post-survey

Notes: **p < .01, *** p < .001
Table 4.5 Predictors of Behavioral Intentions to Increase Fruits and Vegetables

<table>
<thead>
<tr>
<th>Variable</th>
<th>$M$</th>
<th>$SD$</th>
<th>$\beta$</th>
<th>$p$-value $^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>.04</td>
<td>4.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$^1$Change in Attitude</td>
<td>.68</td>
<td>5.12</td>
<td>.237</td>
<td>.04</td>
</tr>
<tr>
<td>Change in Subjective Norm</td>
<td>2.19</td>
<td>14.02</td>
<td>.253</td>
<td>.02</td>
</tr>
<tr>
<td>Change in Perceived Behavioral Control</td>
<td>1.25</td>
<td>12.90</td>
<td>.421</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Attended Optional Nutrition Classes</td>
<td>.39</td>
<td>.49</td>
<td>-.002</td>
<td>.99</td>
</tr>
</tbody>
</table>

$^{1}$Changes in scores from pre-survey to post-survey

$^{2} p < .05$
CHAPTER 5: MANUSCRIPT 2

The Effect of the USDA Summer Food Service Program on Participants’ Observed Nutrition Behaviors

Primary proposed journal: *Journal of Rural Health*

Secondary proposed journal: *Journal of Children and Poverty*

**Abstract**

**Purpose:** The purpose of this study was to examine the observed nutrition behaviors (the quality of food selected and consumed) of rural, low-income adolescents participating in the Summer Food Service Program (SFSP). **Methods:** Participants \( n = 43 \) were recruited from those enrolled in the Upward Bound (UB) Summer Program at a mid-sized university that utilized the SFSP. The quasi-experimental intervention design used digital photography along with a nutrition quality scale (0-6 with 6 indicating higher quality) to determine nutrition behaviors, actual food selection, and food consumption of those enrolled in the SFSP during week 1 (baseline) and week 5 (program completion).

**Findings:** Paired sample t-tests showed a significant increase in consumption from week 1 to week 5 for fruit \( t(42) = -2.04, p = .048 \) and milk \( t(42) = -3.13, p = .003 \) at lunch, for milk \( t(42) = -3.01, p = .003 \) at supper, and for milk overall (all three meals combined), \( t(42) = -3.08, p = .004 \). Vegetable consumption decreased significantly from week 1 to week 5 \( t(42) = 2.47, p = .018 \) at supper and overall (all three meals combined) \( t(42) = 2.65, p = .011 \). Two proportion z tests showed a statistically significant decrease in the selection of food items at quality level 2 from week 1 (.07) to week 5, \( z = 3.11, p = .002 \), and statistically significant increases in the selection of quality level 3 (.04), \( z = \)}
-2.15, \( p = .031 \), and quality level 5 (.05), \( z = -3.33 \), \( p < .000 \), item. Two proportion \( z \) tests showed a statistically significant decrease in the consumption of food items at quality level 5 from week 1 (.11) to week 5, \( z = 2.94 \), \( p = .003 \). The analysis showed no consistent increase in the quality of foods selected or consumed from week 1 to week 5.

**Conclusions:** Opportunities for shaping adolescent nutrient intake and eating behaviors during and outside of enrollment in the SFSP exist. Results indicate that a validated nutritional quality scale is needed in order to better determine the nutritional value for individual food items served in a SFSP. The potential remains to increase the quality of the nutritional value of the foods being offered in the SFSP and may provide the opportunity for an increase in healthy nutritious habits for adolescents from rural areas.
Introduction

Despite advances in clinical and preventive medicine, adolescents in the United States continue to have significant health and nutritional concerns. In rural areas especially, high school students have subpar nutrition, with low intakes of fruits, vegetables, and whole grains; and high intakes of sugar and fat (Schoenberg et al., 2013). In fact, research shows that living in a rural area is by itself a risk factor for children and adolescents being overweight or obese (Lutfiyaa et al., 2007). Therefore, nutrition programs have been established with the intent to increase nutritional status in low-income, often rural, adolescents. And although there has been a decrease in nutrient deficiencies in the American diet over the last hundred years, there has been a great increase in chronic diseases, many of which are related to poor nutrition (DHHS, 2015).

The Dietary Reference Intakes (DRI), the Dietary Guidelines for Americans (DGA), and its supporting documents, the MyPlate, and the USDA Food Groups (Sizer, 2016) were developed in order to lead Americans in making better nutrition choices. The DRIs provide individual nutrient recommendations such as the Recommended Dietary Allowance (RDA) (Schiff, 2018) while the DGAs aim to help the general population consume a healthy, nutritionally adequate diet. These recommendations also serve as the nutrition standard in health policies and programs (DHHS, 2015).

Two of the programs that use the guidelines listed above are the National School Lunch Program (NSLP) and its offshoot, the Summer Food Service Program (SFSP). Both programs were established to help improve the nutritional status of American school-age children (Stephenson & Schiff, 2015). Those aged 17 years and younger, from families that meet the economic eligibility, can receive a free or reduced-cost meal
at a school (NSLP) or during the summer months when school is not in session (SFSP). The participating school or site receives reimbursement money and donated commodities for each meal served in accordance with specific nutrition guidelines (Boyle & Holben, 2012). These guidelines, established by Congress and revised in the Healthy, Hunger-Free Kids act of 2010 (HHFKA) are in line with the U.S. Dietary Guidelines. Like the NSLP, the SFSP requires certain meal components in order to be considered reimbursable by the USDA. A food component is defined as one of the food groups that comprise a reimbursable breakfast, lunch, or supper in the SFSP, whereas a food item is a specific food offered within the food component comprising the reimbursable meal (KDOE, 2012). SFSP sponsors are responsible for serving meal patterns with required food components and their minimum serving sizes in order for the meal to be eligible for reimbursement by the USDA (USDA, 2016d).

To date, there are no studies evaluating the potential impact of the SFSP on the nutritional behaviors of its participants. This study used digital photography to track food choices and consumption of SFSP participants, within the confines of the standards. Digital photography is a valid and reliable method of visually assessing plate waste (Swanson, 2008; Taylor, Yon, & Johnson, 2014; D. Williamson et al., 2004; D. A. Williamson et al., 2003) and has been used as a measurement of food waste in cafeterias (Alaimo et al., 2015; Bontrager Yoder & Schoeller, 2014; Hubbard et al., 2015; Shanks, Banna, & Serrano, 2017; Smith & Cunningham-Sabo, 2014; Yoder, Foecke, & Schoeller, 2015). Digital photography was the most appropriate method to use in this study in order to best track actual food choices and consumption. To the best of our knowledge, this is
the first time it has been used with the SFSP to track food consumption and nutrition behaviors.

**Purpose**

The purpose of this study was to examine the nutrition behaviors (the quality of food selected and consumed) of rural, low-income adolescents participating in the SFSP. Digital photography was used to measure consumption of food groups (fruit, vegetable, milk, grains, and meat/meat alternatives) required for reimbursement by the USDA SFSP during the first week (baseline) and during the fifth week (program completion) of a five week period of participation in the SFSP. It was hypothesized that participants following SFSP standards, along with basic nutrition education, would increase their consumption of food from all food groups, increase the quality of their food selections, and increase the consumption of quality foods selected over the five week period.

**Research Design**

A quasi-experimental intervention design was used. For two days, three meals a day, each participants’ selected items were photographed during the first week of a 5-week enrollment in the national SFSP (baseline). Two days, three meals a day were also photographed during the fifth week of enrollment (program completion).

**Study Population**

The Upward Bound (UB) program is part of the nationwide TRIO programs (a series of programs for students from disadvantaged backgrounds) that was signed by President Johnson in 1964 (McElroy & Armesto, 1998). Upward Bound serves high school students who are low-income, potential first generation college students, and provides opportunities for participants to succeed in their precollege performance and
ultimately in their higher education pursuits (USDOE, 2016). The goal of the program is to increase the rate at which participants complete secondary education and enroll in and graduate from postsecondary institutions. The study population consisted of all participants enrolled in the UB program at a medium sized mid-east university. This UB program has a target area that is comprised of high schools in six rural counties in eastern Kentucky. According to U.S. census data, there is a high percentage (37%), of families in the target area living below 150% of the poverty level compared to 23% in Kentucky and 19% nationwide (2016). Intact sampling was used. The initial invitation to participate in the study was sent to the UB summer program participants ($n = 78$) and their parents in May 2018. Fifteen potential subjects failed to assent or consent and therefore a total of 63 UB participants were enrolled in the study. Six of the assenting and consenting participants left the summer program before its completion and were eliminated from the study. Fifty-seven participants began the study, however, 14 of those had missing photographic data and were eliminated. Therefore a total of 43 completed the study and are included in the analysis. All study participants ($n = 43$) were low-income high school students, aged 14–17 years, and potential first generation college students. Forty-two of the participants were white, with one self-reporting identifying with being both white and black, and most were female (58%; $n = 25$). The mean age was 16.2 ($SD = 0.87$) years, and about half were high school juniors (44%; $n = 19$). More than half (61%; $n = 26$) of the participants were second (35%; $n = 15$) or third (26%, $n = 11$) year UB members and had therefore been exposed to the SFSP the previous year(s); however, there were no significant differences seen between those with
experience in the UB program and first year members at baseline and therefore the groups were combined for analysis. The complete demographics are shown in table 5.1.

**Description of the Intervention**

The intervention was two-fold. First, it included participation in mandatory adherence to the SFSP requirements for three meals each day, for 4-5 days each week for five weeks. This UB summer residence program includes off-campus field trips and on those specified days, the SFSP guidelines were not followed. Offer versus serve (OVS) is an option for SFSP participants and is the option that was used in this study. The OVS option allows for choices of food items within food groups that the participant can select (USDA, 2016c) or decline, with the intent of increasing consumption and reducing waste. This idea is based on the assumption that participants will select and consume the foods that they prefer. The standards for the SFSP OVS are seen in table 5.2. All meals were checked by a graduate assistant, trained in the SFSP standards, to ensure compliance with the SFSP OVS requirements. The second portion of the intervention included attendance at one, 1-hour mandatory nutrition education session. This session was taught by a graduate student studying public health nutrition and was given on the first day of the program. The lesson included an introduction to the US Dietary Guidelines (DHHS, 2015), the basic food groups as identified in MyPlate (USDA, 2016a), and the purpose and requirements of the SFSP OVS (KDOE, 2012). The educational session emphasized the importance of consuming fruits, vegetables, whole grains, and low-fat dairy products. During the session, participants were given examples of healthy, SFSP reimbursable meals. There was also an optional short (20-30 minute) nutrition session (part of an UB program called “College Hacks”) that participants could choose to attend as well as a two-
part (1-hour each) cooking class that was optional for UB participants. However, there were no differences between the groups that attended the optional nutrition events and those who did not attend at baseline (first week) or at program completion (fifth week) and therefore the groups were combined for analysis.

Data Collection Procedures

Protection of human subjects. The study was approved by the Institutional Review Boards (IRB) of both the PI’s place of study and the university where the study took place. The initial invitation to participate in the study was sent to the UB summer program participants \((n = 78)\) and their parents in May 2018. The consent and assent forms were delivered via U.S. Postal Service with a packet of approximately 10 other forms that had to be completed and signed before the participant could be included in the UB Summer Program. The consent and assent forms were paper-based and were returned by the participant and/or their parent or guardian prior to the intervention.

Digital Photography. Digital photographs were taken during the first week of the UB summer program for two breakfast meals, two lunch meals, and two supper meals, and again for two breakfast meals, two lunch meals and two supper meals during the fifth (final) week of the summer program to track plate waste and as a way to measure nutrition behaviors (Swanson, 2008). Average consumptions for each first week meal (breakfast, lunch, and supper) were compared to the average consumption of each fifth week meal (breakfast, lunch, and supper). To ensure compliance with the USDA SFSP OVS, participants passed through a “check” station that confirmed that each meal included all of the food group components required to qualify for a reimbursable meal (USDA, 2016c). If a participant did not have all of the required components, they were
asked to return to the serving line to pick a food item or items needed for them to complete the necessary requirements for USDA reimbursement.

At the check point, participants had their plate labeled with a number identifier that was given to them on the first day of participation in the UB summer program. Each participants’ plates were photographed by one of two research assistants using standard smart phone digital cameras. Two “photo stations” were used to prevent time delays and allow participants to pass through more quickly. To ensure proper comparisons of before- and after-consumption, the plates were placed in one of two marked areas on a table and mounted cameras, approximately 16 inches above the area, with a camera angle of approximately 45° took a photograph. Two marked regions for placement of the meal plates were fixed to the table to support the camera tripods to ensure optimal visibility of the meal in the digital photographs. After finishing their meals, the participants brought their plates and all waste back to the “photo stations” where the plate, cups, and bowls were photographed in the same manner as before.

**Nutrition Quality Score.** To aid in evaluating the quality of the foods selected and consumed a nutrition quality score was developed. Each menu item available for participants to choose on collection days, was nutritionally analyzed and given a quality score based on its nutritional value. The following six criteria were used: total fat less than 35% of calories; saturated fat less than 10% of calories; zero trans-fat; fiber at least 14g for each 1000 calories; sugar <10% of calories; and sodium ≤ 1mg per calorie. Each food item was given a score of 1 if it met the nutritional criteria and 0 if it did not meet the criteria. A scale of 0-6 was then applied for each food item. The criteria were adapted from the Snack Smart standards of the NSLP (USDA, 2016b) and the Dietary
Guidelines for Americans (DHHS, 2015). Nutrition information on the individual food items was obtained from the university dining facility website (Aramark Corporation, 2018) and from the USDA Nutrient Data Base (2018).

**Data Analysis**

Analysis of the photographic data began with two analysts comparing each before and after meal picture to visually estimate the percentage of each item consumed to the nearest 10% increment. Based on previous research using digital photography (Swanson, 2008; D. Williamson et al., 2004) and to ensure interrater reliability, the estimate of the percentage consumed for each food item by analyst 1 was subtracted from the estimate by analyst 2. If there was an observational difference of more than 50%, the PI reevaluated the photo and the average of the two closest estimates were retained for analysis. If the difference in estimation amounts was less than 50%, the 2 original estimations were averaged to give the final average estimation of consumption for each item on the tray (Swanson, 2008). Missing data on any of the collection days were eliminated from the analysis. Fourteen participants were eliminated from the study due to having one or more missing photo. Statistical analysis was completed with SPSS 24 (IBM, 2016) using a significance or alpha level of .05 and 95% confidence intervals (CI) for all hypothesis testing.

**Food group analysis**

Food items were categorized into food groups based on the required components of the SFSP OVS and comparisons of food groups (fruit, vegetable, milk, grain, and meat/meat alternative) were used to analyze the quantities of the foods eaten. To test the hypothesis that consumption of all food groups would increase from week 1 to week 5,
paired-samples $t$-test were conducted to compare quantities of food groups eaten (vegetable, fruit, milk, grain, and meat/meal alternatives) at each meal and at each meal combined (a sum of each food group for all three meals).

**Analysis of the quality of selected foods**

All food items were categorized by their quality as described above on a 0-6 scale, with higher scores indicating higher quality. During week 1, 49 different food items were offered at breakfast, lunch, and/or supper and fifty different food items were offered during week 5. Many food items, such as milk were offered at every meal. To determine frequency of selection, the number of times each food item was selected was compared to the number of times each food item was offered. A percent was calculated based on the number of times the food item was selected compared to the number of times the food item could have been selected. It was hypothesized that there would be a significant increase in the quality of the selection of foods over the five week period. Two-proportion $z$-tests were performed to examine the relation between the percent selected at each quality level in week 1 to their corresponding quality level in week 5.

**Analysis of the consumption of the selected foods**

It was hypothesized that there would be an increase in the consumption of quality foods over the five week period. A standard of 80% consumed of each item was used as a definition of “consumed” based on previous research (Burrows et al., 2010; Buzby & Guthrie, 2002; Schwartz et al., 2015; Sjöberg et al., 2003; Smith & Cunningham-Sabo, 2014; Upton et al., 2013). In other words, it was important to determine not only which foods the participants chose, but how much of those selected foods were consumed.
To determine frequency of consumption, the number of times each food item was consumed was compared to the number of times each food item was selected. A percent was calculated based on the number of times the food item was consumed compared to the number of times the food item was selected. Two-proportion z-tests were performed to examine the relation between the percent consumed at each quality level in week 1 to their corresponding quality level in week 5.

Results

Food groups

Paired samples t-tests were conducted to compare the percent of each food group consumed at week 1 and at week 5 for each meal, with the means representing the percent consumed (range: 0-100). There was a significant difference in the percentages for fruit consumption at lunch in week 1 ($M = 20.00, SD = 29.86$) and for fruit consumption at lunch during week 5 ($M = 34.07, SD = 35.34$); $t(42) = -2.04, p = .048; d = .43$. This is a medium effect according to Cohen (1988). There was also a significant difference in the scores for milk consumption at lunch during week 1 ($M = 10.35, SD = 23.10$) and milk consumption at lunch during week 5 ($M = 30.81, SD = 40.03$); $t(42) = -3.13, p = .003; d = .63$ which is also a medium effect (J. Cohen, 1988). Milk consumption also showed significant increases at supper week 1 ($M = 11.74, SD = 24.20$) to week 5 ($M = 27.67, SD = 38.16$); $t(42) = -3.01, p = .003; d = .50$ which is a medium effect (J. Cohen, 1988). There was also a significant change for milk overall (all three meals combined; a range = 0-300), from week 1 ($M = 72.21, SD = 53.86$) to week 5 ($M = 113.72, SD = 93.94$); $t(42) = -3.08, p = .004; d = .44$. There was a significant change in vegetable consumption at supper with participants actually consuming less vegetables
during week 5 ($M = 56.51, SD = 33.40$) than during week 1 ($M = 70.93, SD = 30.61$); $t(42) = 2.47, p = .018; d = .45$ which is also a medium effect (J. Cohen, 1988). There was also an overall (all three meals combined; range = 0-300) decrease in vegetables from week 1 ($M = 202.21, SD = 67.47$) to week 5 ($M = 173.72, SD = 69.84$); $t(42) = 2.65, p = .011; d = .41$. There were no significant differences in consumption for any food groups at breakfast from week 1 to week 5. A summary of these results can be found in table 5.3.

**Quality of the foods selected**

To test the hypothesis that there would be a significant relationship in the quality of the selection of foods over the five week period, a two-proportion z-test was performed to examine the relation between the percentages selected at each quality level at week 1 and at week 5. There was a statistically significant decrease in the selection of food items at quality level 2 from week 1 (.34) to week 5, $z = 3.11, p = .002$, and statistically significant increases in the selection of quality level 3 (.20), $z = -2.15, p = .031$, and quality level 5 (.17), $z = -3.33, p < .000$, items. Participants were less likely to select quality 2 items at week 5 compared to week 1. Participants were more likely to select quality 3 and quality 5 items at week 5 compared to week 1. The relationship between the variables was not significant for quality 1, quality 4, or quality 6 food items from week 1 to week 5. Table 5.4 shows the comparison of the food items selected, in percentages, during week 1 and week 5 based on their quality scores.

In order to better understand quality selection, the top ten food items selected during week 1 were compared with the top ten food items selected during week 5. Figure 5.1 shows the comparison of the quality of the items selected. There were more high
quality foods selected at post intervention. Three foods with a quality score of 5 (pasta, apples, salad) were part of the top ten selected during week 5 compared to only one food with a quality score of 5 (apple) of the top ten selected during week 1. The week 1 top ten foods selected had a mean quality score of 3.0 \( (SD = 1.05; \text{range: 1-5}) \) whereas the top ten foods selected in week 5 had a mean quality score of 3.5 \( (SD = 1.18; \text{range: 1-5}) \).

**Quality of the foods consumed**

To test the hypothesis that there would be an increase in the consumption of quality foods (not just an increase in the selection of more quality foods), a two-proportion z test was performed to examine the relation between the percent consumed at each quality level in week 1 to their corresponding quality level in week 5. Two proportion z tests showed a statistically significant decrease in the consumption of food items at quality level 5 from week 1 (.62) to week 5, \( z = 2.94, p = .003 \). Participants were less likely to consume quality 5 items at week 5 compared to week 1. There were no significant changes seen in the consumption of any other quality food item from week 1 to week 5. Table 5.4 shows the comparison of the food items consumed, in percentages, during week 1 and week 5 based on their quality scores.

The quality of the foods consumed was also evaluated using the list comprised of the top ten most often selected foods for both week 1 and week 5 to determine if the foods most often selected were also consumed. Table 5.5 shows a summary of the top foods selected and includes the comparison of week 1 and week 5 consumption percentages along with their quality scores. Researchers also examined quality foods that were not on the top 10 list. For example, even though broccoli, a high quality food, did not make the top 10 list, it was selected more often and consumed more often during
week 5 when compared to week 1. Salad, another high quality food showed a large increase in the number of times it was consumed.

Discussion

This study was the first to investigate the nutritional behavioral effects of the SFSP on low income, rural adolescents and aids in filling a gap in the literature regarding the potential influence the SFSP may have on the nutrition behaviors of adolescents. Adolescents living in rural areas have an increased risk for obesity and other chronic diseases due, in part, to their subpar nutritional intake. Residents of the eastern Appalachian portion of Kentucky, which includes the relatives of participants in this study, have among the highest rates of obesity, diabetes and cardiovascular disease in the U.S. (CDC, 2014). On the other hand, food insecurity is also a problem for these rural adolescents (Kentucky Division of Nutrition and Health Services, 2016; USDA, 2016c), lending support for the need to improve the nutrition of adolescents living in these areas.

To the best of our knowledge, this study is also the first to use digital photography with the SFSP as a measurement of actual food consumption and nutrition behaviors. In general, there were significant increases in the consumption of fruit and milk from week 1 to week 5 of the program. Most fruits are naturally low in fat, sodium, and calories, and high in fiber – all components which may help to reduce chronic disease risk (DHHS, 2015), a potential threat to this study population, as previously mentioned. Intake of low fat dairy products is associated with an increase in bone health and a reduced risk of cardiovascular disease and type 2 diabetes (USDA, 2016a), also potential threats to this population.
While there are many factors that influence adolescents’ food choices, (Contento, Williams, Michela, & Franklin, 2006; Stevenson, Doherty, Barnett, Muldoon, & Trew, 2007), an increase in fruit in this study may be due to the simple fact that this food group was, indeed, available. Rural adolescents often lack access to supermarkets and healthful food such as fruits (Larson, Story, & Nelson, 2009). They also face cultural barriers such as the traditional food preferences of meats and high fat foods over fruits and vegetables (Schoenberg et al., 2013) and a resistance to change these ingrained traditions (Brown & Wenrich, 2012). Therefore it appears that perhaps availability alone, may have prompted students to consume fruit, especially during the fifth week when they had become more acclimated and willing to try new, perhaps, unfamiliar foods. The nutrition session may have also helped encourage fruit intake as well as observations of their peers selecting fruits. Another explanation for the increase in fruit consumption in this study may be attributed to the greater variety and frequency of fruits offered during the fifth week. For example, bananas, which were not offered at all during the first week, were offered during five of the six meals analyzed during week 5. Apples were offered four times out of the six meals during week 1 and at all meals during week 5. When healthy alternatives within food groups are presented and adolescents are given a choice, they are more likely to consume their choice (Bassett, Chapman, & Beagan, 2008). For example, when given the option of three different types of fruits, individuals are more likely to choose and consume fruit due to the fact that they feel a sense of control in that they were given a choice versus being told to eat a specific type of fruit (I. Ajzen, 2015).

The significant increase in milk consumption may be explained in part, by highlighting the product and making it more visible by removing cereal bowls and other
items that were around it (Hubbard et al., 2015) during lunch and supper. This action was not intentionally done to increase milk consumption, it was the result of the dining staff making adjustments to a new dining facility and finding the best layout for the summer months. The graduate assistant also began to mention the milk’s location to the participants. An increase in “nudging” also occurred when the graduate assistant helping to check plates for compliance with SFSP standards suggested that the participant return to the serving line to get milk in order to meet the standards for a USDA reimbursable meal (Lehner, Mont, & Heiskanen, 2016).

Consumption of vegetables in general significantly decreased from week 1 to week 5. Initially thought to be a negative conclusion of the study, further investigation into the types of vegetables that decreased revealed that some higher nutritional quality vegetables, such as salad and broccoli increased from week 1 to week 5, and lower nutritional quality vegetables, such as French fries and hash browns, decreased from week 1 to week 5. These observations revealed that a more in depth investigation of the quality of food items selected within food groups was warranted because it appeared that items within food groups were not of equal nutritional value. For example, broccoli and French fries, both considered vegetables according to the SFSP standards, do not have equivalent nutrient composition. Therefore, further exploration of participant choices within food groups and consumption of those selected foods was conducted.

The development of a quality scale that ranged from 0 to 6, with higher numbers indicating higher quality, in this study was useful in categorizing food items based on their nutritional value to determine the differences in the nutritional quality of food items within food groups. In this study, the significant decreases in the selection of food items
with a quality score of 2 and the significant increase in the selection of food items with quality scores of 3 and 5 support the hypothesis that higher quality food items would be selected more often in week 5, however, the lack of significant differences in the selection of foods with quality scores of 1, 4 or 6 did not support the hypothesis. On the other hand, it is important to recognize that more high quality food items were selected: three food items with a quality score of 5 were in the top ten food items selected during week 5 compared to one food item with a quality score of 5 in the top ten foods selected during week 1.

The quality score itself had some limitations but was developed due to a lack of a validated nutrition scale for individual food items. The SFSP standards center on food groups, not the nutritional quality of the individual foods within those groups. Based on the current standards of the OVS, a participant may select the same low nutritional quality food every day it is offered. For example, it was observed that many participants consistently selected cheeseburgers and French fries, a meal which meets the reimbursable standards of the SFSP OVS but may not provide optimum nutritional quality and variety. And although having a choice does increase consumption (Hill, Casswell, Maskill, Jones, & Wyllie, 1998; Loth, MacLehose, Larson, Berge, & Neumark-Sztainer, 2016; Neumark-Sztainer, Story, Perry, & Casey, 1999; Watts, Lovato, Barr, Hanning, & Mâsse, 2015), having low quality food items such as French fries offered every day, permits a participant to select that food item every day. Providing healthy alternatives from which a participant can choose allows for autonomy and perceptions of control while also providing high quality nutritious foods for the participant. Consistent intake of high quality foods (those high in fiber and low in fat, sugar and sodium)
decreases chronic disease risk (DHHS, 2015) and may improve the nutritional status of adolescents.

In this study, there were no significant increases in the quality of the foods consumed, and in fact, a significant decrease was seen in the consumption foods with a quality score of 5. It was deemed prudent then to look at individual food items. Although not significant statistically, it is important to note that entrees such as pizza and cheeseburgers were selected and consumed less often during week 5 compared to week 1. Reasons for the decrease in consumption of these foods cannot be completely determined by this study, however, there are some possible explanations. The graduate assistant and other authority figures (i.e. program directors) encouraged the participants to try new foods which may have prompted some to explore unfamiliar options. Participants encountered more patrons in the dining facility during week 5, causing the pizza and cheeseburger stations to have longer wait times than the main entrée station and therefore may have encouraged participants to select a food item in a shorter line. Boredom with eating the same foods may have also influenced the participants to discover new food options (although comfort in choice may have had the opposite effect by influencing many to continue with the same food selections).

There were more varieties of vegetables offered and selected during week 5 that were not offered during week 1 including: tomatoes, carrots, peas, bell peppers, and mushrooms. An increase in variety during week 5 did not improve participants’ selection or consumption of vegetables, however, consistently offering healthy varieties is a responsibility of those in authority positions and allows the adolescent to decide for themselves how much and whether or not to consume the food (Satter, 2012). This idea
helps demonstrates the need to increase vegetable options in a SFSP OVS in order to find healthy items that participants find more appealing.

In general, participants showed monotony in their food choices for both week 1 and week 5. Seven of the top ten food items selected remained the same after five weeks. This could be indicative of a lack of variety being offered, participants’ comfort with familiar foods, or participants’ assurance in knowing what would qualify as a reimbursable item, and therefore an avoidance of having to return to the serving line for something different. It is important to note that although the highest quality foods in the top 10 selected (apples and bread), were chosen less often during week 5 than during week 1, those foods were consumed in greater quantities during week 5 than during week 1. The increase consumption of the higher quality foods is indicative of a positive nutrition behavior change. In summary, many high quality foods were consumed more often during week 5 when they were selected, and many low quality foods, if selected, were consumed less often in week 5. This demonstrates a positive improvement in healthy food choices and consumption, leading to the potential for an increase in the nutritional status in this low-income, adolescent population.

**Strengths and Limitations**

There were many strengths to the study. The methodology, specifically the use of digital photography, is an innovative approach for collecting consumption data in the SFSP. The ability to capture data from a rural, low-income adolescent population participating in the SFSP was also a strength. This captive audience gave the researchers access to the participants over a five-week period, and provided a 68% study completion rate.
However, there were also some limitations to the study. Intact sampling was used and therefore there was no random assignment of participants to treatment. The small sample size may lead to more difficulty in generalization of the results. Although the participants were in a controlled environment for breakfast, lunch, and dinner, there was the opportunity for them to consume snacks and other foods in between meals from vending machines on campus or from food brought from home. There was no way to capture the “outside” food choices and consumption in this study. Therefore, the focus on the food groups required by the SFSP may have also limited the ability to generalize to the participants’ overall nutrient intake. The “nudging” of participants to select certain food items from food components in order to meet the standards of the USDA may have introduced a bit of selection bias.

The inability to capture food selections and consumption prior to the start of the SFSP prevented a true pre- to post-intervention study. Data collection occurred during the first week of a program in which the participants were following the guidelines of the SFSP and during the fifth week, when continuing to adhere to the standards.

The food quality scale exhibited limitations in using only six items (fat, saturated fat, trans-fat, fiber, sugar, and sodium) to evaluate the quality of a food item. Although the scale was developed based on USDA and DGA recommendations, the quality scale did not consider protein, or micronutrients outside of sodium. For example, plain milk scored a 3 due to low fiber, high sugar, and high sodium. Therefore this quality score may not always be indicative of a healthy food. Almost all food items met the 0 trans-fat standard giving each food at least one point. Many foods failed to meet the sugar
standard based on natural sugars, not added sugars (i.e. fruit and milk) because there was no way to determine this difference in each food.

**Implications**

This study attempted to determine if enrollment in the SFSP influenced the behaviors, specifically increasing consumption of healthy foods, in a low-income, rural adolescent population. This study demonstrated that when healthy choices are offered, adolescents will select them. Therefore, offering only healthy choices on most days, with an occasional offering of a lower quality food has the potential to improve nutrition behaviors in this population. The SFSP has been deemed successful in reducing food insecurity, however, the opportunity remains to increase the quality of the nutritional value of the foods being offered. Future studies should focus on the effects of more stringent nutritional standards for options within food groups. Future directions for the SFSP should also include standard protocols for directing, suggesting and encouraging participants to try new, unfamiliar, healthy foods. The SFSP has the potential to increase the health of the population it serves while also encouraging its participants to form healthy habits that may be continued even outside the confines of the program. Therefore, changes to the SFSP may be necessary (USDA, 2018) and research on the benefits and impact of those changes on low-income participants’ nutrition is warranted.

Results of this study indicate that a nutritional quality scale can be very useful in helping to determine the nutritional value of individual food items within food groups. The scale used in this study, although had limitations, was successful in helping to evaluate food selection and consumption. However, a validated nutrition scale is needed in order to better determine the nutritional value for individual food items served in a
SFSP, especially in a SFSP OVS program in which the participants are offered choices within food groups. Ranking individual food items is complicated as all foods of varying nutritional value have the potential to fit into a healthy meal plan. However, when OVS is used in a SFSP, it is recommended that certain lower nutritional quality foods be served less often so as to avoid the continuous selection and consumption of those foods. A validated scale could be useful in helping SFSP sponsors develop high nutritional quality menus. The food quality scale in this study was developed as only one measure, and should not be used to dichotomously label foods as “good/healthy” or “bad/not healthy. In fact, the DGA, used as a basis for the SFSP standards, provide general, simple guidelines for Americans and encourages a wide variety of foods in the diet. However, the simplicity of using food groups, versus food items in the SFSP, inadvertently caused low quality food selection by some participants.

Larger, longitudinal studies are needed to determine the lasting effects of the SFSP on nutritional behaviors. Studies which include various methods of data collection such as self-report and observation should be conducted and compared to determine the most effective, accurate techniques. Survey questions that attempt to explain the reasons for certain food choices could also add an important component to a study like the one described here. Knowing why certain foods were selected will help future SFSP sites and sponsors target efforts to increase consumption of healthy food choices.

Adolescents in low-income rural areas may benefit greatly from food programs such as the SFSP. Enhancing this and other federal programs with higher nutritional standards and nutrition education components has the potential to improve the health of
its recipients and gives great promise to change the health outcomes of this vulnerable, at-risk population.
Table 5.1 Demographic Information

<table>
<thead>
<tr>
<th>Total</th>
<th>n = 43 (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>%</td>
</tr>
</tbody>
</table>
| *Participants could mark more than one ethnicity category.*

<table>
<thead>
<tr>
<th>Age</th>
<th>n</th>
<th>%</th>
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<tbody>
<tr>
<td>M = 16.2</td>
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<tr>
<td>SD = 0.871</td>
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<tr>
<th>Academic Standing</th>
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<tr>
<td>Junior</td>
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<tr>
<td>Senior</td>
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<td>37.2</td>
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<tr>
<td>Caucasian</td>
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<th>%</th>
</tr>
</thead>
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<td>60.0</td>
</tr>
<tr>
<td>1 year prior</td>
<td>15</td>
<td>34.9</td>
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<td>2 years prior</td>
<td>11</td>
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<tr>
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<td>39.5</td>
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<thead>
<tr>
<th>County of Residence</th>
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<td>9.3</td>
</tr>
<tr>
<td>Estill</td>
<td>2</td>
<td>4.7</td>
</tr>
<tr>
<td>Lee</td>
<td>6</td>
<td>14.0</td>
</tr>
<tr>
<td>Lincoln</td>
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<td>46.5</td>
</tr>
<tr>
<td>Powell</td>
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<td>18.6</td>
</tr>
<tr>
<td>Wolfe</td>
<td>3</td>
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Table 5.2 SFSP Offer Versus Serve (OVS) Requirements

**OVS**

<table>
<thead>
<tr>
<th>Breakfast Meal Patterns</th>
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<tbody>
<tr>
<td>Sites must serve at least four food items from any component. Participant must select at least three food items.</td>
</tr>
<tr>
<td><strong>Component</strong></td>
</tr>
<tr>
<td>milk</td>
</tr>
<tr>
<td>fruit or vegetable</td>
</tr>
<tr>
<td>grain/bread</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Lunch or Supper Meal Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sites must serve at least five food items from four different components (2 from fruits/vegetables). Participants must select at least three different food components.</td>
</tr>
<tr>
<td><strong>Component</strong></td>
</tr>
<tr>
<td>milk</td>
</tr>
<tr>
<td>fruits/vegetables</td>
</tr>
<tr>
<td>grain/bread²</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>meat/meat alternate</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
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<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

¹Fruit or vegetable juice must be full-strength
²Breads and grains must be made from whole-grain or enriched meal or flour. Cereal must be whole-grain or enriched or fortified.
³Breads and grains must be made from whole-grain or enriched meal or flour. Cereal must be whole-grain or enriched or fortified.
⁴A serving consists of the edible portion of cooked lean meat or poultry or fish.
⁵Nuts and seeds may meet only one-half of the total meat/meat alternate serving and must be combined with another meat/meat alternate to fulfill the lunch or supper requirement.
⁶Yogurt may be plain or flavored, unsweetened or sweetened.
⁷Two items from the fruit/vegetable group must be offered at lunch and supper for OVS.
Table 5. Paired-Sample t-test Comparing Week 1 and Week 5 Food Group Consumption for Each Meal

<table>
<thead>
<tr>
<th>Meal</th>
<th>Food Group</th>
<th>Week 1</th>
<th></th>
<th>Week 5</th>
<th></th>
<th>t(42)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breakfast</td>
<td>Meat/Meat Alternative</td>
<td>72.44</td>
<td>32.25</td>
<td>65.47</td>
<td>37.65</td>
<td>1.061</td>
<td>.295</td>
</tr>
<tr>
<td></td>
<td>Grain</td>
<td>72.12</td>
<td>33.29</td>
<td>76.51</td>
<td>33.67</td>
<td>-.976</td>
<td>.335</td>
</tr>
<tr>
<td></td>
<td>Fruit</td>
<td>26.86</td>
<td>30.16</td>
<td>23.60</td>
<td>24.38</td>
<td>.639</td>
<td>.527</td>
</tr>
<tr>
<td></td>
<td>Vegetable</td>
<td>60.58</td>
<td>37.15</td>
<td>51.28</td>
<td>38.98</td>
<td>1.389</td>
<td>.172</td>
</tr>
<tr>
<td></td>
<td>Milk</td>
<td>50.12</td>
<td>40.02</td>
<td>55.23</td>
<td>42.22</td>
<td>-.718</td>
<td>.477</td>
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<tr>
<td>Lunch</td>
<td>Meat/Meat Alternative</td>
<td>89.88</td>
<td>18.95</td>
<td>85.58</td>
<td>24.10</td>
<td>.990</td>
<td>.328</td>
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<tr>
<td></td>
<td>Grain</td>
<td>86.51</td>
<td>48.79</td>
<td>85.35</td>
<td>22.71</td>
<td>.287</td>
<td>.775</td>
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<tr>
<td></td>
<td>Fruit</td>
<td>20.00</td>
<td>29.86</td>
<td>34.07</td>
<td>35.34</td>
<td>-2.041</td>
<td>.048</td>
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<tr>
<td></td>
<td>Vegetable</td>
<td>70.70</td>
<td>30.83</td>
<td>65.93</td>
<td>30.58</td>
<td>.864</td>
<td>.393</td>
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<tr>
<td></td>
<td>Milk</td>
<td>10.35</td>
<td>23.10</td>
<td>30.81</td>
<td>40.03</td>
<td>-3.131</td>
<td>.003</td>
</tr>
<tr>
<td>Supper</td>
<td>Meat/Meat Alternative</td>
<td>84.07</td>
<td>23.89</td>
<td>85.23</td>
<td>21.93</td>
<td>-.244</td>
<td>.809</td>
</tr>
<tr>
<td></td>
<td>Grain</td>
<td>75.35</td>
<td>31.14</td>
<td>79.53</td>
<td>23.45</td>
<td>-.875</td>
<td>.386</td>
</tr>
<tr>
<td></td>
<td>Fruit</td>
<td>25.35</td>
<td>32.56</td>
<td>29.07</td>
<td>33.19</td>
<td>-.568</td>
<td>.573</td>
</tr>
<tr>
<td></td>
<td>Vegetable</td>
<td>70.93</td>
<td>30.61</td>
<td>56.51</td>
<td>33.40</td>
<td>2.465</td>
<td>.018</td>
</tr>
<tr>
<td></td>
<td>Milk</td>
<td>11.74</td>
<td>24.20</td>
<td>27.67</td>
<td>38.16</td>
<td>-3.099</td>
<td>.003</td>
</tr>
</tbody>
</table>

*p < .05
Range 0-100
Note: $M =$ Mean. $SD =$ Standard Deviation
Table 5.4 Results of Two Proportion z-Test and Descriptive Statistics for Selection and Consumption Based on Quality Score

<table>
<thead>
<tr>
<th>Quality Score</th>
<th>Percent Selected Week 1</th>
<th>Percent Selected Week 5</th>
<th>z-test</th>
<th>p-value*</th>
<th>Percent Consumed Week 1</th>
<th>Percent Consumed Week 5</th>
<th>z-test</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16.28</td>
<td>23.26</td>
<td>-.81</td>
<td>.416</td>
<td>71.43</td>
<td>60.00</td>
<td>.49</td>
<td>.627</td>
</tr>
<tr>
<td>2</td>
<td>33.52</td>
<td>26.53</td>
<td>3.11</td>
<td>.001*</td>
<td>73.88</td>
<td>66.14</td>
<td>1.19</td>
<td>.060</td>
</tr>
<tr>
<td>3</td>
<td>19.50</td>
<td>23.01</td>
<td>-2.16</td>
<td>.031*</td>
<td>78.85</td>
<td>82.67</td>
<td>-1.13</td>
<td>.261</td>
</tr>
<tr>
<td>4</td>
<td>15.86</td>
<td>14.16</td>
<td>1.11</td>
<td>.266</td>
<td>71.20</td>
<td>72.86</td>
<td>-.33</td>
<td>.741</td>
</tr>
<tr>
<td>5</td>
<td>17.37</td>
<td>21.95</td>
<td>-3.33</td>
<td>.001*</td>
<td>62.11</td>
<td>50.66</td>
<td>2.94</td>
<td>.003*</td>
</tr>
<tr>
<td>6</td>
<td>14.62</td>
<td>13.18</td>
<td>.60</td>
<td>.548</td>
<td>40.91</td>
<td>42.35</td>
<td>-.16</td>
<td>.875</td>
</tr>
</tbody>
</table>

1Range = 1-6 with higher scores indicating higher quality
2Range: 0-100 indicating a percentage
*p < .05
Table 5.5  Top Ten Foods Selected, Quality Scores and the Percent Consumed at Week 1 and Week 5

<table>
<thead>
<tr>
<th>Quality</th>
<th>Food Item</th>
<th>Week 1</th>
<th>Week 1</th>
<th>Quality</th>
<th>Food Item</th>
<th>Week 5</th>
<th>Week 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Percent</td>
<td>Percent</td>
<td></td>
<td></td>
<td>Percent</td>
<td>Percent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Selected</td>
<td>Consumed</td>
<td></td>
<td></td>
<td>Selected</td>
<td>Consumed</td>
</tr>
<tr>
<td>5</td>
<td>Apple</td>
<td>40.68</td>
<td>20.00</td>
<td>5</td>
<td>Apple</td>
<td>34.88</td>
<td>21.11</td>
</tr>
<tr>
<td>4</td>
<td>Bun, Hamburger</td>
<td>43.60</td>
<td>70.67</td>
<td>4</td>
<td>Bun, Hamburger</td>
<td>38.95</td>
<td>71.64</td>
</tr>
<tr>
<td>3</td>
<td>Tater Tots</td>
<td>62.79</td>
<td>85.19</td>
<td>3</td>
<td>Tater Tots</td>
<td>63.95</td>
<td>76.36</td>
</tr>
<tr>
<td>3</td>
<td>French Fries</td>
<td>50.00</td>
<td>82.56</td>
<td>3</td>
<td>French Fries</td>
<td>37.98</td>
<td>67.35</td>
</tr>
<tr>
<td>3</td>
<td>Pancakes</td>
<td>62.79</td>
<td>70.37</td>
<td>3</td>
<td>Pancakes</td>
<td>34.88</td>
<td>73.33</td>
</tr>
<tr>
<td>2</td>
<td>Sausage patty Egg</td>
<td>74.42</td>
<td>90.63</td>
<td>2</td>
<td>Sausage patty Egg</td>
<td>60.47</td>
<td>67.31</td>
</tr>
<tr>
<td>2</td>
<td>Egg</td>
<td>66.28</td>
<td>70.18</td>
<td>2</td>
<td>Egg</td>
<td>44.19</td>
<td>55.26</td>
</tr>
<tr>
<td>2</td>
<td>Bacon</td>
<td>62.79</td>
<td>59.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cheeseburger</td>
<td>40.11</td>
<td>73.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hash browns</td>
<td>39.53</td>
<td>91.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>Noodles, pasta</td>
<td>35.47</td>
<td>70.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>Salad</td>
<td>33.72</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>Milk, plain</td>
<td>28.68</td>
<td>91.89</td>
</tr>
</tbody>
</table>
Figure 5.1 Top 10 Foods Selected with Their Quality Score

Top 10 Foods Selected with Their Quality Score

Quality Score (higher number indicates higher quality)

- Solid – Week 1
- Dotted – Week 5

- 5
- 4
- 3
- 2
CHAPTER 6: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to examine the impact of the Summer Food Service Program, enhanced with basic nutrition education, on the nutrition-related attitudes, subjective norms, perceived behavioral control, behavioral intentions, and behaviors (the quality of food selected and consumed), of rural, low-income adolescents participating in the Upward Bound program housed at Eastern Kentucky University. The Theory of Planned Behavior (TPB) served as the theoretical framework, with its constructs being measured via survey at baseline and at post-intervention to determine if the change in scores would predict intentions to improve nutrition behaviors, specifically fruit and vegetable consumption. In addition to the survey methods, digital photography, an innovative data collection technique, was used for the first time in SFSP participants to measure actual nutrition behaviors.

Summary of Results

Rural adolescents suffer from poor nutrition, increasing their risk for obesity and other chronic diseases. The SFSP provides summer meals to qualifying children, including low-income, rural adolescents, under the age of 18 (USDA, 2016). While the SFSP does decrease food insecurity and provide meals to those who may otherwise not have access to food (Engle & Tinto, 2008; Hopkins & Gunther, 2015; Nord & Romig, 2006), this study demonstrated that the program has even greater potential to influence the nutritional behaviors of the population it serves. In this study, the constructs of the Theory of Planned Behavior (TPB) (Ajzen, n.d) were investigated to determine which, if any, of the constructs could predict an adolescents’ likelihood of improving their nutrition behaviors while in the SFSP. Attitude, subjective norms and perceived
behavioral control all showed significance in predicting intentions to increase fruit and vegetable consumption, demonstrating the potential to influence nutrition behavior of adolescents enrolled in this program. The innovative use of digital photography (Alaimo et al., 2015; Bontrager Yoder & Schoeller, 2014; Hubbard et al., 2015; Shanks et al., 2017; Smith & Cunningham-Sabo, 2014; Swanson, 2008; Taylor et al., 2014; Yoder et al., 2015) demonstrated that there is potential for increasing the quality of foods offered, selected, and consumed by participants. Results are further summarized below.

Results for Manuscript 1

Participants had a significant improvement from pre- to post-intervention in knowledge ($p = .000$) and in self-reported fruit and vegetable intake ($p = .002$). A change in scores of perceived behavioral control from pre- to post-intervention increased in those participants who voluntarily attended one or more of the optional nutrition classes ($p = .03$).

Multiple regression analysis revealed that knowledge, attitudes, subjective norms, and perceived behavioral control accounted for a little over half of the variance in predicting intentions to increase fruit and vegetable consumption. Attitude ($p = .041$), subjective norms ($p = .022$), and perceived behavioral control ($p < .001$) demonstrated significant effects on intentions to change nutrition behavior with perceived behavioral control being the most salient predictor, even when controlling for attendance at one or more optional nutrition events.

A one-way repeated measures multivariate analysis of variance (MANOVA) was not significant for the comparison of knowledge, self-reported fruit and vegetable
consumption, or the TBP constructs (attitude, subjective norms, and perceived behavioral control) over time (pre- and post- survey scores), $F(4, 53) = .604, p = .660$.

**Results for Manuscript 2**

**Food groups**

Overall fruit group consumption improved at lunch ($p = .048$) and milk consumption improved at both lunch ($p = .003$) and supper ($p = .003$) from week 1 (baseline) to week 5 (program completion). Overall vegetable consumption decreased at supper ($p = .018$) from week 1 to week 5. There was a significant overall (all three meals combined) increase for milk consumption ($p = .004$) and a significant overall (all three meals combined) decrease in vegetable consumption ($p = .011$).

**Quality of the foods selected**

All food items were categorized by their quality on a 0-6 scale, with higher scores indicating higher quality (USDA, 2016b; DHHS, 2015). An average percentage selected was determined for each number on the quality scale. The relation between the percentages selected from week 1 to week 5 was significant for quality 2 food items, $z = 3.11, p = .002$. Participants were less likely to select quality 2 items at week 5 compared to week 1. The relation between the percentages selected was also significant for quality 3 food items, $z = -2.15, p = .031$, and quality level 5 food items, $z = -3.33, p < .000$. Participants were more likely to select quality 3 and quality 5 items at week 5 compared to week 1. The relationship between the variables was not significant for quality 1, quality 4, or quality 6 food items from week 1 to week 5. However, a closer look at the items selected most often (top ten) revealed that there was an increase the number of high quality foods chosen. The mean of the quality selected increased from 3.0 ($SD = 1.05$;
range: 1-5) at week 1 to 3.5 ($SD = 1.18$; range: 1-5) at week 5, however the differences in the means were not statistically significant.

**Consumption of the selected foods**

The relation between the percent consumed at each quality level in week 1 to their corresponding quality level in week 5 was examined. The relation between the percent consumed was significant for quality 5 food items, $z = 2.94$, $p = .003$. Participants were less likely to consume quality 5 items at week 5 compared to week 1. Further investigation of the top 10 items selected revealed that when foods with high quality scores were chosen, they were consumed more often during week 5. Researchers also examined quality foods that were not on the top 10 list. For example, even though broccoli, a high quality food, did not make the top 10 list, it was selected more often and consumed more often during week 5 when compared to week 1. Salad, another high quality food showed a large increase in the number of times it was eaten.

**Contributions to Literature**

This study contributes a unique aspect regarding the impact that a national, federally, funded program (the SFSP) has on the nutrition knowledge, attitudes, subjective norms, perceived behavioral control, self-reported nutrition behaviors, and actual observed behaviors on low-income, rural adolescents. Prior to this study, no research had explored the TPB as a way to evaluate the impact of the SFSP on the nutrition related behaviors of rural, low-income adolescents. The use of the validated measures of the constructs of the TPB can also contribute to the literature in this area.

This study also involved an innovative data collection method using digital photography to capture actual behaviors of those participating in the SFSP. To date, no
research had been conducted using digital photography to examine plate waste and actual food consumption of SFSP participants. The ability to research a captive audience that was not only participating in the SFSP but was given choices within the standards of the program (OVS) allowed a unique opportunity to observe nutrition behaviors.

This study was also the first of its kind to evaluate the SFSP in combination with basic nutrition education. In this study, participants who voluntarily attended one of the optional nutrition events, showed a greater increase in perceived behavioral control, the most salient predictor of behavior intentions for the group as a whole. This contributes to literature supporting the TPB which suggests that improving perceived behavioral control increases the likelihood of increasing positive behavior changes. Although there were no significant differences seen in actual food selection and consumption for those that attended the optional nutrition sessions compared to those that did not, it seems prudent to further research the effects of nutrition education combined with mandatory adherence to the SFSP.

This study supports previous literature on the influences of adolescent nutrition behavior. The food and social environment, peers, access to food, culture, and familiarity are just some of the influences on adolescent food choices (Boyle & Holben, 2012; Fitzgerald et al., 2013; N. Larson et al., 2013; Wouters et al., 2010). This study found that the SFSP has the potential to provide both environmental support in the form of healthy food choices and social support in the form of peers and leaders who can model healthy nutrition behaviors.
Strengths

The strengths of this study lie in the ability to capture data from a rural, low-income adolescent population participating in the SFSP. The participants were enrolled in the structured UB summer program and were following established expectations for that program, which allowed the researchers to have access to the participants and their food choices over a five-week period. This captive audience also allowed for a 90% survey completion rate and a 68% food consumption data collection rate. The use of a survey in this study helps to understand participant perceptions, offering a value-added practical significance for the population. The use of digital photography, an innovative approach for collecting actual participant food selection and consumption data in the SFSP, was a strength in the methodology of the study. The ability to capture actual behavior at baseline (week 1) and at the end of the program (week 5) lends credibility to the methods and is a definitive strength of the study.

Limitations

Limitations of the study included the fact that intact sampling was used and therefore there was no random assignment of participants to treatment. The small sample size, even with a high completion rate, may lead to more difficulty in generalization of the results. With self-reported survey responses, there may have been some bias in that the participants may have a tendency to respond in a certain way, perhaps to consciously or unconsciously to please the surveyor. The online survey process was intended to encourage honesty, however, understanding the question and interpreting the scales may have influenced responses (Nardi, 2006). Although the participants were in a controlled environment for breakfast, lunch, and dinner, there were opportunities for them to
consume snacks and other foods in between meals from vending machines on campus or brought from home. There was no way to capture these “outside” food choices and consumption in this study. Therefore, the focus on the food groups required by the SFSP may have also limited the ability to generalize to the participants’ overall nutrient intake.

The food quality scale exhibited limitations in using only six items (fat, saturated fat, trans-fat, fiber, sugar, and sodium) to evaluate the quality of a food item. Although the scale was developed based on USDA (2016) and Dietary Guidelines for Americans (2015) recommendations, the quality scale did not consider protein, or micronutrients outside of sodium. For example, plain milk scored a 3 out of a potential 6 due to low fiber, high natural sugar, and high sodium levels per calorie. Therefore this quality score may not always be indicative of a healthy food. Almost all food items met the 0 trans-fat standard giving each food at least one point. Many foods failed to meet the sugar standard based on natural sugars, not added sugars (i.e. fruit and milk) because there was no way to determine this difference in each food.

Implications for Researchers and Health Promotion Professionals

Health promotion is defined by the Report of the 2000 Joint Committee on Health Education and Promotion Terminology as a “planned combination of educational, political, environmental, regulatory, and organizational mechanisms that support action and conditions of living conducive to the health of individuals, groups and communities” (2001, p. 89). Nutrition and healthy food intake are well-documented components of healthy behaviors. Targeting a nutritionally at-risk population using existing resources is a way to include cost-effective, nutrition education in a supportive environment. The SFSP is a federally funded program, giving it the potential to affect the lives of many
who utilized its benefits. Policies which support realistic, healthy standards in the SFSP can provide high quality foods to the recipients and support health promotion experts in their endeavors to improve the health of adolescents and children enrolled in this program. Policies that promote nutrition activities and education to supplement this federal food program are also recommended. Together, higher standards and the promotion of healthy nutrition, have the potential to improve the quality of lives of the program participants. The use of theory to explore nutrition knowledge, attitudes, and behavioral intentions can aid health promotion experts in developing sound interventions (Riebl et al., 2015; Simons-Morton et al., 2011).

The present study demonstrates that attitudes, subjective norms, and perceived behavioral control are significant predictors of intentions to improve fruit and vegetable consumption in a low-income adolescent population. Given that many low-income adolescents are eating according to the standards of the NSLP or the SFSP while in school or in a specific program like the one studied here, opportunities for shaping their nutrient intake and eating behaviors during enrollment and even outside the confines of a program, exist. Participants with positive perceived behavioral control showed a greater intent to eat more fruits and vegetables. Therefore, providing resources that reinforce behavioral control may increase the likelihood of practicing good nutrition behaviors when making ones’ own food choices. Providing teens with a wide range of healthy foods, providing access to those healthy foods, and eliminating the cost barrier often associated with the purchase of healthy foods may increase their perceived behavioral control and therefore increase their intentions to consume more healthy options.
Subjective norms also had a positive association with intentions to eat fruits and vegetables, demonstrating that peers, family, and authority figures may provide a positive influence for behavior change. And although there has been increasing attention paid to the role that families, especially rural families, play in affecting dietary habits, (Swanson, Studts, Bardach, Bersamin, & Schoenberg, 2011), influencing the decisions of adolescent peers could positively impact the nutrition habits of entire groups of adolescents. Altering the social norms may impact the subjective norms and therefore influence more positive behaviors in teens. Celebrity endorsements, authority figure role modeling, and peer educators may aid in creating a culture where eating fruits and vegetables is the norm.

Results of this study also point out that a validated nutritional quality scale is needed in order to better determine the nutritional value for individual food items served in a SFSP, especially in a SFSP OVS program in which the participants are offered choices within food groups. Ranking individual food items is complicated as all foods of varying nutritional value have the potential to fit into a healthy meal plan. However, when OVS is used in a SFSP, it is recommended that certain lower nutritional quality foods be served less often so as to avoid the continuous selection and consumption of those foods. The food quality scale was developed as only one measure, and should not be used to dichotomously label foods as “good/healthy” or “bad/not healthy.” In fact, the DGA, used as a basis for the SFSP standards, provide general, simple guidelines for Americans and encourage a wide variety of foods in the diet. However, the simplicity of using food groups, versus food items in the SFSP, inadvertently caused low quality food choices by participants. This study demonstrated that when healthy choices are offered,
adolescents will choose and consume them. Therefore, offering only healthy choices on most days, with an occasional selection of a lower quality food, has the potential to improve nutrition behaviors in this population. The SFSP has been deemed successful in reducing food insecurity (Hopkins & Gunther, 2015), however, the potential remains to increase the quality of the nutritional value of the foods being offered.

**Future Research**

The findings from this study aim to ignite and support future research exploring the effects of Federal Nutrition Programs, such as the SFSP and the NSLP, on the nutrition behaviors of the populations that these programs serve. Given that the SFSP had never before been evaluated for its effect on nutrition knowledge, attitudes, and behaviors, this study can support future programming and research, which could include a randomized controlled trial. Future studies should be larger and evaluate long-term effects of participation in summer programs, like the one studied here, on nutrition behaviors for participants while in high school and also after high school graduation. Survey questions that include self-reports of foods eaten outside the standards of the SFSP (i.e. in this study, participants lived on a college campus and had access to vending machines and off-campus foods that could be eaten in between SFSP meals) should be considered in future studies to examine these behavioral effects on overall nutrient consumption. The focus on the food groups required by the SFSP may have also limited the ability to generalize the participants’ overall nutrient intake. Interventions that include mandatory participation in a variety of nutrition education sessions and interactive activities, especially those that build on increasing perceived behavioral control and subjective norm (both significant predictors of nutrition behavior in this
study), should also be researched to better determine their effects on the likelihood of positive behavior change. Strategies that specifically target the constructs of the TPB should be incorporated into interventions that supplement the SFSP and future studies should aid in determining the value of such interventions in this population.

Studies which include various methods of data collection such as self-report and observation should be conducted and compared to determine the most effective, accurate techniques for determining food choices and consumption. Evaluating SFSP compliance with the Dietary Guidelines for Americans (DHHS, 2015) would also be prudent and could help inform the value and importance of both the SFSP and national recommendations. Studies which focus on the benefits and impact of more stringent nutritional standards for options within food groups of the SFSP standards is warranted.

**Conclusion**

The SFSP has the potential to increase the health of the population it serves while also encouraging its participants to form healthy habits that may be continued even outside of the confines of the program. SFSPs should promote good nutrition and provide participants with the skills and resources to make positive, nutritious choices. Programs such as the USDA SFSP should take advantage of the opportunities to incorporate nutrition education, activities, and environmental support for the captive audience of participants these programs serve. Programs may increase positive nutrition changes and will ideally improve nutrition behaviors, increase the health of its participants, and subsequently, the health outcomes of rural adolescents.
## APPENDICES

### APPENDIX A

### RESEARCH QUESTIONS, CORRESPONDING HYPOTHESES, AND DATA ANALYSIS

<table>
<thead>
<tr>
<th>Manuscript 1: Using the Theory of Planned Behavior to Assess the Impact of the USDA Summer Food Service Program on Fruit and Vegetable Consumption Among Rural Youth</th>
<th>Survey Question/Number of Items</th>
<th>Type of Scale</th>
<th>Proposed Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RQ1:</strong> What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ knowledge about the importance of eating fruits and vegetables?</td>
<td>Q 46.1-15 (knowledge) 15 items Specifically questions Q46.1, Q46.2 and Q46.15 (fruit and vegetable knowledge questions) 3 items</td>
<td></td>
<td>Scores will be summed to calculate composite scores with a possible range of 0-15 Paired samples t-test to compare pre- to post-</td>
</tr>
<tr>
<td><strong>H1:</strong> Participants will have a significant improvement in their knowledge about the importance of eating fruits and vegetables (pre- to post-).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Items</td>
<td>Scale</td>
<td>Analysis</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>-------</td>
<td>----------</td>
</tr>
<tr>
<td>H2: Participants will have a significant improvement in their attitudes about the importance of eating fruits and vegetables (pre- to post-).</td>
<td>Q4-7 4 items</td>
<td>7-point Likert scale</td>
<td>Scores will be summed to calculate composite scores with a possible range of 4-28. Paired samples t-test to compare pre- to post-</td>
</tr>
<tr>
<td>RQ3: What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ subjective norm in relation to eating fruits and vegetables?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H3: Participants will have a significant improvement in positive subjective norms in relation to eating fruits and vegetables.</td>
<td>Q9-17 9 items</td>
<td>7-point Likert scale</td>
<td>Scores will be summed to calculate composite scores with a possible range of 9-63. Paired samples t-test to compare pre- to post-</td>
</tr>
<tr>
<td>RQ4: What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ perceived behavioral control in relation to eating fruits and vegetables?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H4: Participants will have a significant improvement in their perceived behavioral control in relation to eating fruits and vegetables (pre- to post-).</td>
<td>Q18-23 6 items Questions 8-10 ask about PBC at UB Summer Program Questions 11-13 ask about PBC at home on weekends</td>
<td>7-point Likert scale</td>
<td>Scores will be summed to calculate composite scores with a possible range of 6-42. Paired samples t-test to compare pre- to post-</td>
</tr>
<tr>
<td>RQ5: What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ intentions to positively change their fruit and vegetable consumption?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>H5: Participants will have a significant improvement in their intentions to positively change their fruit and vegetable consumption.</td>
<td>Q24-25 2 items</td>
<td>7-point Likert scale (Q24) 8-point Likert (Q25)</td>
<td>Scores will be summed to calculate composite scores with a possible range of 2-15 Paired samples t-test to compare pre- to post-</td>
</tr>
<tr>
<td>RQ6: What is the impact of the USDA SFSP coupled with nutrition education (pre- to post-) on participants’ self-reported fruit and vegetable consumption?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H6: Participants will have a significant improvement in their self-reported fruit and vegetable consumption</td>
<td>Q28-39 12 items Q28-33 Specific for fruit and vegetables (6 items)</td>
<td>7 choices</td>
<td>Scores will be summed to calculate composite scores with a possible range of 12-84 Paired samples t-test to compare pre- to post – Fruit and Vegetable Questions composite scores with a possible range of 6-42</td>
</tr>
<tr>
<td>RQ7: Which of the constructs of the Theory of Planned Behavior (attitudes, subjective norms, and perceived behavioral control) significantly predict the degree of change in intentions to increase fruit and vegetable consumption in high school students participating in the USDA SFSP? Which is the most salient predictor?</td>
<td>Change in composite scores for each variable.</td>
<td>Attitudes, Subjective Norms, Perceived Behavioral Control vs. Behavioral Intention</td>
<td>Multiple Regression</td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Research Question</td>
<td>Measure</td>
<td>Type of Scale</td>
<td>Proposed Analysis</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>--------------------</td>
<td>---------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td><strong>RQ1: Does participating in the USDA SFSP increase food group consumption over a five week period?</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1: Participants will show a significant increase in observed food group consumption over a five week period of enrollment in the USDA SFSP.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RQ1.1: Does participating in the USDA SFSP increase fruit consumption over a five week period?</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1.1: Participants will show a significant increase in observed fruit consumption over a five week period of enrollment in the USDA SFSP.</td>
<td>Digital Photography</td>
<td></td>
<td>Paired t-test for comparisons of percent consumed (estimations from digital photography) during 1st week and with 5th week Separate for breakfast, lunch, supper</td>
</tr>
<tr>
<td><strong>RQ1.2: Does participating in the USDA SFSP increase vegetable consumption over a five week period?</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RQ1.2: Does participating in the USDA SFSP increase observed vegetable consumption over a five week period of enrollment in the USDA SFSP?</td>
<td>Digital Photography</td>
<td>Paired t-test for comparisons of percent consumed (estimations from digital photography) during 1&lt;sup&gt;st&lt;/sup&gt; week and with 5&lt;sup&gt;th&lt;/sup&gt; week. Separate for breakfast, lunch, supper</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>H1.3: Participants will show a significant increase in observed milk consumption over a five week period of enrollment in the USDA SFSP.</td>
<td>Digital Photography</td>
<td>Paired t-test for comparisons of percent consumed (estimations from digital photography) during 1&lt;sup&gt;st&lt;/sup&gt; week and with 5&lt;sup&gt;th&lt;/sup&gt; week. Separate for breakfast, lunch, supper</td>
<td></td>
</tr>
<tr>
<td>RQ1.4: Does participating in the USDA SFSP increase observed grain consumption over a five week period?</td>
<td>Digital Photography</td>
<td>Paired t-test for comparisons of percent consumed (estimations from digital photography) during 1&lt;sup&gt;st&lt;/sup&gt; week and with 5&lt;sup&gt;th&lt;/sup&gt; week. Separate for breakfast, lunch, supper</td>
<td></td>
</tr>
<tr>
<td>H1.4: Participants will show a significant increase in observed grain consumption over a five week period of enrollment in the USDA SFSP.</td>
<td>Digital Photography</td>
<td>7 choices for survey (self-report)</td>
<td>Paired t-test for comparisons of percent consumed (estimations from digital photography) during 1&lt;sup&gt;st&lt;/sup&gt; week and with 5&lt;sup&gt;th&lt;/sup&gt; week. Separate for breakfast, lunch, supper</td>
</tr>
<tr>
<td>RQ1.5: Does participating in the USDA SFSP increase meat/meat alternative consumption over a five week period?</td>
<td>Digital Photography</td>
<td>7 choices for survey (self-report)</td>
<td>Paired t-test for comparisons of percent consumed (estimations from digital photography) during 1st week and with 5th week. Separate for breakfast, lunch, supper</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>H1.5: Participants will show a significant increase in observed meat/meat alternative consumption over a five week period of enrollment in the USDA SFSP.</td>
<td>Digital Photography</td>
<td>7 choices for survey (self-report)</td>
<td>Paired t-test for comparisons of percent consumed (estimations from digital photography) during 1st week and with 5th week. Separate for breakfast, lunch, supper</td>
</tr>
<tr>
<td>RQ2: Does participating in the USDA SFSP increase the quality of the selection of foods over a five week period?</td>
<td>Digital Photography</td>
<td>Chi square analysis to measure the relationship between week 1 and week 5 of the percent selected at each quality level (based on quality food score). Percent selected = times selected/times offered each week</td>
<td></td>
</tr>
<tr>
<td>H2: Participants will show a significant increase in observed quality of the selection of foods over a five week period of enrollment in the USDA SFSP.</td>
<td>Digital Photography</td>
<td>Chi square analysis to measure the relationship between week 1 and week 5 of the percent selected at each quality level (based on quality food score). Percent selected = times selected/times offered each week</td>
<td></td>
</tr>
<tr>
<td>RQ3: Does participating in the USDA SFSP increase the consumption of quality foods over a five week period?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
H3: Participants will show a significant increase in observed consumption of quality foods over a five week period of enrollment in the USDA SFSP.

Chi square analysis to measure the relationship between week 1 and week 5 of the percent consumed at each quality level (based on quality food score). Percent consumed = times consumed/times selected

<table>
<thead>
<tr>
<th>Other survey questions (not necessary a RQ and perhaps for future studies/manuscripts)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics (gender, age, academic year, BMI, ethnicity, length of time in UB, county)</td>
<td>Q47-54</td>
<td>Frequencies</td>
</tr>
<tr>
<td>Sugar Sweetened Beverages (self-report behavior)</td>
<td>Q34</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Breakfast (self-report behavior)</td>
<td>Q38</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Supper with Family (self-report behavior)</td>
<td>Q39</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Physical Activity (self-report behavior)</td>
<td>Q41-45</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Milk (knowledge)</td>
<td>Q46.3</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Chronic Disease Risk/Lifelong health (knowledge)</td>
<td>Q46.4 and Q46.6</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Protein (knowledge)</td>
<td>Q46.5 and Q46.9</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Healthy Eating Patterns (knowledge)</td>
<td>Q46.6 and Q46.13</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Whole Grain (knowledge)</td>
<td>Q46.8</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Energy/Calorie needs (knowledge)</td>
<td>Q46.10</td>
<td>Paired samples t-test</td>
</tr>
<tr>
<td>Added Sugars (knowledge)</td>
<td>Q46.11</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>General SFSP regarding reimbursement, meal components, and food groups (knowledge)</td>
<td>Q46.12, Q46.13, and Q46.14</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

NATIONAL SCHOOL LUNCH AND BREAKFAST MEAL REQUIREMENTS AND STANDARDS
FOR COMPETITIVE (A LA CARTE) FOODS

Nutrition Standards for School Meals

The Healthy, Hunger-Free Kids Act of 2010 required the US Department of Agriculture (USDA) to update federal nutrition standards for school meals. The updated rules went into effect on July 1, 2012. The changes require:

More fruits and vegetables: Schools must offer students fruits and vegetables with every lunch and increase the portion sizes. Vegetable choices at lunch must include weekly offerings of: legumes, dark green, and red or orange vegetables. Every school breakfast must offer students a full cup of fruits or vegetables. Students are required to take at least one half-cup serving of fruits or vegetables with every school breakfast and lunch.

Whole grains: All grains offered with school meals must be whole grain-rich (at least 51% whole grain). In some schools where certain whole grain foods are not well accepted by students (eg whole grain tortillas or brown rice), temporary waivers permit the service of select foods that do not meet this standard.*

Calorie limits: School meals must meet age-appropriate calorie minimums and maximums:

<table>
<thead>
<tr>
<th>Grades</th>
<th>Breakfast</th>
<th>Lunch</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-5</td>
<td>350-500 Calories</td>
<td>550-650 Calories</td>
</tr>
<tr>
<td>6-8</td>
<td>400-550 Calories</td>
<td>600-700 Calories</td>
</tr>
<tr>
<td>9-12</td>
<td>450-600 Calories</td>
<td>150-850 Calories</td>
</tr>
</tbody>
</table>

Sodium limits: Schools must gradually reduce sodium levels in school meals over a ten-year period to meet the following limits. Due to challenges of meeting future sodium limits, schools have an additional year to reach Target 2 limits.*

Sodium Reduction Target Timeline for School Meals

<table>
<thead>
<tr>
<th>Grades</th>
<th>Target 1 (July 1, 2014)</th>
<th>Target 2 (July 1, 2017)</th>
<th>Final Target (July 1, 2022)</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Breakfast Program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K-5</td>
<td>≤ 540mg</td>
<td>≤ 485mg</td>
<td>≤ 430mg</td>
</tr>
<tr>
<td>6-8</td>
<td>≤ 600mg</td>
<td>≤ 535mg</td>
<td>≤ 470mg</td>
</tr>
<tr>
<td>9-12</td>
<td>≤ 640mg</td>
<td>≤ 570mg</td>
<td>≤ 500mg</td>
</tr>
<tr>
<td>School Lunch Program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K-5</td>
<td>≤ 1230mg</td>
<td>≤ 935mg</td>
<td>≤ 640mg</td>
</tr>
<tr>
<td>6-8</td>
<td>≤ 1360mg</td>
<td>≤ 1035mg</td>
<td>≤ 710mg</td>
</tr>
<tr>
<td>9-12</td>
<td>≤ 1420mg</td>
<td>≤ 1080mg</td>
<td>≤ 740mg</td>
</tr>
</tbody>
</table>
Limits on unhealthy fat: Meals cannot contain added trans-fat and no more than 10 percent of calories can come from saturated fat.

Low-fat and fat-free milk: Every school meal offers one cup of fat-free or 1% milk. Flavored milk must be fat-free. To meet calorie limits, milk processors have developed flavored milk with less added sugar. Schools demonstrating declining student milk consumption may apply for a waiver to serve 1% flavored milk.*

Free water: Free drinking water must be available in the cafeteria during lunch and breakfast.

*USDA’s May 1, 2017 Proclamation announced the department’s plan to continue whole grain, sodium and milk flexibilities. (United States Department of Agriculture, 2016b)

Smart Snack Standards (Competitive Foods)
Which food and beverages sold at school need to meet the Smart Snacks Standards? (United States Department of Agriculture, 2016c)

1. Any food and beverage sold to students at schools during the school day, other than those foods provided as part of the school meal programs.
2. Examples include à la carte items sold in the cafeteria and foods sold in school stores, snack bars, and vending machines.
3. Foods and beverages sold during fundraisers, unless these items are not intended for consumption at school or are otherwise exempt by your state.

To qualify as a Smart Snack, a snack or entrée must first meet the general nutrition standards:

- Be a grain product that contains 50 percent or more whole grains by weight (have a whole grain as the first ingredient); or
- Have as the first ingredient a fruit, a vegetable, a dairy product, or a protein food; or
- Be a combination food that contains at least ¼ cup of fruit and/or vegetable; and
- The food must meet the nutrient standards for calories, sodium, sugar and fat

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Snack</th>
<th>Entree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>200 calories or less</td>
<td>350 calories or less</td>
</tr>
<tr>
<td>Sodium</td>
<td>200 mg or less</td>
<td>480 mg or less</td>
</tr>
<tr>
<td>Total Fat</td>
<td>35% of calories or less</td>
<td>35% of calories or less</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>Less than 10% of calories</td>
<td>Less than 10% of calories</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0 g</td>
<td>0 g</td>
</tr>
<tr>
<td>Sugar</td>
<td>35% by weight or less</td>
<td>35% by weight or less</td>
</tr>
</tbody>
</table>

(United States Department of Agriculture, 2016c)(United States Department of Agriculture, 2016b)(United States Department of Agriculture, 2016)
APPENDIX C

MEAL PATTERN REQUIREMENTS FOR THE USDA SUMMER FOOD SERVICE PROGRAM

Menu Planning: How to Serve a Reimbursable Meal

All meals served in the Summer Food Service Program (SFSP) must meet certain requirements in order to receive reimbursement. These requirements, including the meal patterns and recordkeeping, help the menu planner in providing well-balanced, nutritious meals that meet the nutritional and energy needs of children. This toolkit page walks you through some of the SFSP requirements to make sure you receive reimbursement for the meals served at your summer site.

The Basics: Meal Pattern Requirements

The SFSP meal pattern is practical, flexible and allows sponsors to create recipes and menus that are nutritious and consistent with the Dietary Guidelines for Americans. The chart below outlines the required food components and minimum serving size of each food component for breakfast, lunch, supper and snacks. All food components that make up a reimbursable meal must be offered in ordered to be considered for reimbursement and should be served to all children at the same time.

Breakfast Meal Pattern
Select All Three Components for a Reimbursable Meal

<table>
<thead>
<tr>
<th>1 milk</th>
<th>1 cup</th>
<th>Fluid milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 fruit/juice</td>
<td>½ cup</td>
<td>Juice,¹ and/or vegetable</td>
</tr>
<tr>
<td>1 grain/bread²</td>
<td>1 slice</td>
<td>Bread or</td>
</tr>
<tr>
<td></td>
<td>1 serving</td>
<td>Cornbread or biscuit or roll or muffin or</td>
</tr>
<tr>
<td></td>
<td>¾ cup</td>
<td>Cold dry cereal or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Hot cooked cereal or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Pasta or noodles or grains</td>
</tr>
</tbody>
</table>

¹Fruit or vegetable juice must be full-strength
²Breads and grains must be made from whole-grain or enriched meal or flour. Cereal must be whole-grain or enriched or fortified.

Lunch or Supper Meal Pattern
Select All Four Components for a Reimbursable Meal

<table>
<thead>
<tr>
<th>1 milk</th>
<th>1 cup</th>
<th>Fluid milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 fruits/vegetables</td>
<td>¾ cup</td>
<td>Juice, ¹ fruit and/or vegetable</td>
</tr>
<tr>
<td>1 grain/bread²</td>
<td>1 slice</td>
<td>Bread or</td>
</tr>
<tr>
<td></td>
<td>1 serving</td>
<td>Cornbread or biscuit or roll or muffin or</td>
</tr>
<tr>
<td></td>
<td>¾ cup</td>
<td>Cold dry cereal or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Hot cooked cereal or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Pasta or noodles or grains</td>
</tr>
<tr>
<td>1 meat/meat alternate</td>
<td>2 oz</td>
<td>Lean meat or poultry or fish³ or</td>
</tr>
<tr>
<td></td>
<td>2 oz</td>
<td>Alternate protein product or</td>
</tr>
<tr>
<td></td>
<td>2 oz</td>
<td>Cheese or</td>
</tr>
<tr>
<td></td>
<td>1 large</td>
<td>Egg or</td>
</tr>
<tr>
<td></td>
<td>½ cup</td>
<td>Cooked dry beans or peas or</td>
</tr>
<tr>
<td></td>
<td>4 Tbsp</td>
<td>Peanut or other nut or seed butter or</td>
</tr>
<tr>
<td></td>
<td>1 oz</td>
<td>Nuts and/or seeds⁴ or</td>
</tr>
<tr>
<td></td>
<td>8 oz</td>
<td>Yogurt⁵</td>
</tr>
</tbody>
</table>
1 Fruit or vegetable juice must be full-strength.
2 Breads and grains must be made from whole-grain or enriched meal or flour. Cereal must be whole-grain or enriched or fortified.
3 A serving consists of the edible portion of cooked lean meat or poultry or fish.
4 Nuts and seeds may meet only one-half of the total meat/meat alternate serving and must be combined with another meat/meat alternate to fulfill the lunch or supper requirement.
5 Yogurt may be plain or flavored, unsweetened or sweetened (United States Department of Agriculture, 2016d).
Summer Meals Toolkit  (United States Department of Agriculture, 2016d)

Offer versus Serve

Children who are offered food choices are more likely to eat the foods they enjoy rather than throw the food away. Offer Versus Serve (OVS) is an approach to menu planning and meal service that helps summer Meal sponsors reduce food waste and costs, while maintaining the nutritional value of the meal.

How OVS Works

OVS allows children to decline some of the foods offered in a reimbursable breakfast, lunch, or supper at Summer Food Service Program (SFSP) sites. Any site, regardless of location or type of sponsor, may use OVS.

Schools that participate under the Seamless Summer Option and SFSP school sponsors that choose to use the National School Lunch or School Breakfast Programs’ meal patterns must follow the OVS requirements under 7 CFR 210(e) and 7 CFR 220.8(e). All other sponsors that choose to use OVS must follow the SFSP requirements that are outlined here. These requirements support the practice of offering a variety of food choices for children, increase the likelihood that children will select foods they prefer, reduce food waste, and ensure that children are receiving enough food to meet their nutritional needs.

Terms to Know

•A food component is one of the food groups that comprise a reimbursable breakfast, lunch, or supper.

•A food item is a specific food offered within the food components comprising the reimbursable meal. For example, separate ½ cup servings of peaches and pears are two food items that comprise the Fruit and Vegetable component.

•A combination food contains more than one food item from different food components that cannot be separated, such as cheese pizza, which contains three food items from different food components: a serving of Grains (crust), a serving of Fruit and Vegetable (tomato sauce), and a serving of Meat and Meat Alternate (cheese). Other examples of combination foods are soups, prepared sandwiches, and burritos.

OVS at Breakfast

The SFSP meal pattern requires three food components – Fruit and Vegetable, Grains, and Milk – to be served at breakfast.

Sites that choose to use OVS at breakfast must offer the following four food items:

1. A food item from the Fruit and Vegetable component,
2. A food item from the Grains component,
3. A serving of Milk,
4. A food item from the Meat and Meat Alternate component, or one additional food item from the Fruit and Vegetable component or Grains component.

All the food items offered must be different from each other. For example, while a flake cereal and a puff cereal are two types of cereals that are not identical, they are the same food item.

A child must select at least three of any of the food items offered.

If combination foods are offered, instructions or signs must be available to let site supervisors and children know what choices make up a reimbursable breakfast.

There are a variety of ways to plan a menu that meets the OVS breakfast requirements.

**OVS at Lunch or Supper**

The SFSP meal pattern requires four food components – Meat and Meat Alternate, Fruit and Vegetable, Grains, and Milk – to be served at lunch or supper.

Sites that choose to use OVS at lunch or supper must offer the following five food items:

1. A food item from the Meat and Meat Alternate component,
2. A food item from the Fruit and Vegetable component,
3. Another food item from the Fruit and Vegetable component,
4. A food item from the Grains component, and
5. A serving of Milk.

All the food items offered must be different from each other. For example, while Honeycrisp apple slices and Granny Smith apple sauce are two types of apples that are not identical, they are the same food item.

A child must take at least three food components. This is different from OVS breakfast. While a child must select three food items at breakfast, at lunch and supper a child must take three different food components to ensure that each child receives a nutritious meal.

If combination foods, or two or more food items, such as bread and rice, from one food component are offered, site supervisors and children must be able to know what choices make up a reimbursable meal. Instructions or signs must be available.
### USDA Summer Food Service Program
#### Sample Site Review Form

**NOTE:** To be completed during first four weeks of operation

- **Sponsor:** [ ]
- **Site:** [ ]
- **Site Contact Name:** [ ]
- **Title:** [ ]
- **Site Address:** [ ]
- **Telephone:** [ ]
- **Date of site visit:** [ ]
- **Monitor's arrival time:** [ ]
- **Departure Time:** [ ]
- **Site Supervisor:** [ ]

- **Open site** [ ]
- **Camp site** [ ]
- **Average daily participation (if applicable):** [ ]
- **Today's attendance:** [ ]
- **Approved meal service time:** [ ]

<table>
<thead>
<tr>
<th>Types of meals reviewed:</th>
<th>Breakfast</th>
<th>AM Snack</th>
<th>Lunch</th>
<th>PM Snack</th>
<th>Dinner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM Snack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lunch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM Snack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dinner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day of visit</th>
<th>Breakfast</th>
<th>AM Snack</th>
<th>Lunch</th>
<th>PM Snack</th>
<th>Dinner</th>
</tr>
</thead>
<tbody>
<tr>
<td># Meals delivered (if applicable)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Meals/milk from previous day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time meals delivered (if applicable)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time meals served</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># First meals served to children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Second meals served to children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Meals served to Program adults</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Meals served to non-Program adults</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discarded meals (dropped, spoiled, incomplete meal, test meat*, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Meals leftover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Test meal cannot be claimed for reimbursement but should be recorded.*
Sample Site Review Form, Continued

<table>
<thead>
<tr>
<th>Site Review Questions</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does the staffing pattern correspond to that listed on the approved site sheet?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Has the site supervisor attended training session?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Does the site have sufficient food service supervision?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Are meals counted/checked before signing delivery receipt?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Are accurate meal counts taken of meals served?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Are meals served as second meals excessive?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Are records of adult meals being kept?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Do meals meet approved menu?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Do meals meet meal pattern requirements?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Are meals checked for quality?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Is there proper sanitation/storage?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Is the site supervisor following procedures established to make meal order adjustments?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Are meals served within approved time frames?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Are all meals served and consumed on-site? (Note: If State agency and sponsor allow fruits/vegetables/grains to be taken off-site.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Does site have a place to serve children meals in case of inclement weather?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Is each meal served as a unit?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Is the meal delivery schedule followed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Are there provisions for storing or returning excess meals?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Is there documentation of children's income eligibility, if applicable?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Is there an &quot;And Justice for All&quot; poster, provided by the sponsor, on display in a prominent place?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Are meals served to all attending children regardless of the child's race, color, national origin, sex, age, or disability?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Do all children have equal access to services and facilities at the site regardless of the child's race, color, national origin, sex, age, or disability?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Is informational material concerning the availability and nutritional benefits of the Program available in appropriate languages and translations are accurate?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Are there reasonable modifications in policies and procedures to ensure individuals with disabilities have equal access and effective communication when accessing the Program?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Are there reasonable steps in place to ensure meaningful access to services for limited English proficient persons by providing information in the frequently encountered, non-English languages of individuals eligible to be served or likely to be affected by the program?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sample Site Review Form, Continued

**Program Violations** | **Actual Count** | **Type of Meal**
---|---|---
1. Adult meals included in count of meals served to children. |  |  
2. Offsite consumption. (Do not include fruits/vegetables/grains if allowed by State agency and sponsor). |  |  
3. More than one meal served at one time to children. |  |  
4. Meal pattern not met (specify): |  |  
5. Meals not served as a unit. |  |  
6. Meal serving times not met. |  |  
7. Other Program violations (specify): |  |  

Check and explain if any of the following apply:

- [ ] No records
- [ ] Incomplete records
- [ ] Poor sanitation
- [ ] Other

Explanation:________________________

Corrective action discussed with (Name and Title):________________________

Corrective action taken:________________________

Site supervisor’s comments:________________________

Further action needed by (date):________________________

I certify that the above information is correct:

Monitor’s Signature ________________________ Date ________________________

Site Supervisor’s Signature ________________________ Date ________________________

Sponsor Representative’s Signature ________________________ Date ________________________

(United States Department of Agriculture, 2016d)
APPENDIX F

SPONSOR CHECKLIST FOR REQUIRED SFSP DOCUMENTATION

The State Agency recommends that you keep the required documents that you keep at a sponsor level separate from the required documents you keep for each of your sites. For sponsors that have multiple food preparation facilities, we recommend that you keep a separate folder for each facility as well. For sponsors of multiple sites, we also recommend keeping site documentation separate from other sites.

Sponsor Documentation

- Fiscal Management: Receipts, Inventories, Paycheck Stubs, Timesheets, Etc.
- Required Annual Training Documentation and Proof of Participation: (Dates, Locations, Topics, Participant Names and Sign-In Signatures)
- Media Release and all Updates to Media Release Notifying Changes in Site Information
- Health Department Notification and updates
- Procurement Procedures, as applicable
- Income applications, as applicable
- Menu Records
- Delivery Tickets for All Sites Served (required for vended sites, optional for self-prep sponsors)
- Food Service Management Contract, as applicable

Site Documentation

- Civil Rights Data Collection
- Pre-Approval Visit (If Applicable)
- First Week Visit (If Applicable)
- Monitor Review (Required for Every Site. Conducted within the first four weeks of programming) and documentation of corrective action taken to correct any violations
- Daily Meal Count Sheets (Turned into Sponsor Once a Week-non-residential camp sites)
- Meal Count Worksheet (or “roster meal count sheet”-residential camps only)
- Sponsor-Site Agreement for Sites Not Directly Connected to the Sponsor Organization (recommended, but not required)
APPENDIX G

KY AREA DEVELOPMENT DISTRICT (ADD) PROFILES
KY BRFSS 2015

1Counties listed in red are Eastern Kentucky University Upward Bound Targeted Counties (KY Behavioral Risk Factor Survey, 2017)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Bluegrass ADD</th>
<th>Kentucky River ADD</th>
<th>Lake Cumberland ADD</th>
<th>KY</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counties Included:</td>
<td>Anderson, Bourbon, Boyle, Clark, ¹Estill, Fayette, Franklin, Garrard, Harrison, Jessamine, Lincoln, Madison, Mercer, Nicholas, Powell, Scott, Woodford</td>
<td>Breathitt, Knott, Lee, Leslie, Letcher, Owsley, Perry, Wolfe</td>
<td>Adair, Casey, Clinton, Cumberland, Green, McCreary, Pulaski, Russell, Taylor, Wayne</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular Disease</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>Median %</td>
</tr>
<tr>
<td>Adults who have ever had a heart attack</td>
<td>4.3</td>
<td>8.3</td>
<td>9.6</td>
<td>6.7</td>
<td>4.2</td>
</tr>
<tr>
<td>Adults who have coronary heart disease</td>
<td>3.6</td>
<td>8.6</td>
<td>8.3</td>
<td>6.0</td>
<td>3.9</td>
</tr>
<tr>
<td>Adults who have ever had a stroke</td>
<td>3.4</td>
<td>2.8</td>
<td>4.7</td>
<td>4.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults who have diabetes</td>
<td>16.2</td>
<td>18.2</td>
<td>14.8</td>
<td>13.4</td>
<td>9.9</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults who have hypertension</td>
<td>38.1</td>
<td>48.7</td>
<td>42.4</td>
<td>39.0</td>
<td>30.9</td>
</tr>
<tr>
<td>Overweight and Obesity (BMI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults who are overweight (BMI 25-29.9)</td>
<td>27.2</td>
<td>28.6</td>
<td>34.9</td>
<td>32.6</td>
<td>35.5</td>
</tr>
<tr>
<td>Adults who are obese (BMI &gt;30)</td>
<td>36.4</td>
<td>41.7</td>
<td>38.4</td>
<td>34.6</td>
<td>29.8</td>
</tr>
<tr>
<td>Physical Activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults who participate in any physical activity</td>
<td>71.4</td>
<td>59.7</td>
<td>61.2</td>
<td>67.5</td>
<td>73.8</td>
</tr>
</tbody>
</table>
## APPENDIX I

### TARGETED COUNTY DEMOGRAPHICS

<table>
<thead>
<tr>
<th>County</th>
<th>% Male</th>
<th>% White</th>
<th>% Black</th>
<th>% Am Ind</th>
<th>% Asian</th>
<th>% Hispanic</th>
<th>% Other</th>
<th>Median Age</th>
<th>¹Total Population</th>
<th>²Total Enrolled in HS</th>
<th>Total Enrolled in UB 2017</th>
<th>% Sophomore</th>
<th>% Junior</th>
<th>% Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casey</td>
<td>48.8</td>
<td>97.2</td>
<td>0.5</td>
<td>0.2</td>
<td>0.2</td>
<td>2.4</td>
<td>1</td>
<td>40.6</td>
<td>15815 (19.6%)</td>
<td>672 (17.6%)</td>
<td>9 (10.8%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estill</td>
<td>49.3</td>
<td>98.5</td>
<td>0.2</td>
<td>0.2</td>
<td>0.1</td>
<td>0.7</td>
<td>0.2</td>
<td>41.3</td>
<td>14307 (17.8%)</td>
<td>699 (18.3%)</td>
<td>13 (15.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lee</td>
<td>54.8</td>
<td>96.4</td>
<td>2.3</td>
<td>0.3</td>
<td>0.1</td>
<td>0.7</td>
<td>0.1</td>
<td>40.9</td>
<td>6580 (8%)</td>
<td>316 (8%)</td>
<td>7 (8.4%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lincoln</td>
<td>49.4</td>
<td>95.2</td>
<td>2.3</td>
<td>0.2</td>
<td>0.2</td>
<td>1.5</td>
<td>0.7</td>
<td>39.5</td>
<td>24372 (30.3%)</td>
<td>1057 (27.7%)</td>
<td>29 (34.9%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powell</td>
<td>49.7</td>
<td>97.7</td>
<td>0.6</td>
<td>0.1</td>
<td>0.1</td>
<td>1</td>
<td>0.5</td>
<td>38.7</td>
<td>12308 (15.3%)</td>
<td>719 (18.9%)</td>
<td>7 (8.4%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wolfe</td>
<td>49.1</td>
<td>98.8</td>
<td>0.1</td>
<td>0.3</td>
<td>0.01</td>
<td>0.6</td>
<td>0.2</td>
<td>40.9</td>
<td>7159 (9%)</td>
<td>347 (9%)</td>
<td>18 (21.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UB 2017</td>
<td>36</td>
<td>94</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
<td>33</td>
<td>37</td>
<td>30</td>
</tr>
<tr>
<td>Total (or avg)</td>
<td>50.2</td>
<td>97.3</td>
<td>1.2</td>
<td>0.22</td>
<td>0.13</td>
<td>1.03</td>
<td>0.45</td>
<td>40.32</td>
<td>80541</td>
<td>3810</td>
<td>83 (+ 1 from Jackson Co.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Percent of the total of the population in these 6 counties
²Percent of high school students from this county of the 6)
³Percent of UB enrollment(United States Census Bureau, 2015)
APPENDIX J

MPH EKU UB INTERN JOB DESCRIPTION

MPH students at EKU are required to complete 240 hours of observation and participation in selected programs at local, state or the federal level (called the MPH Practicum) in their area of concentration.

The UB job description for the MPH graduate student includes the following:

- Assist with checking students’ plates to ensure they met the requirements set forth by the SFSP.
- Record all meals eligible for reimbursement.
- Assist with the UB application process for the SFSP.
- Conduct a workshop with students in April or May regarding the required meal pattern.
- Conduct a workshop with students during the summer related to healthy eating when transitioning into college (“College 101”)
- Conduct a staff training regarding the SFSP requirements.
- Serve as an integral member of the administrative full-time staff and participate in program implementation rather than just being perceived as the “food police”.
- Demonstrate good communication skills.
- Demonstrate the ability to be a mentor who is caring and responsive to student needs while maintaining authority and order.
- Attend and actively participate at the Tutor Advisor Orientation Training prior to the start of the summer component.
- Be directly concerned with the safety and well-being of all participants.
- Listen and strive to understand the needs of UB students.
- Maintain free and open communication with UB Director and other staff.
- Coordinate the blood drive.
- Collaborate with the Madison County Extension Office to co-teach a cooking class.
- Provide transportation for students to the cooking class.
- Participate in “Kentucky Experience” activities (field trips in KY).
- Work closely with UB Senior Office Associate to submit a correct claim reimbursement to USDA.
- Work closely with Aramark at EKU to ensure SFSP requirements are met.
- Coordinate meals for special events
- All other duties as assigned.

(EKU, 2014)
APPENDIX K

NUTRITION LESSON

This approximately 1-hour session will be taught by a research assistant who is an EKU student enrolled in the Master of Public Health program at the university.

Speaker Introduction (1 minute): Good morning! My name is ______________ and I am graduate student in public health here at EKU. This summer, I will be an intern during your summer session, so you will see me around in the dining hall, at cooking classes at the extension if you choose to participate, and giving nutrition presentations. Today, I am here to provide an introduction to nutrition, the Dietary Guidelines, MyPlate, and to summarize the Summer Food Service Program that you will be involved in this summer. To start off, let’s see how much you guys already know about nutrition.

Ice-Breaker (5 minutes)

Ask three nutrition questions. Participants stand up and shout answer. Give orange/apple to those that participate.

1. How many servings of fruits and vegetables you should eat (at minimum) every day? Answer: at least 5 according to the DGA; MyPlate suggests that ½ of your plate (diet) should be from fruits and vegetables
2. Why do nutritionists and other health professionals recommend whole grains? Answer: they are less processed and contain the fiber that our bodies need for proper digestion and the prevention of some chronic diseases
3. Can anyone name the meal components required at lunch for the Summer Food Service Program (this question would be for those students who participated last year)? Answer: One serving of milk Two or more servings of vegetables and/or fruits One serving of grain One serving of meat or meat alternative

Outline slide after Icebreaker – Objectives:
1. Students will be able to name the key components of the 2015 Dietary Guidelines
2. Students will be introduced to the myplate, a visual representation of food group recommendations
3. Students will be able to identify the components of a reimbursable meal according to the USDA Summer Food Service Program

I. Introduce Dietary Guidelines (7 minutes)

Raise your hand if you have heard of the US Dietary Guidelines. The Dietary Guidelines are a set of nutrition recommendations published every five years by the Department of Agriculture and the Department of Health and Human Services. The guidelines look at the current American diet and new nutrition research to provide suggestions on how Americans can improve their diet and lead healthier lives. In 2015, the guidelines Key Recommendations for Consumers:
1. Consume a healthy eating pattern that accounts for all foods and beverages within an appropriate calorie level.

2. A healthy eating pattern includes:
   a. A variety of vegetables from all of the subgroups—dark green, red and orange, legumes (beans and peas), starchy, and other
   b. Fruits, especially whole fruits
   c. Grains, at least half of which are whole grains
   d. Fat-free or low-fat dairy, including milk, yogurt, cheese, and/or fortified soy beverages
   e. A variety of protein foods, including seafood, lean meats and poultry, eggs, legumes (beans and peas), and nuts, seeds, and soy products
   f. Oils

3. A healthy eating pattern limits:
   Saturated fats and trans fats, added sugars, and sodium

**Focus on the Dietary Guidelines – What Does it Mean for You? (20 minutes)**

Today, we will focus on how to put those Dietary Guidelines into action – what does it mean for you?

1. Consume a healthy eating pattern that accounts for all foods and beverages within an appropriate calorie level.
   Calories are how we measure food energy. Everyone needs a different amount based on age, gender, and physical activity level. Most teenagers need anywhere from 1400 – 3200 calories each day (Stephenson & Schiff, 2015)

2. A healthy eating pattern includes:
   a. A variety of vegetables from all of the subgroups—dark green, red and orange, legumes (beans and peas), starchy, and other
   b. Fruits, especially whole fruit

   **Make ½ of your plate fruits and vegetables**

   Let’s review: How many fruits and vegetables are recommended daily? Stand up if you think the U.S. average reaches this amount. Stand up if you think the Kentucky average reaches this amount.

   - Show link
   - Benefits of fruits and veggies
   - Fiber, vitamins, minerals, phytochemicals
   - Decrease risk for heart attack and stroke, and some cancers
   - Lower blood pressure
   - Vitamin C- helps skin look nicer, antioxidants, helps absorb iron, heal cuts and wounds, keep teeth and gums healthy
   - Something about better sports and academic performance

   c. Grains, at least half of which are whole grains

   **Make at least ½ of your grains whole**

   Who can tell me the difference between whole and refined grains? (allow 1-2 answers)
Whole grains vs. Refined grains (Sizer, 2016)

- Whole grains contain the entire grain kernel — the bran, germ, and endosperm.
- Refined grains have been milled, which removes the bran and germ. This process increases the amount of time that this product can be stored and still be edible. However, it also removes dietary fiber, iron, and many B vitamins.
  - Fiber - keep you full longer, maintain healthy weight, may decrease blood cholesterol levels, risk of type 2 diabetes, CVD, helps move things through digestive tract – found in whole grain breads, beans, vegetables and fruits (only found in plant-based foods)
  - Iron - carry oxygen in the blood, teens growing: need more blood for tissues; deficient- tired, impair sports performance
  - B-vitamins - nervous system, metabolism
  - Folate - form red blood cells, decrease risk of neural tube defects
- Enriched grains - B-vitamins are added back into refined grains but still not as healthy

- Review: why whole grains?
  - Diabetes, CVD, and lower body weight
- Bring examples to pass around of quinoa, wild rice, buckwheat

d. Fat-free or low-fat dairy, including milk, yogurt, cheese, and/or fortified soy beverages

Switch to low-fat or fat-free milk products

Does anyone know how much better teens are at absorbing calcium than adults?

- Teens 4x better at absorbing calcium than adults
- Strong bones
- Low-fat or fat-free provides same nutrients with less calories and saturated fat

e. A variety of protein foods, including seafood, lean meats and poultry, eggs, legumes (beans and peas), and nuts, seeds, and soy products (United States Department of Agriculture, 2016a)

Vary your protein choices

Protein is important for growth, maintenance and repair of your body. It does NOT build muscle mass (that takes a lot of hard work and physical activity). We need it for a healthy immune system and to keep our body’s working right.

- Eat a variety of foods from the Protein Foods Group each week. Experiment with main dishes made with beans or peas, nuts, soy, and seafood.
- Choose seafood twice a week
- Make meat and poultry lean or low fat
- Have an egg
  - One egg a day, on average, doesn’t increase risk for heart disease, so make eggs part of your weekly choices. (Only the egg yolk contains saturated fat, so have as many egg whites as you want)
- Eat plant protein foods more often
  - Try beans and peas (kidney, pinto, black, or white beans; split peas; chickpeas; hummus), soy products (tofu, tempeh, veggie burgers), nuts, and seeds. They are naturally low in saturated fat and high in fiber.
o Nuts and seeds
Choose unsalted nuts or seeds as a snack, on salads, or in main dishes to replace meat or poultry. Nuts and seeds are a concentrated source of calories, so eat small portions to keep calories in check.

f. Oils

Girls 14-18 about 5 tsp per day (United States Department of Agriculture, 2016a)
Boys 14-18 about 6 tsp per day
Show oil table from myplate.gov

All of the above components are a part of the Summer Food Service Program (SFSP) that we will be using this summer. I am going to discuss the SFSP in another section.

g. A healthy eating pattern limits added sugars, saturated fats and trans fats, and sodium
Specific recommendations:

*Consume less than 10 percent of calories per day from added sugars*
~This is about 50 g or less/day (a 12oz can of soda contains about 40gms of added sugar)

**Drink water instead of sugary drinks.**

_Who knows why this might be a recommendation?_

o Rethink your drink: amount of sugar in beverages (mountain dew, coke, Capri sun, etc.)
o More calories in sugary drinks, yet not as filling
o Bad for teeth

*Consume less than 10 percent of calories per day from saturated fats*
~This is about 22 g of saturated fat (a Big Mac contains about 10 g of saturated fat)

o These types of fats are generally found from animals based foods (meat, poultry, pork, milk, butter, ice cream, cheese) and they are usually solid if left at room temperature (they melt when heated or can be solid when mixed for example in milk)
o Fat jars- show saturated fat. Solid at room temp. Raises cholesterol levels.

*Consume less than 2,300 milligrams (mg) per day of sodium*
~This is the approximate amount of sodium found in 1 tsp of salt

**Choose foods with the least amount of sodium**

Compare sodium in foods like soups, breads, and frozen meals. Choose foods with least amount of sodium.

~*What are complications associated with eating too much salt?*

o Increased risk of HTN. More teens developing HTN.
o Recommendation: 1500 mg/day
o How much per day recommended vs. how much in can of soup (salt in bag to show difference).
o Food labels- where to look for sodium.
II. **MyPlate (10 minutes)**

The MyPlate was developed to be a visual aid that would help us to understand the Dietary Guidelines.

Let’s take some time to look at the visual and to review the dietary guidelines along with it.

(At this time, the instructor will show the MyPlate and point to each food group and ask the participants to review the components of the group and the ideas listed above in the Dietary Guidelines)

III. **Purpose and Requirements of the SFSP (15 minutes)**

USDA summer food service program will help you:

- Learn how to quickly choose all you need for a balanced diet!
- Learn the different food groups!
- Make healthier choices!
- Improve academically, socially, and physically!

Because of your good work, we get reimbursed money for each meal that qualifies and that means more money for other fun activities!!

**USDA SFSP Food Components: (United States Department of Agriculture, 2016d)**

*Show Power Point slides with pictures of the food groups and food models to show serving sizes and serving equivalents*

- **Milk – 2% and below**
  
  1 Serving = 8 oz which is 1 cup or 1 glass or 1/2 pint carton

- **Vegetables**
  
  1 serving = 1/2 cup at breakfast or 3/4 cup at lunch or supper
  
  *100% vegetable juice can count (4 oz) but not more than one-half of the requirement

- **Fruits**
  
  1 serving = 1/2 cup at breakfast or 3/4 cup at lunch or supper
  
  *100% fruit juice can count (4 oz) but not more than one-half of the requirement

- **Grains**

<table>
<thead>
<tr>
<th>Whole Grain Breads</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 serving = 1 slice</td>
</tr>
</tbody>
</table>

  Bread, bagels, Tortillas, English Muffins, Pita Bread, Dinner rolls

<table>
<thead>
<tr>
<th>Whole Grain Pasta</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 serving = 1 oz</td>
</tr>
</tbody>
</table>

  Whole wheat, Brown Rice, Corn

<table>
<thead>
<tr>
<th>Whole Grain Cereals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 serving = 1/2 cup cooked</td>
</tr>
</tbody>
</table>

  Oats, Rolled Oats, Barley, Shredded Wheat, Bran Flakes

<table>
<thead>
<tr>
<th>Whole Grain Snacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 serving = 1 oz</td>
</tr>
</tbody>
</table>

  Popcorn, Whole Wheat Crackers, Whole Rice Crackers, Corn Chips

160
Lean Meats:
Beef, Ham, Lamb, Pork, Chicken, Fish, Seafood
1 serving = 1 oz at breakfast and 2 oz at lunch or supper

Meat Alternatives
These are foods that can be eaten to substitute meat in your diet. They contain the comparable amounts of nutrients as meat
Eggs
1 serving = 1 egg
Cheese
1 serving = 1 oz at breakfast and 2 oz at lunch or supper
Yogurt
1 serving = 4 oz or ½ cup
Dry Beans and Peas
Black beans, chick peas, soy beans, lima beans
1 serving = ¼ cup at breakfast and ½ cup at lunch or supper
Nuts and Seeds
Almonds, Cashews, Peanuts, Pumpkin seeds, Sunflower seeds
1 serving = 1 oz (can only count toward half of requirement; can be combined with another meat alternative to fulfill requirement)
Nut Butters
1 serving = 2 tablespoons at breakfast or 4 tablespoons at lunch and supper
Alternate Protein Product
Beef patties, meat loaf, pizza toppings, chicken nuggets
1 serving = 1 oz equivalent at breakfast or 2 oz equivalents at lunch and supper

Some odd foods in need of review
Are peas a vegetable or a meat alternative? (green peas are a vegetable; chickpeas, black-eyed peas, soybeans are a meat alternative)
Is corn a vegetable or a grain? (vegetable) (Could also ask if popcorn is a vegetable or grain)
Is yogurt milk or a meat alternative? (meat alternative)
Are potatoes vegetables? (yes)
What group are vegetable and fruit juices? (vegetables and fruits but can only count toward ½ requirement and therefore cannot be the only fruit or vegetable served/taken).

Requirements of Offer Versus Serve (OVS) which is what we will use this summer here at EKU
UB

Food Component: one of the food groups that comprise a reimbursable meal
Food Item: a specific food offered within the food components

Breakfast
4 Food Components must be offered:

1. Milk
2. Vegetable and Fruit
3. Grain
4. Meat/Meat Alternative OR an additional fruit or vegetable
You must select 3 different food items (they don’t have to be from different components)

**Lunch**

4 Food Components must be offered:

1. Meat/Meat Alternative
2. Vegetable and Fruit
3. Another Vegetable and Fruit
4. Grain
5. Milk

You must select 3 different food components (they must be from three different components)

**Activity: (10 minutes)**

Students will get into groups of 3-4
Pass out papers/posters with meal pictures
Have students:

a. Identify whether or not the meal is reimbursable according to the USDA SFSP OVS
b. Have groups identify why their meal is or is not reimbursable
c. Ask the students to share if they see a food on their papers/posters that they would like to try or have not ever tried.

**Summary Slide**

Today we discussed a lot of things regarding good nutrition. You

1. Learned the key components of the 2015 Dietary Guidelines
2. Were introduced to the myplate, a visual representation of food group recommendations
3. identified the components of a reimbursable meal according to the USDA Summer Food Service Program
APPENDIX L

COLLEGE HACKS OPTIONAL NUTRITION EDUCATION OUTLINE

What should you eat?

Living in a dorm, cooking in a dorm, & eating on campus!

Eating on campus.
Freshman 15??
Add more fruits and veggies to your meals!
Take them to-go & save then for later
If you choose French fries add in another veggie
Drink milk not just at breakfast

Variety-TRY SOMETHING NEW

Keeping Food in Your Residence Hall
Packets of instant oatmeal
Low fat popcorn,
Whole wheat bread,
Granola
Peanut butter and trail mix/nuts
Grab a banana or apple from the diner for a snack or breakfast
Milk
Tuna pouches
Protein bars (Not filled with Sugar)

Instead of this………………try this! (Examples)

Rethink your drink!
Got milk?
H2O?

Healthy Habits to form
Plan and Make Time to Eat Meals
How many of you skip breakfast?
Regular lunch and supper meals are important too
Find balance
Learn Some Simple Recipes
READ THE LABEL

The Power of a Good Self-Body Image
90/10 rule
You are your own individual, unique, human being – and you should LOVE who you are for the special person you are
Make time Exercise and Stay active
SLEEP
163
Remind yourself Change is difficult and takes time!

APPENDIX M

OPTIONAL COOKING CLASS BASIC OUTLINE
UK MADISON COUNTY COOPERATIVE EXTENSION OFFICE

Session 1:

1. Nutrition Ball Toss Activity – Ice Breaker
   After short personal introductions, a ball with nutrition questions on it was tossed around the room. When a participant caught the ball, they had to answer the question under their left thumb.

2. Handwashing
   a. To demonstrate how quickly germs can spread, instructors put a clear substance ‘germs’ on participants’ hands and asked them to go wash them. They came back and put hands under a black light to see what ‘germs’ were left.
   b. This activity taught the importance of washing hands before preparing food. Instructors explained the proper way to get all the germs off every time.

2. Food Safety lesson
   Participants were given informational packets and explained proper food safety temperatures, proper food storage, handling meat, and other food safety tips.

3. Reading recipe/collecting ingredients
   Participants were given a simple recipe. The table was already set up with stations that had knifes and all ingredients on the end of table. Participants were instructed to read the entire recipe before they began. Participants were divided into smaller groups to make recipe.

4. Knife Skills/Cutting fruit
   Instructors gave some knife skills/directions on the best way to slice apples and the participants were invited to cut their own apple with the methods taught to them.

Session 2:

1. Food Preparation Lesson
   Participants were given more information packets which included tips for preparing meals, buying food for college dorms, and making one item and using it in more than one recipe. They talked about buying food in the grocery and buying foods in seasons to save money and to get the freshest foods.

2. Cooking lesson/Set table
Participants were divided into two groups. One group cooked the chicken and vegetables and the other group cooked rice and set the table for our meal.

3. Eating at together
   a. All sat together to dine. Food was passed around the table. Everyone took only one serving to make sure that everyone got some and passed the extras around if anyone wanted seconds.
   b. After the meal was over, participants cleaned up and talked about what they liked and did not like about the meal preparation, table setting, and meal. Participants and instructors talked about trying new things. When asked if they would make and eat the prepared meal again, the majority said yes!
   c. After the lesson the participants were presented with a bag full of dorm-friendly cooking essentials (a knife, a cutting board, a colander, and few storage containers) and some recipes to try with their new cooking equipment.

**Participant Evaluations of the Cooking Classes**

This is a short evaluation of the cooking class activity we had at the Madison Extension Office. DO NOT INCLUDE YOUR NAME.

Please indicate on a scale of 1-5 how much you liked the following activity.
1- Completely disliked; 2- Somewhat disliked; 3- Neither; 4- Somewhat liked; 5- liked it a lot!

<table>
<thead>
<tr>
<th>Activity</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tossing ball activity</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Hand washing</td>
<td>1</td>
<td>5</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Food safety lesson</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knife Skills/ Cutting apples</td>
<td>1</td>
<td>2</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Making a fruit dip exercise</td>
<td>2</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting the table</td>
<td>2</td>
<td>2</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Reading directions &amp; cooking food</td>
<td>1</td>
<td>4</td>
<td></td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**There were 10 students who went to both weeks of the cooking class.**
APPENDIX N

Upward Bound and the SFSP Nutrition Survey

Q1 You are being asked to complete this on-line survey consisting of 55 questions on nutrition behaviors, nutrition knowledge, attitudes about nutrition, physical activity behaviors and some demographics. The survey will take approximately 10-15 minutes to complete. All of your answers will remain confidential.

Thank you.

Q2 What is the ID code you have been assigned? (it will be the last two digits of the number on back of your meal card). **PLEASE ENTER CAREFULLY.**

Q3 Please click on the circle below the words or number that best indicates your level of agreement with the statement. **Please note:** The questions may look the same but your answer choices are different.
Q4 During the **next week**, for me to **eat 5 servings** of fruits and vegetables each day will be:

<table>
<thead>
<tr>
<th>Extremely harmful (1)</th>
<th>Quite harmful (2)</th>
<th>Slightly harmful (3)</th>
<th>Neutral (4)</th>
<th>Slightly beneficial (5)</th>
<th>Quite beneficial (6)</th>
<th>Extremely beneficial (7)</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

Q5 During the **next week**, for me to eat 5 servings of fruits and vegetables each day will be:

<table>
<thead>
<tr>
<th>Extremely bad (1)</th>
<th>Quite bad (2)</th>
<th>Slightly bad (3)</th>
<th>Neutral (4)</th>
<th>Slightly good (5)</th>
<th>Quite good (6)</th>
<th>Extremely good (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Q6 During the **next week**, for me to eat 5 servings of fruits and vegetables each day will be:

<table>
<thead>
<tr>
<th>Extremely boring (1)</th>
<th>Quite boring (2)</th>
<th>Slightly boring (3)</th>
<th>Neutral (4)</th>
<th>Slightly fun (5)</th>
<th>Quite fun (6)</th>
<th>Extremely fun (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Q7 During the **next week**, for me to **eat 5 servings** of fruits and vegetables each day will be:

<table>
<thead>
<tr>
<th>Extremely unenjoyable (1)</th>
<th>Quite unenjoyable (2)</th>
<th>Slightly unenjoyable (3)</th>
<th>Neutral (4)</th>
<th>Slightly enjoyable (5)</th>
<th>Quite enjoyable (6)</th>
<th>Extremely enjoyable (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Q8 Please click on the circle below the word or number that best indicates your level of agreement with the statement. **You may select any number, even if it does not have a word description above it**.
Q9 My parents and relatives think I should eat 5 servings of fruits and vegetables each day during the next week.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree 1 (1)</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>Strongly agree 7 (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q9</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Q10 My friends think I should eat 5 servings of fruits and vegetables each day during the next week.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree 1 (15)</th>
<th>2 (16)</th>
<th>3 (17)</th>
<th>4 (18)</th>
<th>5 (19)</th>
<th>6 (20)</th>
<th>Strongly agree 7 (21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q11 My teachers think I should eat 5 servings of fruits and vegetables each day during the next week.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree 1 (22)</th>
<th>2 (23)</th>
<th>3 (24)</th>
<th>4 (25)</th>
<th>5 (26)</th>
<th>6 (27)</th>
<th>Strongly agree 7 (28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q12 My parents and relatives approve of me eating 5 servings of fruits and vegetables each day during the next week.

<table>
<thead>
<tr>
<th>Strongly disagree 1 (38)</th>
<th>2 (39)</th>
<th>3 (40)</th>
<th>4 (41)</th>
<th>5 (42)</th>
<th>6 (43)</th>
<th>Strongly agree 7 (44)</th>
</tr>
</thead>
</table>

Q13 My friends approve of me eating 5 servings of fruits and vegetables each day during the next week.

<table>
<thead>
<tr>
<th>Strongly disagree 1 (29)</th>
<th>2 (30)</th>
<th>3 (31)</th>
<th>4 (32)</th>
<th>5 (33)</th>
<th>6 (34)</th>
<th>Strongly agree 7 (35)</th>
</tr>
</thead>
</table>

Q14 My teachers approve of me eating 5 servings of fruits and vegetables each day during the next week.

<table>
<thead>
<tr>
<th>Strongly disagree 1 (29)</th>
<th>2 (30)</th>
<th>3 (31)</th>
<th>4 (32)</th>
<th>5 (33)</th>
<th>6 (34)</th>
<th>Strongly agree 7 (35)</th>
</tr>
</thead>
</table>

Q15 My parents and relatives support me eating 5 servings of fruits and vegetables each day during the next week.

<table>
<thead>
<tr>
<th>Strongly disagree 1 (36)</th>
<th>2 (37)</th>
<th>3 (38)</th>
<th>4 (39)</th>
<th>5 (40)</th>
<th>6 (41)</th>
<th>Strongly agree 7 (42)</th>
</tr>
</thead>
</table>

Q16 My friends support me eating 5 servings of fruits and vegetables each day during the next week.

<table>
<thead>
<tr>
<th>Strongly disagree 1 (1)</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>Strongly agree 7 (7)</th>
</tr>
</thead>
</table>

169
Q17 My **teachers support** me eating 5 servings of fruits and vegetables each day during the **next week**.

<table>
<thead>
<tr>
<th>Strongly disagree 1 (22)</th>
<th>2 (23)</th>
<th>3 (24)</th>
<th>4 (25)</th>
<th>5 (26)</th>
<th>6 (27)</th>
<th>Strongly agree 7 (28)</th>
</tr>
</thead>
</table>

Q18 During the **next week at Upward Bound Summer Program**, how confident are you that you can eat 5 servings of fruits and vegetables each day?

<table>
<thead>
<tr>
<th>Not at all confident 1 (1)</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>Extremely confident 7 (7)</th>
</tr>
</thead>
</table>

Q19 During the **next week at Upward Bound Summer Program**, for me to eat 5 servings of fruits and vegetables each day will be:

<table>
<thead>
<tr>
<th>Extremely difficult 1 (1)</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>Extremely easy 7 (7)</th>
</tr>
</thead>
</table>

Q20 During the **next week at Upward Bound Summer Program**, if I **wanted** to, I could easily eat 5 servings of fruits and vegetables each day.

<table>
<thead>
<tr>
<th>Strongly disagree 1 (1)</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>Strongly agree 7 (7)</th>
</tr>
</thead>
</table>

Q21 During the **next weekend at home**, how **confident** are you that you can eat 5 servings of fruits and vegetables each day?

<table>
<thead>
<tr>
<th>Not at all confident 1 (1)</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>Extremely confident 7 (7)</th>
</tr>
</thead>
</table>

170
Q22 During the next weekend at home, for me to eat 5 servings of fruits and vegetables each day will be:

<table>
<thead>
<tr>
<th>Extremely difficult</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>Extremely easy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 (7)</td>
</tr>
</tbody>
</table>

Q23 During the next weekend at home, if I wanted to, I could easily eat 5 servings of fruits and vegetables each day?

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 (7)</td>
</tr>
</tbody>
</table>

Q24 During the next week, I plan to eat 5 servings of fruits and vegetables each day.

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 (7)</td>
</tr>
</tbody>
</table>

Q25 During the next week, my goal is to eat 5 servings of fruits and vegetables on _____________ day(s).

Q26 The Summer Food Service Program (SFSP) part of the Upward Bound Summer Program will help me to improve my nutrition behaviors.

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>2 (19)</th>
<th>3 (20)</th>
<th>4 (21)</th>
<th>5 (22)</th>
<th>6 (23)</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 (24)</td>
</tr>
</tbody>
</table>
Q27 The next set of questions ask about food you ate or drank during the past 7 days. Think about all the meals and snacks you had from the time you got up until you went to bed. Be sure to include food you ate at home, at school, at restaurants, or anywhere else.

Q28 During the past 7 days, how many times did you drink 100% fruit juices such as orange juice, apple juice, or grape juice? (Do not count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks).

- I did not drink 100% fruit juice during the past 7 days (1)
- 1 to 3 times during the past 7 days (2)
- 4 to 6 times during the past 7 days (3)
- 1 time per day (4)
- 2 times per day (5)
- 3 times per day (6)
- 4 or more times per day (7)

Q29 During the past 7 days, how many times did you eat fruit? (Do not count fruit juice).

- I did not eat fruit during the past 7 days (1)
- 1 to 3 times during the past 7 days (2)
- 4-6 times during the past 7 days (3)
- 1 time per day (4)
- 2 times per day (5)
- 3 times per day (6)
- 4 or more times per day (7)
Q30 During the past 7 days, how many times did you eat green salad?

- I did not eat green salad during the past 7 days (1)
- 1 to 3 times in the past 7 days (2)
- 4 to 6 times in the past 7 days (3)
- 1 time per day (4)
- 2 times per day (5)
- 3 times per day (6)
- 4 or more times per day (7)

Q31 During the past 7 days, how many times did you eat potatoes?  (Do not count french fries, fried potatoes, or potato chips).

- I did not eat potatoes during the past 7 days (1)
- 1 to 3 times during the past 7 days (2)
- 4 to 6 times in the past 7 days (3)
- 1 time per day (4)
- 2 times per day (5)
- 3 times per day (6)
- 4 or more times per day (7)
Q32 During the past 7 days, how many times did you eat carrots?

- I did not eat carrots during the past 7 days (1)
- 1 to 3 times during the past 7 days (2)
- 4 to 6 times during the past 7 days (3)
- 1 time per day (4)
- 2 times per day (5)
- 3 times per day (6)
- 4 or more times per day (7)

Q33 During the past 7 days, how many times did you eat other vegetables? (Do not count green salad, potatoes, or carrots).

- I did not eat other vegetables during the past 7 days (1)
- 1 to 3 times during the past 7 days (2)
- 4 to 6 times during the past 7 days (3)
- 1 time per day (4)
- 2 times per day (5)
- 3 times per day (6)
- 4 or more times per day (7)
Q34 During the past 7 days, how many times did you drink a can, bottle, or glass of soda or pop, such as Mountain Dew, Coke, Pepsi, or Sprite? (Do not count diet soda or diet pop).

- I did not drink soda or pop during the past 7 days (1)
- 1 to 3 times during the past 7 days (2)
- 4 to 6 times during the past 7 days (3)
- 1 time per day (4)
- 2 times per day (5)
- 3 times per day (6)
- 4 or more times per day (7)

Q35 During the past 7 days, how many glasses of milk did you drink? (Count the milk you drank in a glass or cup, from a carton, or with cereal. Count the half pint of milk served at school as equal to one glass).

- I did not drink milk during the past 7 days (1)
- 1 to 3 glasses during the past 7 days (2)
- 4 to 6 glasses during the past 7 days (3)
- 1 glass per day (4)
- 2 glasses per day (5)
- 3 glasses per day (6)
- 4 or more glasses per day (7)
Q36 During the past 7 days, how many times did you eat whole grains such as bagels, bread, cereal, pasta, or rice?

- I did not eat whole grains during the past 7 days (1)
- 1 to 3 times during the past 7 days (2)
- 4 to 6 times during the past 7 days (3)
- 1 time per day (4)
- 2 times per day (5)
- 3 times per day (6)
- 4 or more times per day (7)

Q37 During the past 7 days, how many times did you eat a meat or a meat alternative such as beef, pork, chicken, fish, beans, nuts, nut butter, eggs, or tofu?

- I did not eat meat or a meat alternative during the past 7 days (1)
- 1 to 3 times during the past 7 days (2)
- 4 to 6 times during the past 7 days (3)
- 1 time per day (4)
- 2 times per day (5)
- 3 times per day (6)
- 4 or more times per day (7)

Q38 During the past 7 days, on how many days did you eat breakfast?

- ▼ 0 days (1) ... 7 days (8)

Q39 During a typical week, on how many days do you eat supper or dinner with your family?

- ▼ 0 days (1) ... 7 days (8)
Q40 The next questions ask about physical activity.

Q41 During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time).

▼ 0 days (1) ... 7 days (8)

Q42 On an average school day, how many hours do you watch TV outside of school?

○ I do not watch TV on an average school day (1)
○ Less than 1 hour per day (2)
○ 1 hour per day (3)
○ 2 hours per day (4)
○ 3 hours per day (5)
○ 4 hours per day (6)
○ 5 or more hours per day (7)

Q43 On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Count the time spent on things such as Xbox, PlayStation, an iPad or other tablet, a smartphone, texting, YouTube, Instagram, Facebook, or other social media).

○ I do not play video or computer games or use a computer for something that is not school work (1)
○ Less than 1 hour per day (2)
○ 1 hour per day (3)
○ 2 hours per day (4)
○ 3 hours per day (5)
○ 4 hours per day (6)
○ 5 or more hours per day (7)
Q44 On an average week when you are in school, on how many days do you go to physical education (PE) classes?

○ 0 days (1)
○ 1 day (2)
○ 2 days (3)
○ 3 days (4)
○ 4 days (5)
○ 5 days (6)

Q45 During the past 12 months, on how many sports teams did you play? Count any teams run by your school or community groups).

○ 0 teams (1)
○ 1 team (2)
○ 2 teams (3)
○ 3 or more teams (4)

Q46 The next set of questions ask about your knowledge of nutrition and of the USDA Summer Food Service Program (SFSP). Please answer true if you think the statement is accurate or false if you think the statement is inaccurate.
<table>
<thead>
<tr>
<th>Statement</th>
<th>True (23)</th>
<th>False (24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber is found in plant based foods such as wheat, beans, fruits and vegetables. (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>According to the USDA MyPlate, at least 1/2 of your plate should be fruits and vegetables. (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-fat or fat-free milk provide the same nutrients (vitamins and minerals) as regular milk but with less calories and fat. (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A poor diet can lead to diseases such as diabetes, heart disease and cancer. (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If a person eats extra protein, it will cause muscle growth. (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Dietary Guidelines for Americans provide suggestions on how Americans can improve their diets and live healthier lives. (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy eating patterns limit saturated fats and trans fats, added sugar, and added sodium. (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>According to the USDA MyPlate, at least 1/2 of your grains should be whole grains. (8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An egg is considered a meat alternative. (9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teenagers need on average 2000 to 3200 calories a day. (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Dietary Guidelines for Americans recommend that added sugars should be less than 10% of your calories every day. (11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In order for a meal to be reimbursable by the offer versus serve Summer Food Service Program (SFSP) it must include milk. (12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The requirements of the Summer Food Service Program (SFSP) are intended to help create a balanced, healthy meal. (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheese and yogurt count as meat alternatives according to the Summer Food Service Program (SFSP). (14)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A healthy eating pattern includes a variety of vegetables and fruits. (15)

Q47 What is your gender?

- Male (1)
- Female (2)
- Would rather not say (3)

Q48 Which most closely represents your academic standing?

- I am going to be a sophomore in August 2018 (1)
- I am going to be a junior in August 2018 (2)
- I am going to be a senior in August 2018 (3)
- I graduated in May or June of 2018 (4)

Q49 What is your age (in years)?

________________________________________________________________

Q50 How tall are you in feet and inches?

| Feet () | [ ] 0 | [ ] 1 | [ ] 2 | [ ] 3 | [ ] 4 | [ ] 5 | [ ] 6 | [ ] 7 | [ ] 8 | [ ] 9 | [ ] 10 | [ ] 11 | [ ] 12 |

| Inches () | [ ] | [ ] 0 | [ ] 1 | [ ] 2 | [ ] 3 | [ ] 4 | [ ] 5 | [ ] 6 | [ ] 7 | [ ] 8 | [ ] 9 | [ ] 10 | [ ] 11 | [ ] 12 |

Q51 How much do you weigh in pounds?

________________________________________________________________
Q52 How would you classify yourself? (select all that apply).

- Asian/Pacific Islander (1)
- Black (2)
- White (3)
- Hispanic (4)
- Multi-racial (5)
- Would rather not say (6)
- Other (Please specify) (7) ________________________________

Q53 How many years have you attended the Upward Bound Summer Program?

- 2 years (this will be my 3rd summer) (1)
- 1 year (this year will be my 2nd summer) (2)
- 0 (this year will be my 1st summer) (3)

Q54 Which county do you live in?

- Casey (1)
- Estill (2)
- Lee (3)
- Lincoln (4)
- Powell (5)
- Wolfe (6)
- Other (Please specify) (7) ________________________________
APPENDIX O

PILOTING THE SURVEY FOR DISSERTATION STUDY

There were 10 students who went to both weeks of the cooking class.

Overall comments:
- 8 high school students: 7 females, 1 male
- Piloted on Feb 15, 2018
- Found multiple choice questions (i.e. YRBS) to be easier than the Likert-scale type questions.
- Overall took approximately 12 minutes.

Other Piloting Comments

Reviewer
For the 7-point strongly agree to strongly disagree and other scales (SN & PBC), I couldn't tell if they included stems for each of those on the article you sent. They didn't mention doing so like they did with the others above, which was interesting. However, without something above those circles, it is likely you will get polarized responses. When you piloted this, were there any concerns here? You included numbers on the Word version though so it may not be comparable.
See what I did with PBC8 and let me know what you think compared to those without numbers. You would just need to add another set of instructions before these items, reinforcing to respond on a scale depending on where they fall between those two stems.

**Second set of attitude questions - need to correct spelling 'does'
Please click on the circle below the words or number that best indicates your level of agreement with the statement. You may select any number, even if it does not have a word description above it.

Change to 'times'

During the past 7 days, how many times did you drink a can, bottle, or glass of soda or pop, such as Mountain Dew, Coke, Pepsi, or Sprite? (Do not count diet soda or diet pop).

Set parameters so that ID code is 1-99

Content Expert

Three minor issues.
The good/bad question is a little confusing to me. However, I have read the article you formatted from, and understand if you keep it. But does it mean taste? Health? General feeling?
The potato question reads “I did not” instead of “I did not”
You have to enter an age less than 2 years to complete the survey. I am guessing it should be 20. I entered 14 initially and I was forced to enter something less than 2.
Also, 1400 kcal just seems so low? Does that make it false? I think I answered everything false (just for good measure. :)

Content Expert

I enjoyed the survey! I am positive about the length of the questionnaire and ease of answering questions.
Please see my additional feedback.
• I am sorry…I am not aware of Upward Bound Summer Program. If your samples know of it, it is okay. But if they don’t know it, it would be better to provide the definition of it at the beginning of the questionnaire.
• Also, I think it would be better you can briefly introduce the purpose of the questionnaire along with the participation consent (forced question) at the beginning of the questionnaire.
• In terms of “5 servings of fruits and vegetables each day”, I feel it is a bit vague. I am sorry again. I am not a person who knows nutrition well. For me, I am not sure how to count servings. Is it counted as the eating times or eating amounts? If the serving relates to the amount, my serving size is different from the one for my wife. So, I am not sure about the standard serving size.
• Also, I think it would be better to state as “fruit and/or vegetables” instead of “fruits and vegetables.”
• In terms of “times of drinking 100% fruit juices”, I am not sure about the time interval. For example, I drank 3 ½ cups of orange juice during my lunchtime. Is it 3.5 times or one time of drinking 100% fruit juice? If it is 3.5 times of drinking fruit juices, there is no choice available on the selection. The choices are 2-3 times, 4-5 times, and etc.
• At the Demographic section, “Upward bound Summer Program” should be revised as “Upward Bound Summer Program.”

Target Population
Grammatical/spelling

Additional highlighting of key words

K12: Add in “be” and “Offer vs. Serve” so question reads: “In order for a meal to be reimbursable by the Summer Food Service Program Offer vs Serve (SFSP) it must include milk.”
K15: “A healthy eating pattern includes a variety of vegetables and fruits.” (eliminate especially whole fruits.)
Target Population
For Attitude Questions: Added “These questions may look the same but your answer choices are different.”
BI14 – change “intend” to “plan”
BI15 Take out “per week” (not necessary and redundant with the given answers)
SN5: What is meant by “people important to me?” Therefore changes questions to include three separate questions:

“During the next week, my parents/relatives think I should/approve of me/support me (3 separate questions) eating 5 servings of fruits and vegetables each day.”

Based on following research: (Francis et al., 2004; Ickes & Sharma, 2012; Pawlak et al., 2009; Tsorbatzoudis, 2005a)

Drop down preferred by Ellen and Shelby, but not Luke

Knowledge questions:

2. Take out United States Department of Agriculture and just use USDA

6. Change “The dietary Guidelines for Americans provide suggestions on how Americans can improve their diets and lead healthier lives” to “The Dietary Guidelines for Americans provide suggestions on how Americans can improve their diets and live healthier.”

9. “An egg is considered a meat alternative” (take out parentheses – “in the protein group on the MyPlate”)
## APPENDIX P

### QUALITY SCORES OF FOODS ITEMS OFFERED

<table>
<thead>
<tr>
<th>Quality Score</th>
<th>Food Item Offered</th>
<th>Quality Score</th>
<th>Food Item Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Broccoli</td>
<td>6</td>
<td>Banana</td>
</tr>
<tr>
<td>6</td>
<td>Green beans</td>
<td>6</td>
<td>Broccoli</td>
</tr>
<tr>
<td>6</td>
<td>Oatmeal</td>
<td>6</td>
<td>Green beans</td>
</tr>
<tr>
<td>5</td>
<td>Apple</td>
<td>6</td>
<td>Oatmeal</td>
</tr>
<tr>
<td>5</td>
<td>Cauliflower</td>
<td>6</td>
<td>Rice, brown</td>
</tr>
<tr>
<td>5</td>
<td>Cereal, unsweetened</td>
<td>5</td>
<td>Apple</td>
</tr>
<tr>
<td>5</td>
<td>Cherries</td>
<td>5</td>
<td>Cereal, unsweetened</td>
</tr>
<tr>
<td>5</td>
<td>Chicken Breast</td>
<td>5</td>
<td>Chicken, baked</td>
</tr>
<tr>
<td>5</td>
<td>Corn</td>
<td>5</td>
<td>Corn</td>
</tr>
<tr>
<td>5</td>
<td>Fruit, mixed</td>
<td>5</td>
<td>Melon</td>
</tr>
<tr>
<td>5</td>
<td>Grits</td>
<td>5</td>
<td>Mushroom</td>
</tr>
<tr>
<td>5</td>
<td>Hash browns</td>
<td>5</td>
<td>Noodles, pasta</td>
</tr>
<tr>
<td>5</td>
<td>Melon</td>
<td>5</td>
<td>Orange</td>
</tr>
<tr>
<td>5</td>
<td>Milk, Plain</td>
<td>5</td>
<td>Peas</td>
</tr>
<tr>
<td>5</td>
<td>Noodles, pasta</td>
<td>5</td>
<td>Peppers, bell</td>
</tr>
<tr>
<td>5</td>
<td>Okra</td>
<td>5</td>
<td>Salad, mixed green with dressing</td>
</tr>
<tr>
<td>5</td>
<td>Orange</td>
<td>5</td>
<td>Salsa</td>
</tr>
<tr>
<td>5</td>
<td>Pineapple</td>
<td>5</td>
<td>Tortilla</td>
</tr>
<tr>
<td>5</td>
<td>Salad, mixed green with dressing</td>
<td>5</td>
<td>Turkey burger</td>
</tr>
<tr>
<td>4</td>
<td>Tortilla</td>
<td>4</td>
<td>Bread, whole wheat</td>
</tr>
<tr>
<td>4</td>
<td>Turkey Breast (deli)</td>
<td>4</td>
<td>Bun</td>
</tr>
<tr>
<td>4</td>
<td>Bread, white enriched</td>
<td>4</td>
<td>Carrots</td>
</tr>
<tr>
<td>Score</td>
<td>Meal Item</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bread, whole wheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Cereal, sweetened</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bun, Hamburger, Enriched</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Ham steak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Cereal, sweetened</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pickles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Chicken Fried Steak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Potatoes, mashed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Ham Steak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Roll, dinner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Orange Juice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tomato</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Potato, mashed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tomato sauce</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Roll, dinner, enriched</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Vegetables, mixed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Am. Cheese</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Beef</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>French fries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>French Fries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Milk, chocolate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Milk, plain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pancakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pancakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Peanut Butter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Peanut butter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pizza</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pizza, pepperoni</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pork Loin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tater tots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tatar Tots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bacon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Beef stroganoff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Biscuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cheeseburger/hamburger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cheeseburger/hamburger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chicken, fried</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chicken, fried</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Egg scrambled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Egg scrambled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>French toast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Meatballs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ham (deli)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sausage, breakfast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sausage, smoked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sausage, patty or links</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tortilla chips</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Chicken, BBQ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Range = 0-6 with higher scores indicating higher quality

Based on the following criteria: total fat less than 35% of calories; saturated fat less than 10% of calories; zero trans-fat; fiber at least 14g for each 1000 calories; sugar <10% of calories; and sodium ≤ 1gm per calorie. Each food item was given a score of 1 if it met the nutritional criteria and 0 if it did not
meet the criteria. The criteria were adapted from the Snack Smart standards of the NSLP (USDA, 2016b) and the Dietary Guidelines for Americans (DHHS, 2015). Nutrition information on the individual food items was obtained from the university dining facility website (Aramark Corporation, 2018) and from the USDA Nutrient Data Base (2018).
APPENDIX Q

Invitation to Participate in a Study Titled:
The Effects of the USDA Summer Food Service Program on Rural Adolescents’ Nutrition Attitudes, Knowledge, Behavioral Intentions and Behaviors

Dear Parent/Guardian of Upward Bound Participant,

My name is Rachel Harrington. I am a doctoral student at the University of Kentucky. I am involved in a research project that will study the effects of the USDA Summer Food Service Program (SFSP), coupled with nutrition education, on the nutrition behaviors of rural high school students. The purpose of this research is to examine nutritional knowledge, attitudes towards nutrition, and some of your child’s behaviors before and after participation in the SFSP during the Upward Bound (UB) Summer Program at Eastern Kentucky University. This study is performed as a partial fulfillment of the requirements for my doctorate in Health Promotion under the supervision of Dr. Melinda Ickes.

Your child’s participation in this project is strictly voluntary and he or she may still participate in all activities of the UB Summer Program even if you do not want your child to be in the study. Your child qualifies for the study if they are members of the EKU UB program. If you decide that your child will not participate in the research activities, it will have no bearing on his or her participation in the EKU UB Summer Program. This research is completely separate from the UB Summer Program.

For the study, your child will be asked to complete two on-line surveys, each taking approximately 10-15 minutes. Your child will also have their food photographed in order to assess consumption. If you are interested in the details of the study, please read the consent form.

If you have questions, suggestions, or concerns regarding this study, you can contact Rachel Harrington at 859-321-8113 or Dr. Mindy Ickes at 859-257-1625. Thank you for considering to allow your child to participate in this important research.

Sincerely,

M. Rachel Harrington, MHA, RDN, LD
Doctoral Candidate, University of Kentucky
859-321-8113
APPENDIX R

CONSENT FORM

Parent Permission to Participate in a Research Study

KEY INFORMATION FOR THE EFFECTS OF THE USDA SUMMER FOOD SERVICE PROGRAM ON RURAL ADOLESCENTS’ NUTRITION ATTITUDES, KNOWLEDGE, BEHAVIORAL INTENTIONS AND BEHAVIORS

Your child is being invited to take part in a research study about the impact of the USDA Summer Food Service Program (SFSP) enhanced with nutrition education, on the nutrition–related behaviors, attitudes, and behavioral intentions of adolescents.

WHAT IS THE PURPOSE, PROCEDURES, AND DURATION OF THIS STUDY?

By doing this study, we hope to learn about the impact of the SFSP, along with nutrition education on adolescents’ knowledge, attitudes, and behaviors regarding nutrition.

If you agree to allow your child to be in the study, he/she will be asked to complete two on-line surveys (one at the beginning of the Upward Bound (UB) Summer Program and one at the end of the UB Summer Program) consisting of 55 questions on nutrition behaviors, nutrition knowledge, attitudes about nutrition, physical activity behaviors and some demographics. Each survey will take approximately 10-15 minutes to complete.

Your child will also have their food photographed a total of 12 times over the 5-week UB summer session to assess consumption (before and after pictures will be compared to determine how much of the food taken was actually consumed). Only a number, not a name, will be associated with the food photographs and your child will not be photographed for this study.

Your child’s participation in this research will last about 5 weeks, from June 9, 2018 to July 13, 2018.

WHAT ARE THE REASONS YOUR CHILD MIGHT CHOOSE TO VOLUNTEER FOR THIS STUDY?

Your child may choose to participate in order to improve his/her nutrition knowledge, attitudes and behaviors. For a complete description of benefits, see the Detailed Consent.

WHAT ARE REASONS YOUR CHILD MIGHT CHOOSE NOT TO VOLUNTEER FOR THIS STUDY?

Your child may choose not to participate in this study if he/she does not want to take the online survey or have his/her foods photographed. If your child is younger than 14 years or older than 17 years, he/she is not eligible to participate. Your child, aged 14-17 is eligible to participate but you will need to provide permission for them to participate in this study. For a complete description of risks, refer to the Detailed Consent.
DOES YOUR CHILD HAVE TO TAKE PART IN THE STUDY?

If your child decides to take part in the study, it should be because he/she really wants to volunteer. Your child will not lose any services, benefits, or rights he/she would normally have if he/she chooses not to volunteer. As an UB student, if your child decides not to take part in this study, his/her choice will have no effect on his/her academic status or class grade(s) in the UB Program.

WHAT IF YOU OR YOUR CHILD HAVE QUESTIONS, SUGGESTIONS OR CONCERNS?

The person in charge of this study is Rachel Harrington of the University of Kentucky, Department of Kinesiology and Health Promotion. Rachel is being guided in this research by Dr. Melinda Ickes. If you have questions, suggestions, or concerns regarding this study or if you want your child to withdraw from the study, you can contact Rachel Harrington at 859-321-8113 or Dr. Melinda Ickes at 859-257-1625.

If you have any questions, suggestions or concerns about your child’s rights as a volunteer in this research, you may contact staff in the University of Kentucky Office of Research Integrity between the business hours of 8am and 5pm EST, Monday-Friday at 859-257-9428 or toll free at 1-866-400-9428.
DETAILED CONSENT:

WHY YOUR CHILD WOULD NOT QUALIFY FOR THIS STUDY?

If your child is younger than 14 years or older than 17 years, he/she is not eligible to participate. If your child is not part of the EKU Upward Bound (UB) 2018 Summer Program, he/she is not eligible to participate.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

The research procedures will be conducted at Eastern Kentucky University in Case Dining Hall and in a surrounding classroom building. The study will take place during the normal breakfast, lunch, and dinner hours of the UB Summer Program. The study will last for the five weeks of the EKU UB Summer Program, June 9, 2018 through July 13, 2018.

WHAT WILL YOUR CHILD BE ASKED TO DO?

Your child will be asked to complete two on-line surveys (one at the beginning of the UB Summer Program and one at the end of the UB Summer Program) consisting of 55 questions on nutrition behaviors, nutrition knowledge, attitudes about nutrition, physical activity behaviors and some demographics. Each survey will take approximately 10-15 minutes to complete and will be given during the UB Summer Program.

Your child will have his/her food photographed a total of 12 times over the 5-week UB summer session to assess consumption (before and after pictures will be compared to determine how much of the food taken was actually consumed).

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

To the best of our knowledge, the things your child will be doing have no more risk or harm than he/she would experience in everyday life.

Some of the information your child is being asked to provide is related to nutrition and food behaviors which may create feelings of discomfort. If so, we can tell you and him/her about some people who may be able to help him/her with these feelings.

WILL YOUR CHILD BENEFIT FROM TAKING PART IN THIS STUDY?
We do not know if your child will get any benefit from taking part in this study. However, some people have experienced improved consumption of healthy foods or increased knowledge and attitudes about nutrition when they have participated in the SFSP.

**WHAT WILL IT COST YOUR CHILD TO PARTICIPATE?**

There are no costs associated with taking part in this study. Each of the two surveys will take approximately 10-15 minutes to complete.

**WHO WILL SEE THE INFORMATION THAT YOUR CHILD GIVES?**

When we write about or share the results from the study, we will write about the combined information. We will keep your child’s name and other identifying information private. We will make every effort to prevent anyone who is not on the research team from knowing that your child gave us information, or what that information is.

Your child will be given a unique code that will allow for confidentiality while allowing the researcher to match the pre-survey with the post-survey and with the digital photography. A master list of the codes will be stored on a University of Kentucky (UK) secured, password protected server. The primary researcher, using an additional password, will be the only person with access to these codes. The survey will be generated using Qualtrics Labs, Inc. software, Version 12,018 of the Qualtrics Research Suite, 2009. Data will be managed and stored on their site through the UK account of the PI. Access to this account will be via research team members’ office computers and using the UK secure, password protected server. Access to the Qualtrics site requires an additional password. The photographs of your child’s food before and after consumption will be downloaded to the primary researcher’s secure, password protected office computer.

You should know that there are some circumstances in which we may have to show your child’s information to other people. We may be required to show information which identifies your child to people who need to be sure we have done the research correctly; these would be people from such organizations as the University of Kentucky.

**CAN YOUR CHILD CHOOSE TO WITHDRAW FROM THE STUDY EARLY?**

If you decide to allow your child to take part in the study your child will have the right to decide at any time to no longer continue. Your child will not be treated differently if he/she decides to stop his/her participation in the study.

If your child chooses to leave the study early, data collected until that point will remain in the study database.

The investigators conducting the study may need to remove your child from the study. This may occur if your child is not able to follow the directions given to him/her or if they find your child being in the study is more risk than benefit to him/her.
CAN YOUR CHILD PARTICIPATE IN ANOTHER RESEARCH STUDY AT THE SAME TIME AS PARTICIPATING IN THIS ONE?

Your child may take part in this study if he/she is currently involved in another research study. It is important to let the investigator know if your child is in another research study. You and your child should discuss this with the investigator before your child agrees to participate in another research study while in this study.

WILL YOUR CHILD RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

Your child will not receive any rewards or payment for taking part in the study.

WILL YOU OR YOUR CHILD BE GIVEN INDIVIDUAL RESULTS FROM THE RESEARCH TESTS/SURVEYS?

Generally, tests/surveys done for research purposes are not meant to provide clinical information/diagnoses. Because the investigators may not have access to information that identifies your child, the research findings will not be provided to you or your child.

WHAT ELSE DO YOU AND YOUR CHILD NEED TO KNOW?

If you allow your child to volunteer to take part in this study, he/she will be one of about 100 people to do so.

The primary investigator is being guided in this research by Dr. Melinda Ickes. There may be other people on the research team assisting at different times during the study.

The information that you and your child are providing will no longer belong to you or your child. The research may lead to new clinical or educational knowledge, tests, treatments, or products.

FUTURE USE OF YOUR CHILD’S INFORMATION.

Identifiable information such as your child’s name or date of birth may be removed from the data collected in this study. After removal of the identifiable information, the data may be used for future research or shared with other researchers without your additional informed consent.
INFORMED CONSENT SIGNATURE PAGE

You are a participant or are authorized to act on behalf of the participant. This consent includes the following:

- Key Information Page
- Detailed Consent

You will receive a copy of this consent form after it has been signed.

___________________________________________  ____________________________
Signature of research subject or, if applicable,  Date
*research subject’s legal representative

___________________________________________
Printed name of research subject and, if applicable,

___________________________________________
*Printed name of research subject’s legal representative

*If applicable, please explain Representative’s relationship to subject and include a description of representative’s authority to act on behalf of subject:
Printed name of [authorized] person obtaining informed consent  Date

Signature of Principal Investigator or Sub/Co-Investigator
APPENDIX S

ASSENT FORM

The Effects of the USDA Summer Food Service Program on Rural Adolescents’ Nutrition Attitudes, Knowledge, Behavioral Intentions and Behaviors

You are invited to be in a research study being done by Rachel Harrington from the University of Kentucky.

You are invited because you will be attending the 2018 Upward Bound Summer Program.

If you agree to be in the study, you will be asked to complete two on-line surveys (one at the beginning of the Upward Bound Summer Program and one at the end of the Upward Bound Summer Program) consisting of 55 questions on nutrition behaviors, nutrition knowledge, attitudes about nutrition, physical activity behaviors and some demographics. Each survey will take approximately 10-15 minutes to complete.

You will be asked to attend at least one basic nutrition class. You will also have your food photographed a total of 12 times over the 5-week UB summer session to assess consumption (before and after pictures will be compared to determine how much of the food taken was actually consumed).

There will be no payment or incentive offered for participation in the study.

Your family will know that you are in the study. If anyone else is given information about you, they will not know your name. A number will be used instead of your name.

If something makes you feel bad while you are in the study, please tell Rachel Harrington (Primary Researcher) or Dr. Melinda Ickes (Primary Researcher’s Advisor). If you decide at any time that you do not want to finish the study, you may stop whenever you want.

You can ask Rachel Harrington or Dr. Melinda Ickes questions any time about anything in this study. You can also ask your parent any questions you might have about this study.

Signing this paper means that you have read this or had it read to you, and that you want
to be in the study. If you do not want to be in the study, do not sign the paper. Being in the study is up to you, and no one will be mad if you do not sign this paper or even if you change your mind later. You agree that you have been told about this study and why it is being done and what to do. You may still participate in all activities of the program even if you do not want to be in the study.

__________________________________________

Signature of Person Agreeing to be in the Study

Date

__________________________________________

Name of [Authorized] Person Obtaining Informed Assent

Date
REFERENCES


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Vegetables per Day: A Theory of Planned Behavior Perspective. *Journal of
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VITA

Mary Rachel Harrington

EDUCATION

<table>
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<tr>
<th>Institution</th>
<th>Degree</th>
<th>Date Conferred</th>
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<tr>
<td>Chapman University</td>
<td>Master of Health Administration</td>
<td>November 1995</td>
</tr>
<tr>
<td>United States Army</td>
<td>Dietetic Internship</td>
<td>June 1993</td>
</tr>
<tr>
<td>University of Kentucky</td>
<td>Bachelor of Science in Dietetics</td>
<td>December 1991</td>
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CERTIFICATIONS AND LICENSURE
Registered Dietitian Nutritionist #802807
Kentucky Licensed Dietitian #123606

ACADEMIC APPOINTMENTS

Eastern Kentucky University 2004 – present Richmond, Kentucky
Assistant Professor, Department of Family and Consumer Sciences (2013 – present)
Instructor, Department of Family and Consumer Sciences (2004-2012)

Missouri State University 2000-2001 Springfield, Missouri
Instructor, Biomedical Sciences Department

OTHER PROFESSIONAL EXPERIENCE

Outpatient Dietitian, Central Baptist Hospital, Lexington, KY 2004 – 2005
Oncology Dietitian, Bluegrass Nutrition Counseling, Lexington, KY 2004 – 2005
Seacoast Cancer Center, Wentworth-Douglass Hospital, Dover, NH 2001 – 2003
Clinical Dietitian, Cox Medical Center, Springfield, MO 1999 – 2000
Public Health Dietitian, South Carolina Department of Health and Environmental Control 1997 – 2000
United States Army Dietitian 1992 – 2000

PUBLICATIONS


AWARDS

2018 Kentucky Academy of Nutrition and Dietetics, Outstanding Dietetics Educator Award
<table>
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<tr>
<td>2018</td>
<td>Bluegrass District Academy of Nutrition and Dietetics, Outstanding Dietetics Educator Award</td>
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<tr>
<td>2016</td>
<td>Kentucky Department of Education School Food Service Champion Award</td>
</tr>
<tr>
<td>2015</td>
<td>University Programs’ Outside Service Recognition (to identify non-University programs and members who demonstrate outstanding cooperation and support to assist in the University Program’s success).</td>
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<tr>
<td>1999</td>
<td>National Cancer Institute 5 A Day for Better Health Program, Special Contribution Award</td>
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