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Dr. Robert Shapiro, Director of Graduate Studies

THE DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF A CAMPUS-  
BASED CULINARY NUTRITION PROGRAM FOR COLLEGE STUDENTS

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DISSERTATION

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A dissertation submitted in partial fulfillment of the  
requirements for the degree of Doctor of Philosophy in the  
College of Education, Kinesiology and Health Promotion Department  
at the University of Kentucky

By

Jennifer McMullen

Lexington, Kentucky

Director: Dr. Melinda Ickes, Assistant Professor of Health Promotion

Lexington, Kentucky

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## ABSTRACT OF DISSERTATION

### THE DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF A CAMPUS-BASED CULINARY NUTRITION PROGRAM FOR COLLEGE STUDENTS

College students, on average, do not consume enough fruits and vegetables. Contributing to poor eating habits is an overall decline in young adults' cooking skills as compared to previous decades, with today's college students often relying on ubiquitous convenience food options. The detriments associated with these food choices are linked to a number of chronic diseases, including obesity. Though programming for college students which incorporates both nutrition education and hands-on cooking opportunities is rare, programs which have been implemented have had positive outcomes associated with increased self-efficacy with cooking and eating healthfully, and improved eating behaviors.

This research utilized a mixed methods approach driven by the social cognitive theory to develop, implement, and assess the impact of a culinary nutrition education program, The College CHEF. The first phase of the research included conducting a PRECEDE-PROCEED model-driven primary and secondary needs assessment to develop programming. The second phase consisted of program implementation and evaluation. The program was evaluated through a Qualtrics survey to determine participants' changes pre- to –post- with cooking and eating attitudes, behaviors, self-efficacy and knowledge. Pre- and –post- measures consisted primarily of Likert-type scales, in addition to demographic questions. Research participants were students living on University of Kentucky's campus who were part of particular Living Learning Programs (LLPs), through which they lived, socialized, and often took classes together. Participants from two intervention groups ( $N = 15$ ) attended four weekly 2-hour sessions, completing the measures online before and after the program. An inclusion criteria to be included in the study was that participants must have attended at least three of the four sessions. Control

group participants ( $N = 17$ ) did not partake in programming, but completed both pre- and post-surveys at the same time as the intervention groups. The study's results indicated that campus-based, hands-on culinary nutrition education programming was impactful in improving college students': 1) self-efficacy for using fruits, vegetables, and seasonings ( $p = .015$ ); 2) fruit and vegetable consumption ( $p = 0.03$ ); and 3) knowledge of cooking terms and techniques ( $p = .000$ ).

Given the limited research studying the impact of culinary nutrition education programming on college students, especially as it applies to those living in the same environment and reciprocally influencing one another, this study provides a unique perspective to the field of health promotion. Its findings can support campus-based, culinary nutrition programming for the college population in an effort to improve eating and cooking attitudes, behaviors, self-efficacy, and knowledge, and subsequently, overall health.

KEYWORDS: Cooking; culinary; nutrition; program; college; self-efficacy, health promotion, social cognitive theory

Jennifer McMullen

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4-28-16

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THE DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF A CAMPUS-BASED  
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Date

I dedicate this dissertation to my husband, Bryan. Your unconditional love and unwavering support and belief in me throughout every aspect of my pursuit of this degree made the endeavor possible.

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## CHAPTER 1

### INTRODUCTION

Most college students do not meet the recommendations for daily fruit and vegetable intake (ACHA, 2015). Further, college students frequently make unhealthy food choices based on cost and availability of fast, convenient foods. They often lack the knowledge to make nutritious food choices, which may adversely affect their eating habits and nutritional status (Gan, Mohd, Zalilah, & Hazizi, 2011). It is suspected that many college students do not know that by eating a variety of foods in reasonable quantities, they can meet the required dietary recommendations without consuming an excess of calories, fat, or sugar (Brown, Dresen, & Eggett, 2005).

Only 4.6% of college students report eating the daily recommended servings of fruits and vegetables (ACHA, 2015). However, in focus groups examining fruit and vegetable consumption of college students, many thought that they were eating the daily recommended amount when they were, on average, consuming far less (Hartman, Wadsworth, Penny, van Assema, & Page, 2013). Thus, the percentage of college students consuming the daily recommended servings of fruits and vegetables may even be lower than is reported, lending support to providing college students with nutritional knowledge to aid dietary practices. Additionally, current research indicates there is a significant correlation between college students' nutritional knowledge and attitudes toward healthy eating (Barzegari, Ebrahimi, Azizi, & Ranjbar, 2011). As such, providing college students with nutritional knowledge may improve their attitudes toward eating healthier.

The average college students' poor eating habits are perpetuated by the fact that many are not learning cooking skills when they are younger. Today's society is fast-

paced, and many individuals do not routinely prepare meals at home (Smith, Ng, & Popkin, 2013; Soliah, Walter, & Antosh, 2006). A study exploring the cooking competencies of college-age students indicated that while some students have basic knowledge of how to eat a balanced diet, knowledge does not necessarily translate into cooking practices. Further, research suggests that programming which aids college students in improving cooking behaviors may be beneficial in improving their dietary and cooking practices (Murray et al., 2015). In health education classes for college students, it is common practice to educate students on what they should be eating. However, in order to promote behavior change, research indicates that more time should be spent toward helping students learn how to prepare and make healthy food (Soliah et al., 2006).

College students' lack of nutritional knowledge and cooking skills, poor eating habits, and consequences associated with these facets support the implementation of campus-based programming to promote healthy eating and cooking in an effort to improve young adults' overall health. Hands-on culinary nutrition education classes may provide a novel, impactful approach toward behavior change with college students' eating habits (Warmin, 2009; Kerrison, 2014). Culinary nutrition education programming which incorporates a hands-on approach may result in a gain in attitudes, behavior, self-efficacy, and knowledge (Meloche, 2003). Efforts to improve the overall healthiness of one's diet should focus on how to prepare healthy foods at home (Smith et al., 2013). On-campus nutrition education programming may provide a medium through which to offer students evidence-based, research-supported information necessary to aid in making healthy cooking and eating choices. There are many gaps in the literature with regard to programming of this kind, though those that have been implemented have been impactful

in improving variables pertaining to participants' eating and cooking knowledge and self-efficacy.

### **Statement of the Problem**

In the United States, more than one-third (78.6 million or 39.4%) of U.S. adults are obese (Ogden, Carroll, Kit, & Flegal, 2014). Further, more than one third of U.S. college students are overweight or obese (ACHA, 2015). Annually in the U.S., obesity-related medical care costs between 147 and 210 billion dollars, the majority of which is allocated to obesity-related diseases (Finkelstein, Trogon, Cohen, & Dietz, 2009). Increased BMI is a considerable risk factor for many conditions and diseases, including, but not limited to: cardiovascular disease, diabetes, some forms of cancer, and musculoskeletal disorders (WHO, 2015). Additionally, nearly 20% of deaths in the United States are associated with obesity (Masters et al., 2013). However, research has indicated that adults of a normal weight status are less likely to die prematurely than those who are obese (Healthy People, 2020). A lack of nutritional knowledge to make healthy dietary choices is a contributing factor in the overweight/obese status of college students (Holden, Pugh, Norrell, & Keshock, 2014). Thus, providing college students with nutritional knowledge may enable them to eat healthier, and may contribute to a healthier weight status.

College students' poor dietary habits may be impacted by: ubiquitous unhealthy food choices on most campuses which students often perceive as more convenient and less expensive than healthy foods, a lack of nutritional knowledge to make healthy dietary choices, and perceived barriers of time, money, and skills to cook and eat healthfully (Deliens, Clarys, De Bourdeaudhuij, & Deforche, 2014; Holden et al., 2014;



Larson, Perry, Story, & Neumark-Sztainer, 2006). However, research indicates that if college students are taught the skills to cook, they are apt to utilize what they have been taught to prepare healthy foods (Soliah et al., 2006). Findings implicate the impact of nutrition education classes among young adults in increasing nutritional knowledge to promote healthful dietary practices (Misra, 2007).

Campus-based culinary nutrition education programs often utilize the social cognitive theory (SCT), because observational learning and reciprocal determinism are underlying constructs of this theory and collectively play an important role when implementing this kind of programming (Kerrison, 2014; Warmin, 2009). Further, SCT provides an ideal framework for food selection and healthy eating (Lewis, Sims, & Shannon, 1989). SCT focuses on goal-setting behavior, which should be emphasized throughout programming of this kind to promote behavior change and improve self-efficacy. SCT focuses on the importance of self-efficacy, which may be an integral component of behavior change. Strategies meant to improve self-efficacy should be embedded throughout programming, as further described in Chapter I (Strong, Parks, Anderson, Winett, & Davy, 2008).

The current dietary and obesity trends associated with college students make clear the need for promoting and improving health within this subset of the population. This is acknowledged by Healthy Campus 2020, which ascertains the need to increase the proportion of college students who are of a healthy weight, decrease the proportion of students who are obese, and increase the number of those reporting that they consume five or more servings of fruits and vegetables daily (Healthy Campus, 2020). It is important to note that there is limited literature involving the impact of campus-based

culinary nutrition education programming. The positive findings from previous research, though limited, makes clear the need for continued research in this area. As such, this study sought to determine if a tailored program targeted toward college students which incorporated nutrition education and culinary skills and techniques impacted participants' attitudes, behaviors, self-efficacy and knowledge related to healthy cooking and eating.

### **Purpose**

A lack of cooking skills, money, and time to cook collectively serve as the main barriers with young adults with healthy cooking and eating (Larson et al., 2006). Research indicates that a skill-based approach is important in improving cooking attitudes, behavior, self-efficacy and knowledge (Meloche, 2003). Thus, hands-on culinary nutrition education programming operationalizing SCT constructs to promote behavior change could support college students in improving the aforementioned outcomes. Therefore, the purpose of the dissertation study was to develop, implement, and evaluate through a mixed-methods approach, the College CHEF: “Cooking **Healthfully, Educating For Life-Long Change.**” The methodological approach taken in this study was guided by a PRECEDE- PROCEED-driven needs assessments, rooted in evidence-based research, and framed by the social cognitive theory. Primary outcomes related to healthy cooking and eating (attitudes, behaviors, self-efficacy and knowledge) were evaluated from pre- to -post- programming for both intervention and control group participants.

### **Research Questions and Associated Hypotheses**

In order to achieve the program goals of improving college students' attitudes, behaviors, self-efficacy and knowledge as related to healthy cooking and eating, there

were a number of research questions and associated hypotheses explored through three separate manuscripts, as detailed in Chapters IV, V, and VI. See Appendix A for the research matrix which details for each manuscript: research questions and hypotheses, independent and dependent variables, scales and data analysis. Research questions and hypotheses by manuscript are as follows:

### **Manuscript I Research Questions**

**RQ1-** How does the summary of secondary needs assessment findings influence the development of the College CHEF program?

**RQ2-** How does the summary of findings from formative focus groups with college students influence the development of the College CHEF program?

**RQ3-** How does the summary of findings from interviews with campus stakeholder influence the development of the College CHEF program?

**RQ4-** How does the summary of findings from surveys with college students influence the development of the College CHEF program?

**RQ5-** What are the goals of the College CHEF program?

**RQ6-** What tailored evidence based intervention strategies are included in the College CHEF?

### **Manuscript II Research Questions and Associated Hypotheses**

**RQ7-** What is the impact of the College CHEF (pre- to -post-) on participants' attitudes toward healthy cooking?

H7.1- Intervention group participants will have significant improvements in attitudes toward healthy cooking (pre- to -post-).

H7.2- Control group participants will not have a change in attitudes toward healthy

cooking (pre- to -post-).

H7.3- Intervention participants will have significant improvements in attitudes toward healthy cooking, as compared to the control group (pre- to -post-).

**RQ8-** What is the impact of the College CHEF (pre- to -post-) on participants' cooking behavior?

H8.1- Intervention group participants will have significant improvements with cooking behavior (pre- to -post-).

H8.2- Control group participants will not have a change with cooking behavior (pre- to -post-).

H8.3- Intervention participants will have significant improvements with cooking behavior as compared to the control group (pre- to -post-).

**RQ9-** What is the impact of the College CHEF (pre- to -post-) on participants' fruit and vegetable consumption?

H9.1- Intervention group participants will have significant improvements with fruit and vegetable consumption (pre- to -post-).

H9.2- Control group participants will not have a change with fruit and vegetable consumption (pre- to -post-).

H9.3- Intervention participants will have significant improvements with fruit and vegetable consumption, as compared to the control group, (pre- to -post-).

**RQ10-**What is the impact of the College CHEF (pre- to -post-) on participants' eating behaviors?

H10.1- Intervention group participants will have significant improvements with eating behaviors (pre- to -post-).

H10.2- Control group participants will not have a change with eating behaviors (pre- to – post-).

H10.3- Intervention participants will have significant improvements with eating behaviors, as compared to the control group (pre- to -post-).

**RQ11-** What is the impact of the College CHEF (pre- to -post-) on participants' knowledge of cooking terms and techniques?

H11.1- Intervention group participants will have significant improvements with knowledge of cooking terms and techniques (pre- to -post-).

H11.2- Control group participants will not have a change with knowledge of cooking terms and techniques (pre- to -post-)

H11.3- Intervention participants will have significant improvements with knowledge of cooking terms and techniques, as compared to the control group (pre- to -post-).

### **Research Questions and Associated Hypotheses for Manuscript III**

**RQ12-** What is the impact of the College CHEF (pre- to -post-) on participants' self-efficacy with fruit and vegetable consumption?

H12.1- Intervention group participants will have significant improvements with self-efficacy for fruit and vegetable consumption (pre- to -post-).

H12.2- Control group participants will not have a change with self-efficacy for fruit and vegetable consumption (pre- to -post-)

H12.3- Intervention participants will have significant improvements with self-efficacy for fruit and vegetable consumption, as compared to the control group, (pre- to -post-).

**RQ13-** What is the impact of the College CHEF (pre- to -post-) with participants' cooking self-efficacy?

H13.1- Intervention group participants will have significant improvements with cooking self-efficacy (pre- to -post-).

H13.2- Control group participants will not have a change with cooking self-efficacy (pre- to -post-).

H13.3- Intervention participants will have significant improvements with cooking self-efficacy, as compared to the control group, (pre- to -post-).

**RQ14-** What is the impact of the College CHEF (pre- to -post-) with participants' self-efficacy for using basic cooking techniques?

H14.1- Intervention group participants will have significant improvements with self-efficacy for using basic cooking techniques (pre- to -post-).

H14.2- Control group participants will not have a change with self-efficacy for using basic cooking techniques (pre- to -post-).

H14.3- Intervention participants will have significant improvements with self-efficacy for using basic cooking techniques, as compared to the control group, (pre- to -post-).

**RQ15-** What is the impact of the College CHEF (pre- to -post-) on participants' self-efficacy for using fruits, vegetables, and seasonings?

H15.1- Intervention group participants will have significant improvements with self-efficacy for using fruits, vegetables, and seasonings (pre- to -post-).

H15.2- Control group participants will not have a change with self-efficacy for using fruits, vegetables, and seasonings (pre- to -post-).

H15.3- Intervention participants will have significant improvements with self-efficacy for using fruits, vegetables, and seasonings, as compared to the control group, (pre- to -post-).

### **Significance of the Study to Health Promotion**

To the researcher's knowledge, no published studies have detailed the programming planning process, as driven by the PRECEDE-PROCEED model, in developing a campus-based, culinary nutrition education program. The impact of an unhealthy diet may not be apparent until years after an individual has routinely engaged in poor eating habits (Denny, 2008). College students have a proclivity for diets which are high in fat, which serves as a risk factor for obesity and for developing heart disease and some types of cancer (Kuller, 1997; Stoeckli & Keller, 2004). Thus, providing college students with information and the skill set to cook and eat healthier may have the ability to positively impact their life-long health, lending support to an intervention such as the College CHEF. Further, there are no present studies which evaluate campus-based culinary nutrition education programming's impact on college students who live together as part of a Living Learning Program cohort. These programs, referred to as LLPs, house undergraduate students based on their academic interests, routinely engaging them in academic and/or social programming (National Study of Living Learning Programs, 2007). LLP participants were a unique sample, given that individuals had the opportunity to extend the impact they had on one another to that of where they lived, participated in academic classes together, and routinely interacted. Findings from this study contribute to the general understanding of the role in which campus-based culinary nutrition education programming influences healthy eating and cooking attitudes, behaviors, self-efficacy, and knowledge, in an effort to improve these outcomes with college students.

## **Theoretical Framework**

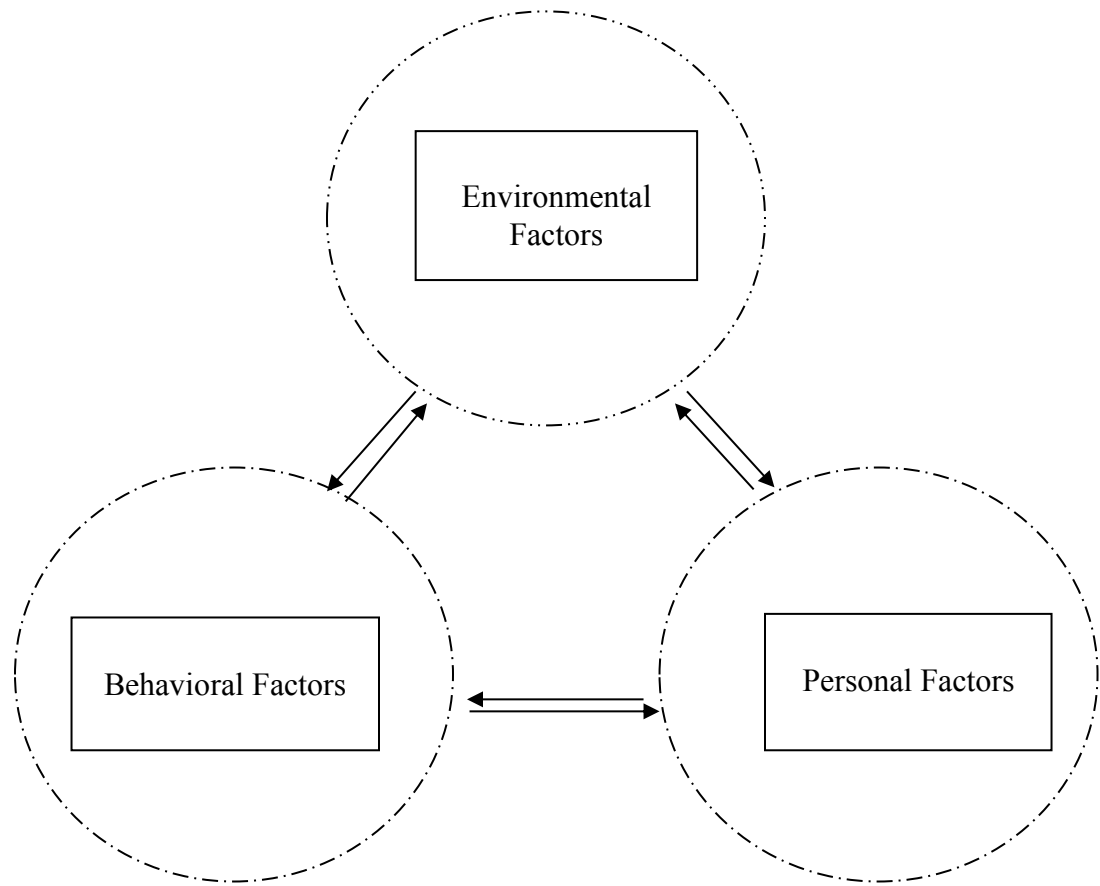
The College CHEF was theory-driven and evidence-based. Given that previous campus-based nutrition education programs have successfully been driven by the social cognitive theory, in conjunction with how well its constructs align with the goals, research questions, and hypotheses of the College CHEF, the SCT served as its theoretical framework (Warmin, 2009; Kerrison, 2014; Bandura, 1977). A previous campus-based culinary nutrition education program driven by the SCT operationalized eight constructs routinely throughout sessions and through having participants complete at-home assignments which reflected lessons learned throughout programming, in an effort to promote self-efficacy. Additionally, this study placed emphasis on the construct of "environment" by guiding students on an interactive tour through a grocery store they most commonly frequented. Collectively all constructs contributed to participants having significant improvements in various areas related to cooking self-efficacy, lending merit to operationalizing SCT constructs in programming of this kind (Kerrison, 2014).

The SCT asserts that personal, behavioral, and environmental factors influence one another reciprocally, referred to as reciprocal determinism. Reciprocal determinism asserts that a person's behavior is influenced by personal factors which encompass individuals' past experiences as well as genetic, behavioral, environmental, predisposing, reinforcing, and enabling factors (Bandura, 1977; KU Work Group, 2015). The SCT asserts that learning occurs within a social context, and that observation of behaviors and associated outcomes influence one's behavior (Bandura, 1977). The College CHEF's intervention participants observed the dynamic associated with instructors providing feedback to fellow LLP members throughout the course of programming. It was the



intention of the program's instructors that they routinely provided feedback to participants, and praise as appropriate, in an effort to influence the behavior of not only the participant receiving feedback, but fellow participants' behavior as well.

Programming also emphasized self-efficacy, an individual's beliefs in their ability to carry out behaviors in order to produce specific outcomes, of which is arguably the most impactful self-knowledge aspect in individuals' lives, and key in sustaining behavior change (Bandura, 1977). Self-efficacy was reinforced throughout programming through direct and vicarious reinforcements, as well as through instructors encouraging goal-setting and allowing participants to work with and help one another practice cooking skills and techniques in small groups. Goal-setting within programming was enforced through having participants record one SMART goal associated with participating in the College CHEF. See Figure 1 for a diagram of the SCT, depicting its bidirectional nature. An overview of the SCT constructs utilized in programming are outlined at the end of Chapter I. Strategies utilized in programming which are rooted in SCT constructs are included in Chapter III within "Evidence-Based Strategies".



*Figure 1.* Social cognitive theory model diagram

### **Delimitations**

Delimitations consist of choices a researcher purposefully makes, and of which encompass boundaries within a study. These may include the literature that will not be reviewed, the things that will not be done within the study, the population not being studied, and the methodological procedures not being used (Develop a Research Study, n.d.). Delimitations for the study are outlined below.

### **Literature**

Literature was not reviewed which did not pertain to college students or individuals in a similar situation as typical college students, such as those participating in community-based programming geared toward low-income adults. While a low-income

status may not pertain to all college students, research indicates that a large number of college students struggle with financial burden in the way of debt through student loans and credit cards. Thus, cooking and nutrition education programming which is geared toward low-income participants was considered pertinent to the study and related literature was reviewed (Bowen & Lago, 1997). Literature was not reviewed which related to childhood-based (e.g. elementary and/or middle school) cooking programming, as the amount of literature which exists is too vast and too different from college-aged populations, making applicability and generalizability of findings difficult.

### **Population/Sample/Setting**

Individuals not included in the study were those who were not college students living on campus as part of select LLPs, as the purpose was to evaluate how programming impacted traditional, campus-based, LLP-affiliated college students. The traditional college population is one which may be more apt for behavior change, given that many are independently making major lifestyle choices for the first time. College campuses have the opportunity to promote healthy behavior, and to educate students on how to make positive behavior changes become life-long habits, which the College CHEF capitalized upon (Sparling, 2007).

### **Limitations**

Limitations are influences which extend beyond the control of the researcher. For this study, these included the following components.

### **Sample**

The goal was to recruit twenty-five participants for each intervention group, as there was funding and space for that many individuals. However, initial enrollment and

attendance at subsequent sessions did not garner that many participants. Intervention participants who completed the pre- and –post- survey and attended three or more sessions comprised a small sample size ( $N = 15$ ) and it was determined appropriate to combine them for manuscript and data analysis purposes, given their similarities in baseline demographics and that they participated in nearly identical programming. Consequently, the small sample size with participants from only one campus served as a limitation, as it made results from the study more difficult to generalize. One month follow-up data was not included for analysis purposes as only five intervention participants completed this set of measures. For the combined intervention groups, there were thirty participants who completed the baseline survey, twenty-four individuals who attended the first session, and fifteen who attended at least three sessions and completed the pre- and –post- survey. With the control group, there were 47 participants who completed the baseline survey, and seventeen individuals who completed both the baseline and –post- survey.

Historically, the majority of individuals participating in culinary programming are female, often at a 2:1 ratio (Lin & Dali, 2012). For one intervention group, this trend was reflected, as the KHP intervention group was comprised of 80% female and 20% male participants who attended three or more sessions. However, the First Generation LLP intervention group was comprised of an almost equal number of male and female participants with a weekly turnout of 46% male and 54% female. Though in the end, 67% ( $n = 10$ ) of intervention participants who both attended three or more sessions and completed both the pre- and -post- surveys were female, serving as a limitation.

## **Methodological Procedures**

A convenience sample was used for the study given the limited time, available space, staff, willing participants, and resources involved with program planning and implementation. Though as the College CHEF was a pilot study, this choice of sample was deemed appropriate. Further, self-reporting of outcomes on the pre-, -post- measures served as a limitation, but it was the only feasible way to assess programming's impact.

## **Funding**

Funding served as a barrier, especially as it pertained to providing incentives for completing the 1-month follow-up survey. Funding for incentives for follow-up survey completion was provided through the George and Betty Blanda Endowed Professorship awarded through the University of Kentucky's Kinesiology and Health Promotion Department in the way of 5-\$20 VISA cards. These gift cards were awarded to five control group participants who completed the 1-month follow-up survey, chosen at random through a random number generator via Microsoft Excel version 6.3.9600. However, not enough funding existed to provide follow-up incentives for intervention participants, resulting in low response rates for the 1-month follow-up survey, inadequate to include in analysis.

## Cooking Definitions

Table I

*Key Cooking Definitions Used in Programming*

Term	Definition
Mise en place	French for ‘to put in place’. This refers to the assembly and preparation of necessary equipment and ingredients (LaBourdai, 1953).
Julienne	To cut food into stick-shaped pieces (LaBourdai, 1953).
Blanching	A cooking process in which a food item is plunged into boiling water, briefly cooked, and then plunged into iced water to halt the cooking process (LaBourdai, 1953).
Poaching	To cook in a boiling or simmering liquid (LaBourdai, 1953).

### Summary

This chapter introduced the rates of overweight and obesity in U.S. adults and college students and associated health effects. Further, college students’ poor eating habits and lack of nutritional knowledge and cooking skills were outlined. Campus-based programming to promote healthy cooking and eating was recommended to improve related attitudes, behavior, self-efficacy, and knowledge among college students. Research questions and hypotheses in relation to the development, implementation, and evaluation of the College CHEF were referenced in Appendix A. The significance of the study to the field of health promotion was provided, exploring the incorporation of a unique sample. This chapter concluded by discussing delimitations and limitations of the study, as well as outlining cooking definitions used in programming.

Chapter II presents a literature review. Chapter III provides information regarding the research methodology for both studies associated with the evaluation, development, and implementation of the College CHEF. Chapter IV describes the utilization of a PRECEDE-PROCEED model used to drive primary and secondary needs assessments to develop the College CHEF. Chapter V details the impact evaluation of the College CHEF to determine if there was a significant difference from pre- to post- intervention with participants' attitudes, behaviors toward, and knowledge of healthy cooking. Chapter VI discusses the impact of programming on participants' self-efficacy with cooking skills and nutrition behaviors. Lastly, Chapter VII entails the summary of results, contributions to the literature, limitations, implications, suggestions for future research, and ends with a conclusion.

## CHAPTER 2

### REVIEW OF THE LITERATURE

Over one third of U.S. college students are overweight or obese (ACHA, 2015). Obesity-related conditions comprise, but are not limited to: heart disease, stroke, type 2 diabetes and certain types of cancer (Centers for Disease Control and Prevention, 2014). Other notable consequences include gallstones, sleep apnea, gastrointestinal disease, asthma, infertility and psychological issues such as depression and anxiety (Centers for Disease Control and Prevention, 2014). Overweight and obesity are attributed to a lack of energy balance. Energy balance refers to energy expenditure being equivalent to energy intake. Energy intake occurs through consuming food and drinks. Expended energy refers to the energy one uses when breathing, metabolizing food, and engaging in physical activity. To maintain a normal weight, an individual's overall energy needs to be balanced (National Heart, Lung, and Blood Institute, 2012). Current rates of obesity have been partially attributed to an increase in individuals': snacking, eating away from home, and portion sizes (Duffey & Popkin, 2011; Piernas & Popkin, 2011). Many college students engage in detrimental health practices, future contributing to obesity rates, such as routinely making poor dietary choices, partaking in unhealthy dieting tactics, skipping meals, and consuming fast food (DeBate, Topping, & Sargent, 2001; Franko et al., 2008).

Research indicates that college students cite many perceived barriers related to eating and cooking healthfully including: a lack of time and tools with which to cook, not having enough money, not willing to put forth the effort, and issues with transportation to grocery stores (Benner-Kenagy, 2013). Efforts to prevent and manage obesity with adults typically emphasizes educating them on nutrition topics such as how to make healthy



food choices, as a poor understanding of nutrition and dietary practices may lead to weight gain in adults (Burns, Richman, & Caterson, 1987). Initiatives targeted toward providing nutritional knowledge to college students, and promoting healthy eating practices are judicious given that a large percentage of 18 to 25 year-olds who enroll in college and have poor nutritional practices are far more likely than those with healthy dietary habits to be overweight after graduating from college (Sparling & Snow, 2002).

For many young adults, leaving home for college marks the first time they independently make major lifestyle choices (Sparling, 2007). College students have an opportunity to gain personal freedom, encounter new experiences, and develop a sense of self as they progress from adolescence to adulthood. Unfortunately, with these changes comes the proclivity to make unhealthy food selections, to skip meals, and to consume fast food (Franko et al., 2008). Colleges and universities provide settings which may be impactful in promoting healthy weight management techniques in an effort to reduce the prevalence of the overweight and obese statuses of some college students (National Center for Education Statistics, 1996). Since college students' living situations may impact their diet and diet-related health, campuses should provide nutrition education and cooking programming to improve cooking and dietary practices to promote healthier habits (Brevard & Ricketts, 1996).

The recognition of food insecurity is an important factor in identifying barriers which may exist with college students in making healthy food choices. Food security is defined as having access by all people at all times to ample food so as to be able to lead an active, healthy life, whereas food insecurity is inaccessibility to enough healthy food to meet the recommended dietary guidelines (USDA, 2015). As food insecurity rises,

college students report decreases in: self-efficacy for cooking cost effective, healthy meals ( $p = 0.004$ ), self-reported cooking skills ( $p = 0.003$ ), money to purchase ingredients ( $p < 0.001$ ) and time for food preparation ( $p = 0.001$ ). As such, ensuring that college students are aware of how they can access healthy foods is an important facet in supporting food security. This can be done through implementing programming to teach college students about healthy food options on campus as well as tips for budgeting and purchasing healthy foods at a reasonable cost, such as through: couponing, making lists, and examining store flyers for best prices (Gaines, Knol, Robb, & Sickler, 2012).

There are multiple facets which impact one's ability to make healthy food choices, many of which are modifiable. Determinants include: the built environment (the space in which people live, work, and socialize), environmental factors (climate) and social and individual factors (age, gender, race and ethnicity, socioeconomic status, education, disabilities, genetics) (Healthy People, 2020). Determinants may affect one's proclivity toward overweight/obesity, further supporting the necessity for prevention and intervention programs to target modifiable behavior and factors in promoting positive behavior change. These factors were taken into consideration when developing, implementing, and evaluating the College CHEF.

## **Literature Review**

### **Purpose**

The purpose of the literature review was to investigate existing research highlighting culinary nutrition education programming in order to determine evidence-based best practices for developing and implementing the College CHEF. These practices and findings were tailored to promote theory-driven, evidence-based strategies throughout programming. Findings were a result of conducting a secondary needs

assessment to develop curriculum as part of the program planning process. The program planning process involving both the secondary and primary needs assessment is detailed in Chapter IV.

### **Literature Review Criteria**

A literature review was conducted utilizing the following databases through EBSCOhost through the University of Kentucky's library system: (1) Academic Search Complete, the most comprehensive, academic database which includes full text articles from across the disciplines; (2) CINAHL, an allied health database; (3) ERIC, which includes educational resources; (4) MEDLINE, which is comprised of medical, science, and health sources; and (5) Psychology and Behavioral Sciences Collection, an important source given its behavioral science component and tie to this particular type of research. Search terms were as follows: college AND cooking OR culinary AND nutrition AND intervention OR program. Articles were chosen which were peer-reviewed and published between the years 2005-2015. This resulted in 2,135 articles, the first several hundred of which their abstracts were extracted and reviewed to determine if they were appropriate to include. Further, the PI scanned the reference lists of pertinent manuscripts to determine if additional sources could be utilized, and those which were applicable were included within the literature review.

### **Health in Kentucky**

Kentucky's health ranking is based upon a number of strengths and challenges which are faced by many of its residents. Strengths include: a low violent crime rate, a low prevalence of excessive drinking of alcohol, and high rates of high school graduation. Challenges include: high rates of deaths due to cancer, high rates of

preventable hospitalizations, and a high prevalence of smoking. Of note, in the past year, adults with diabetes in the state of Kentucky have increased from 10.6% 12.5% (America's Health Rankings, 2016).

Obesity rates in Kentucky vary according to education level. Obesity in adult Kentuckians who have graduated from high school, but have not completed additional education beyond high school, comprises 36.6% of the obese adult population in Kentucky. Those individuals who have had some amount of college education make up 34.6% of obese adults in Kentucky. Finally, 28.7% of obese Kentuckians are college graduates (America's Health Rankings, 2016). These findings may indicate the influence that exposure to and completion of college and the varying elements which encompass attending college may have including increased knowledge through higher education, may have the potential to positively influence one's health.

Within the United States, Kentucky ranks 44<sup>th</sup> out of 50 states with regard to overall health status (America's Health Rankings, 2016). This ranking is due in part to the previously mentioned factors which serve as both challenges and strengths to the overall state of the people of Kentucky's health statuses. This encompasses the inclusion of other factors including determinants of health and health outcomes. Research indicates that Kentuckians report a greater number of poor mental health days (those days in which an individual indicates that their activities are limited as a result of mental health difficulties) than 47 other states (America's Health Rankings, 2016). This, paired with the fact that a significant number of Kentucky residents suffer from chronic disease makes clear the need for change (America's Health Rankings, 2016).

## **Health Education in Kentucky Schools**

In Kentucky elementary, middle, and high schools, health instruction is aligned to National Health Education Standards and addresses topics such as alcohol and drug use and abuse, nutrition, mental and emotional health, personal health and wellness, physical activity, safety and injury prevention, sexual health, tobacco use, and violence prevention. Instructional methods and time allotted for certain topics varies by county, school, grade, and instructor (Kentucky Department of Education, 2012). This makes it difficult to determine students' pre-existing level of nutrition education prior to entering college. Since 79% of UK students are Kentucky residents, this information is important to consider when implementing health-oriented programming at the college level, as it suggests that the extent and variety of nutrition education received at the elementary through high school levels may vary significantly (Carnegie Communications, 2015). This indicates that campus-based culinary nutrition education programming should initially incorporate the introduction of basic, foundational nutritional concepts, given the lack of consistency in what is required of nutrition education in Kentucky schools.

## **Healthy People 2020**

Healthy People 2020 is an initiative which provides updated health-related objectives every ten years in an effort to improve Americans' overall health statuses. There are a wide array of categories included within the realm of Healthy People 2020 in an effort to support a society at the national, local, and state level, in which everyone lives long and healthy lives (Healthy People 2020, 2014a). Objectives related to nutrition and weight status are plentiful and pertain to individuals across the lifespan. Examples of objectives pertinent to the adult population include: increase the percentage of Americans

with access to stores which sell a variety of foods suggested within dietary guidelines, increase the variety and amount of fruits and vegetables in Americans' diet, decrease the consumption of calories consumed from fat and sugar, prevent unnecessary weight gain in you and adults, and decrease the percentage of obese adults (Healthy People 2020b, 2014).

### **Healthy Campus 2020**

Healthy Campus 2020 is a framework which provides support to campuses to improve the health of their students, faculty, and staff. There are objectives for both students and for faculty/staff. Categories of which objectives are a part include: Mental Health and Mental Disorders, Injury and Violence Prevention, Nutrition and Weight Status, and Physical Activity and Fitness, among others. Healthy Campus 2020's nutrition-related goals, from the Nutrition and Weight Status category, were used as a reference when creating the goals of the College Chef. These include: increasing the number of normal weight students, reducing the number of students who are obese, increasing the number of students who consume at least five or more servings of fruits and vegetables per day, and increasing the number of students who report receiving nutrition information from their school (ACHA, Healthy Campus 2020, 2015).

### **2015-2020 Dietary Guidelines for Americans**

The Dietary Guidelines for American provide recommendations for adults in the U.S. to guide them in making healthier dietary choices. The five main guidelines intended to promote healthy eating patterns include: 1) Follow a healthy eating pattern rich in fruits and vegetables across the lifespan, in support of a healthy BMI and to decrease the risk of chronic disease; 2) focus on variety and amount of foods; 3) limit sodium, sugar,

and saturated fats; 4) Consume nutrient-dense food and drinks; and 5) support healthy eating patterns for everyone (Dietary Guidelines 2015-2020, 2015).

Dietary guidelines were included within programming as research indicates that college students are generally unaware of the proper dietary recommendations, potentially making healthy eating behaviors difficult (Brown et al., 2005). Therefore, guidelines were made clear to intervention participants and used as a reference throughout sessions.

### **College Nutrition Education**

While it was the researcher's intention through the literature review to focus solely on culinary nutrition education programming for college students, given the somewhat limited literature within this specific facet, college-based nutrition education interventions which did not include a culinary component were also explored. A systematic review of nutrition education interventions with college students indicated that there were three main formats for their implementation: web-based, through lectures, and through providing supplemental materials. In campus-based nutrition education interventions, dietary intake measures are typically utilized, consisting primarily of questions pertaining to food recall and dietary habits. Outcome measures with these types of interventions tended to vary, but often include: food consumption, nutritional knowledge, and dietary practices. Overall, outcome measures indicated that college students who participate in nutrition education interventions experience significant improvements with their dietary habits (Lua & Elena, 2012).

In one study which evaluated the effectiveness of incorporating instructional videos into a college-level nutrition education course, results were statistically significant

for individuals exposed to this medium of instruction. Videos portrayed vegetable-focused cooking demonstrations which included the execution of cooking skills and techniques. Participants who viewed the videos additionally had the opportunity to taste-test a number of healthy foods. Results indicated that class participants' overall stage of readiness to consume more vegetables improved from the contemplation stage to the preparation stage within the Transtheoretical Model ( $p < 0.001$ ). Further, self-efficacy of vegetable preparation significantly increased ( $p = .001$ ) (Brown, Wengreen, Vitale, & Anderson, 2011).

Another study examined the impact of participating in nutrition education incorporated as part of a module within a new student orientation course for college freshmen. As a result of the intervention, students improved their understanding of: nutritional knowledge as it pertained to recognition and understanding of appropriate portion size, caloric and fat content of fast food and snacks, and how to shop and prepare healthful snacks and meals. Participants were, overall, willing to change their eating behaviors to reflect a more healthy approach -post- programming. Additionally, after the intervention, participants indicated that they were cooking recipes from class, eating breakfast more regularly, avoiding soft drinks, and more frequently consuming healthy snacks and meals (Todorovich, 2011).

Bu (2012) examined the impact of a 14-week elective college-level nutrition education course which delivered a series of lectures pertaining to topics such as: obesity, weight management, general nutrition, and healthy food choices. As a result of the intervention, participants reported a decrease with both unhealthy dietary habits and overeating ( $p < 0.01$ ). Thus, campus-based nutrition education programming may have



the potential to significantly impact participants' eating and cooking habits, and possibly, their overall health.

### **College Cooking and Nutrition Education**

Research indicates that programs which aim to improve the health and wellness of college students can play a role in delaying the onset of chronic illness. Specifically, programming whose focus is on improving individuals' self-efficacy, such as through promoting the importance of maintaining healthy nutritional habits, may be impactful in improving individuals' overall health status (Sidman, D'Abundo, & Hritz, 2009).

Nutrition education is widely used across populations in order to deliver information as it relates to nutrition knowledge to promote healthy eating practices. Classes which focus on nutrition knowledge alone are not as effective as programming which additionally incorporates hands-on cooking opportunities (Horodynski, Hoerr, & Coleman, 2004). However, research indicates that interventions which encompass both nutrition education and include a hands-on cooking component are rarely implemented for college students (Warmin, 2009).

Lin & Dali (2012) suggest that programming focusing on nutrition, when combined with engaging, hands-on cooking strategies may be beneficial in improving college students' eating habits. One study found that the acquisition of cooking skills was moderately correlated to higher vegetable consumption among college students ( $p < 0.001$ ), lending support to employing cooking classes to encourage young adults in meeting daily dietary recommendations (Kourajian & Stastny, 2015). Alsing et al. (2015) examined the impact of three, 1-hour extracurricular campus-based cooking class for college students. Participants were taught to make Mediterranean-inspired recipes

tailored to be prepared in a limited time, given most college students' perceived barrier of not having enough time to cook. No association was found between previous cooking experience and meal preparation practice -post- programming. However, this could have been attributed to the limited duration of programming. Participants did report improved interest in cooking more regularly in an effort to improve their personal dietary practices. Additionally, they were more interested in cooking -post- programming, as a result of learning of its cost effective nature. The nutritional education component of this class focused on the importance of cooking as related to these two facets (improved dietary practice and cost-effectiveness), indicating that if instruction hones in on helping college students overcome perceived barriers with cooking and eating healthfully, it may impact their associated attitudes and behaviors (Alsing et al., 2015).

An exploratory study examining college students' skills, confidence, and healthy cooking competencies found that a lack of cooking knowledge, skills, money, and access to healthy foods, as well as constraints with time may play significant roles in participants' ability to cook and consume nutritious meals. The study made clear the importance of incorporating strategies which motivate and encourage college students in their dietary behaviors and practices in a way that is practical for this population (Murray et al., 2015). With female college students, the primary reasons cited for not being able to prepare basic foods were never having been taught (knowledge barrier) and not having an interest in learning (attitude barrier). However, if individuals are taught the skills necessary to prepare specific foods, they are very likely to prepare them (Soliah et al., 2006). Further, research indicates college students' living environments' influence their diet and overall health (Brevard & Ricketts, 1996). Eating on campus, such as through

meals consumed through campus-based dining services may provide college students with an overabundance of food choices. The exposure to an environment with calorie-dense food items may serve as a significant risk factor for weight gain if students consume more energy through food than they are expending (Levitsky, Halbmaier, & Mrdjenovic, 2004). College students may lack appropriate self-regulatory skills, such as self-monitoring, to maintain healthy dietary practices given the food-related temptations that the college environment provides (Strong et al., 2008). The findings may support the dissemination of information to provide students with ways to make healthy food choices within the realm of the college environment.

Research indicates that as a result of participating in hands-on cooking programming which incorporates nutritional information, significant improvements in knowledge of fruit and vegetable recommendations may ensue. This was the case with one study in which participants had statistically significant improvements in these areas as compared to control groups both -post-intervention and at a 4-month follow-up (Clifford et al., 2009). Another research study examined the impact of college students who had watched cooking demonstrations versus those who participated in hands-on cooking classes. Participants who received instruction and executed skills through hands-on cooking classes displayed positive shifts in cooking knowledge, and with behaviors related to healthy eating. Participants also had significantly higher scores -post- test on attitude scales. Improved attitudes included "liking to cook" and feeling that cooking was beneficial to them. Additionally, the intervention group had a statistically significant increase in self-efficacy with using various cooking techniques. Thus, through the instruction and practical application of cooking skills came the obtainment of knowledge

and self-efficacy in aiding individuals in making healthier foods (Levy & Auld, 2004).

Kobler (2013) evaluated the impact of a 16-week seminar for first-year college students which emphasized cooking skills and techniques through hands-on practice. Significant changes in food preparation skills were observed in participants from pre- to -post- ( $p < 0.05$ ). Further, at baseline, 80.5% of participants were self-efficacious that they could consume at least a 1/2 cup serving of vegetables at home once per week. Contrastingly, at -post- survey, 93% of participants felt confident with the same eating behavior.

Warmin (2009) found that both intervention groups in a hands-on culinary program comparing pre- and post-survey data scored significantly higher on the scales for Cooking Self-Efficacy ( $p = 0.041$ ), Cooking Techniques Self-Efficacy ( $p = 0.012$ ), Self-Efficacy for Fruits, Vegetables, and Seasonings ( $p = 0.002$ ), and Knowledge of Cooking Terms and Techniques ( $p < 0.001$ ). Additionally, for the delayed post-survey, the intervention groups scored significantly higher with three questions regarding nutrition knowledge. The study illustrates the benefit of using a hands-on culinary nutrition education program with college students in improving their cooking and healthy eating self-efficacy, as well as their cooking knowledge. While intervention groups did not score significantly higher on all scales compared to the control group, their higher self-efficacy scales' scores reinforced the potential impact that culinary nutrition education programming may have on self-efficacy with healthy cooking, and the importance of incorporating strategies to promote associated self-efficacy, which the program did through the use of the social cognitive theory. The findings of this study based upon an intervention entitled *Cooking with a Chef* are of particular note given that the College

CHEF used a modified version of its survey and components of its facilitators guide, with permission. Another intervention, which also utilized the *Cooking with a Chef* program and measures, found that three of the eight indexes/scales on the pre- and -post- tests showed significant differences between the treatment and control groups: Cooking Self-Efficacy (SEC) ( $p = 0.0024$ ), Self-Efficacy for Using Basic Cooking Techniques (SECT) ( $p < 0.0001$ ), and Self-Efficacy for Using Fruits, Vegetables, and Seasonings (SEFVS) scales ( $p < 0.0001$ ) (Kerrison, 2014).

One culinary nutrition education intervention unearthed through the literature review was SCT-driven with the purpose of increasing the fruit and vegetable consumption of college students. Though this study did not include an in-class cooking component, it employed hands-on, interactive activities such as having participants taste-test healthy foods and receive instruction on how to follow a recipe. Students were also assigned at-home cooking projects. The activities were intended to evaluate students' cooking and eating behaviors as well as environmental factors which influenced these behaviors. Instruction and hands-on application of skills sought to motivate individuals to change not only their dietary habits, but to modify their eating and cooking attitudes and behaviors on a long-term basis. As a result, there were statistically significant increases in the consumption of total vegetables, fresh vegetables, total fruit, and fresh fruit from pre- to -post- test. Further, there was a significant decrease in consumption of french fries from pre- to -post- test ( $p = 0.01$ ) (Ha & Caine-Bish, 2009).

When individuals are unable to prepare simple foods, it perpetuates the potential to become dependent on restaurants, bakeries, and other take-away options, often less healthy than cooking and eating at home (Soliah et al., 2006). Such data support cooking

programming as a means to teach individuals skills to create healthy meals so as provide them the tools necessary to rely less on food options away from their home. Providing and utilizing these tools can potentially lead to healthier diets, and improved related health. It has been revealed that with college-aged women who report that they do know how to prepare foods, they, in fact, most often know how to prepare sweet foods, such as brownies, pancakes, muffins, cookies, and cake. Possible explanations for this are that these foods are sweet, which can be tastier than other foods, and that women are taught how to prepare these foods when they are younger. However, research indicates that overall women in college may be less motivated to prepare food than in previous generations (Soliah et al., 2006). Cullen et al. (2001) suggested that goal setting can be a useful tool in increasing one's motivation as it relates to healthy dietary practices, which the College CHEF included as a component of programming.

### **Community Cooking and Nutrition**

Nutrition education interventions may be impactful in helping to combat the rising trends in obesity, especially with individuals who are at an increased risk for obesity, such as low-income adults (Drewnowski, & Specter, 2004). Programming may help in guiding individuals toward making healthier dietary choice, like not relying on processed foods and cooking meals at home more often. Community-based programming aimed at improving these areas has the potential to impact low-income adults who may rely on less expensive, less nutritious foods choices (Keystone Center, 2006).

"Share our Strength" is a nation-wide community-based organization which seeks to teach families how to cook and eat more healthfully in an affordable manner. A key component of this programming is *Cooking Matters at the Store* in which class

instructors lead small groups of individuals on a grocery store tour, teaching them the essentials of shopping for ingredients to make healthy meals on a budget. In an executive summary outlining feedback from programming, participants indicated a high level of confidence with applying skills learned as part of the grocery store tour. Skills from the interactive grocery store tour translated when participants had to shop for healthy groceries independently. Participants seem to best retain nutrition information which was incorporated in a hands-on, skill-based approach, such as how to read food labels and how to compare unit prices (Share our Strength's Cooking Matters, n.d.).

One community-based intervention provided adult participants with information regarding skills pertaining to preparing fruits and vegetables, food safety practices, and general nutrition education related to fruits and vegetables. Skills taught and practiced included how to: microwave, stir-fry, bake, use a pressure cooker, steam, grill, use a slow cooker, and incorporate produce into a variety of snacks including smoothies and salads. As a result of participation, the average number of fruit servings respondents consumed per day increased significantly ( $p < .0001$ ) from 1.5 to 2.1 servings. The average number of vegetable servings consumed per day among participants also significantly increased ( $p < .0001$ ) from 2.1 to 2.7 servings per day. Further, 48% reported trying a new fruit or vegetable -post- programming. (Brown, & Hermann, 2005).

One study found, through the utilization and operationalization of the Health Belief Model and the SCT, that a nutrition education program incorporating cooking classes for low-income Hispanic mothers was effective in increasing nutritional knowledge and providing culturally compatible programming from which Hispanic mothers of a lower education level could benefit (Acuna & Eugenia, 2010). Scripa (2012)

implemented SCT-based programming tailored toward low-income young mothers intended to impact participants' nutritional knowledge, cooking knowledge, and self-efficacy toward both cooking and eating healthfully. Programming emphasized nutrition and cooking programming, incorporating these facets into existing life skills classes at a YWCA. Classes utilized taste-testing in an effort to encourage participants to experience new, healthy foods they might otherwise not have tried. Recipes created were both healthy and budget-friendly. Qualitative measures assessing change -post- intervention determined that a limited food budget and transportation impeded healthy eating and cooking/shopping practices. Sixty-four percent of participants said that the recipes made in class were helpful, but few reported re-creating them outside of class. Potentially, future programming could incorporate additional strategies for to help in overcoming barriers that low-income individuals' may face in preparing and cooking healthy foods. The barriers and findings resulting from these studies were considered when implementing the College CHEF, given the similarity to impediments which may affect college students.

### **Social Cognitive Theory and Self-efficacy**

Campus-based culinary nutrition interventions often utilize the social cognitive theory (Kerrison, 2014; Warmin, 2009). The SCT asserts that personal, behavioral, and environmental factors influence one another reciprocally (Bandura, 1977). This theory is ideal for health promotion programming as it is centered around the understanding of participants' reality constructs, or the way that individuals view the world (Warmin, 2009; Bandura, 1977). SCT argues that self-efficacy is a key component to behavior change (Strong et al., 2008). Self-efficacy is an individual's beliefs in their ability to



execute specific behaviors so as to produce specific outcomes, of which many agree is the most impactful self-knowledge aspect in individuals' lives. Self-efficacy influences all aspects of behavior, including the acquiring of a new behavior (Bandura, 1977).

Self-efficacy is indicative of one's confidence in their ability to gain control over personal behavior, motivation, and their environment; it is driven by a number of factors, including one's prior experiences. Self-efficacy affects individuals' behavioral settings and the effort they are willing to expend on particular tasks (Bandura, 1977). Self-efficacy expectations have added significantly to the prediction of intention for behavior change (de Vries, Dijkstra & Kuhlman, 1988). With studies examining self-efficacy expectations as they relate to behavior change, self-efficacy is often measured through the use of questionnaires. In campus-based culinary nutrition education programming, - post- test scales measuring cooking self-efficacy, cooking techniques for self-efficacy, and self-efficacy for fruits, vegetables, and seasonings improved significantly in intervention groups (Warmin, 2009; Kerrison, 2014). Self-efficacy aids with achieving one's goal(s) as it perpetuates both planning and behavioral initiative. Additionally, those who boast self-efficacy tend to feel more comfortable with trying a new behavior, or one perceived as difficult, and tend to put more effort into working toward and maintaining a behavior, despite obstacles which may arise (Brug, Lechner, & de Vries, 1995).

### **Gaps in the Literature**

There is a lack of culinary, nutrition education interventions for traditional, college-aged students in a multi-session format which is not a component of a nutrition education course. Culinary nutrition education programming focusing on students who are early in their college experience and living together in a cohort was not found during

the literature review. As studies are limited, follow-up data evaluating the impact and sustainability of programming is also limited. Therefore, it is also the purpose of this study to fill the existing void of these research gaps by determining if campus-based culinary nutrition education programming has an ongoing impact on the variables assessed through the study's measures: attitudes, behaviors, self-efficacy, and knowledge with healthy cooking and eating. The need for programming was made clear throughout the literature review, given the alarming rates of obesity in the U.S., as well as the poor dietary behaviors and lack of nutritional knowledge among college students and the associated consequences of poor dietary practices, paired with the potential impact that limited research in this field has indicated. This intervention and subsequent findings can contribute to literature supporting progress toward achieving objectives associated with Healthy Campus 2020, in an effort to improve the weight and nutrition status of college students.

### **Summary**

Chapter II outlined information related to the background and purpose of the study. Background information included statistics concerning the obesity epidemic and associated consequences, as well as impediments with college students with eating and cooking healthfully, including determinants related to making healthy choices. A literature review was conducted with findings pertaining to the following categories: campus-based nutrition education, campus-based culinary nutrition education, and community-based culinary nutrition education. Findings which were pertinent to the College CHEF were presented.

Further, the state of health in Kentucky was explored, as was health education in

Kentucky, to provide insight into the health and health education background of many of the College CHEF's participants. Objectives and guidelines were outlined which collectively seek to aid in improving U.S. citizens' health including Healthy People 2020, Healthy Campus 2020, and daily dietary recommendations. This was followed by summarizing gaps which presently exist in the literature with campus-based culinary nutrition education programming, making clear the need for tailored programming to address these gaps, collectively supporting the development, implementation, and evaluation of the College CHEF.

## CHAPTER 3

### DISSERTATION METHODS

The study focused on the development, implementation, and impact of a campus-based culinary nutrition education program, the College CHEF, and sought to determine the influence of culinary nutrition education classes on the cooking and eating attitudes, behaviors, self-efficacy, and knowledge of participating college students at the University of Kentucky. Qualitative data were collected through a primary needs assessment as part of developing the College CHEF through conducting focus groups and interviews and through conducting a literature review as part of a secondary needs assessment, all of which were guided by the PRECEDE-PROCEED model. Quantitative data were collected through surveys distributed as part of the needs assessment in study 1 and from control and intervention participants through measures which sought to determine changes pre- to –post- College CHEF.

Chapter III will first detail study 1, which consisted of the primary and secondary needs assessment which helped with the development of the College CHEF. Then, the methodology for study 2, the implementation and evaluation of the College CHEF, will be described. This will consist of: the research design, population, a description of programming, measures, procedures and data analysis. Subsequent Chapters, IV, V, and VI, will expand upon these facets in greater detail, to address all research questions and hypotheses.

#### **Study 1 Research Design**

Phase one of the program planning process was comprised of a secondary needs assessment (SNA), conducted through a literature review, to determine risk factors and

predisposing, enabling, and reinforcing factors for the target population with regard to the program outcomes, as well as to identify evidence-based best practices. Phase two of the study, a primary needs assessment (PNA), was made up of a convenience sample, was non-experimental, and consisted of two semi-structured interviews, one focus group, and a Qualtrics administered survey (Qualtrics, Inc). The SNA's research questions were related to healthy eating and cooking attitudes, behaviors, self-efficacy, and knowledge among college students, addressing barriers and what should be included in programming.

### **Study 1 Population**

As part of phase 2 of the needs assessment study, participants who completed the survey and/or took part in the focus group attended a large, co-educational, southeastern public university, University of Kentucky (UK). In general, the demographics of UK students are as follows: Total Enrollment:  $N = 28,094$ ; Undergraduate students: 20,099; Graduate students: 7,127; 89.3% full-time ( $n = 25,084$ ); 75.1% resident ( $n = 21,086$ ). Race/Ethnicity: White: 78.4%; Black: 6.6%; Hispanic or Latino: 2.1%; Native American: 0.2%; Asian/Pacific Islander: 2.7%; International: 5.1%; Two or more: 1.2%. Gender: Men: 49.1% ( $n = 13,784$ ) and Female: 50.9% ( $n = 14,310$ ) (UK Fact Booklet, 2012).

Focus group and interview participants were part of a campus-based health-oriented Living Learning Program (LLP). LLPs are communities where students with similar academic interests live in the same dormitories, and are provided support through programming and staff dedicated to helping each individual LLP (National Study of Living Learning Programs, 2007). Focus group participants resided on-campus in a dormitory with individuals from the same LLP, were undergraduate students, 18 years or

older, and signed a consent form to agree to participate in the study. There were seven focus group participants, all of whom were female and freshmen. A convenience sample of college students from the same college were recruited from university activity classes to participate in the survey. Forty-three individuals completed the survey. Of those 43, 90% were female, 8% were male, and 2% identified as other. The mean age of survey respondents was twenty-two years old ( $SD = 5.76$ ). The semi-structured interviews were conducted with two staff members from the same health-oriented LLP as those who took part in the focus group. Interview participants were 18 years or older, and signed a consent form to agree to participate in the study. Both interviewees were instructors within the department.

### **Study 1 Data Collection**

**Phase I of the study: Secondary needs assessment (SNA).** The SNA's data came from a literature review conducted through using EBSCOhost, an online reference system, and the following databases: (1) Academic Search Complete; (2) CINAHL; (3) ERIC; (4) MEDLINE; and (5) Psychology and Behavioral Sciences Collection. A combination of search terms included: college, college students, cooking, nutrition, classes, programs, interventions. Inclusion criteria for this literature review included the following terms: (1) primary research; (2) cooking and/or culinary nutrition education programs; (3) college or community based; (4) peer-reviewed and published in selected databases; (5) available in the English-language; and (6) outcome based.

**Phase II of the study: Primary needs assessment (PNA).** Data were collected from two interviews and one focus group (qualitative) and an online-administered survey (quantitative). The PNA went through Phases 1-3 of the PRECEDE-PROCEED model in

developing programming, as further outlined in Chapter IV. Throughout the interviews and the focus group, participants were presented questions pertaining to: barriers with cooking, information to include in programming, and logistics such as dosage, duration, and format of programming. Following Institutional Review Board (IRB) approval, the two staff members and all of the students from the health-oriented LLP ( $N = 47$ ) were emailed an invitation to participate in the study with interviews and focus group, respectively. Those who signed up to participate in the focus group and interviews were sent a follow-up reminder prior one week prior to them taking place.

The survey administered through Qualtrics consisted of thirty four questions related to healthy cooking and eating attitudes, self-efficacy, and behavior (Qualtrics Inc.). Individuals were recruited to complete the survey by way of four instructors sending an email invitation on behalf of the researcher to students from their respective campus-based activity classes ( $N = 320$ ). A total of 43 students provided written consent and completed the survey.

### **Study 1 Data Analysis**

**Qualitative analytic strategies.** Qualitative data were collected as part of the model-driven primary and secondary needs assessments in developing the College CHEF through conducting: a literature review, a focus group, and interviews. The focus group and interviews were digitally recorded and later transcribed verbatim by the researcher. Common themes were then recorded and compared. This occurred through the researcher recording the focus group and interviews, then listening to each, recording patterns, or themes, which were referenced twice or more for each group. Within each of these themes, further details were recorded and compared between groups. The strategy used to

approach data analysis was constant comparative analysis, originally developed for use in grounded theory methodology (Glaser & Strauss, 1967). This focuses on taking one piece of datum, such as through responses to one question from all focus group participants, and comparing the information with similar findings from other aspects of the qualitative data collection, such as through interview responses to similar questions. As such, similar experiences or ideas are compared to determine commonalities among respondents. This results in creating richer, more descriptive data, which can then be used to support quantitative data unearthed through the secondary needs assessment (Glaser & Strauss, 1967).

**Quantitative analytic strategies.** Quantitative data were collected via Qualtrics-administered surveys (Qualtrics, Inc.). Frequencies for demographic variables were summarized. Descriptive statistics were used to determine the mean and standard deviation for each variable pertaining to cooking and healthy eating attitudes, behaviors, and self-efficacy. Data were analyzed using SPSS version 23.0 (IBM Corp, 2013).

## **Study 2 Research Design**

The study was quasi-experimental, pre-, -post- design which utilized a control group. A quasi-experimental design is frequently used when it is not feasible to conduct a randomized, controlled trial (RCT), often referred to as the gold standard of research designs (Harris et al., 2004). The lack of random assignment in quasi-experimental studies serves as a weakness. However, for the purpose of implementing the College CHEF as a pilot study and given the small sample size interested in participating, convenience samples were deemed appropriate. Quasi-experimental studies intend to demonstrate if a program has had an intended effect (or effects) on participants (Harris et



al., 2004). It was important to utilize pre-test measures for treatment and control groups to gauge the potential impact of the intervention, as some individuals may have an increased knowledge base, skill level, and/or higher levels of self-efficacy before participating in an intervention (Breakwell, Smith, & Wright, 2012). Prior to data analysis, baseline demographics were compared for statistically significant differences, none of which were found. See Table II.

### **Study 2 Population**

The study occurred at a large, co-educational, southeastern public university, University of Kentucky (UK). The general demographics of UK students for study 2 are the same as outlined for study 1: Total Enrollment:  $N = 28,094$ ; Undergraduate students: 20,099; Graduate students: 7,127; 89.3% full-time ( $n = 25,084$ ); 75.1% resident ( $n = 21,086$ ). Race/Ethnicity: White: 78.4%; Black: 6.6%; Hispanic or Latino: 2.1%; Native American: 0.2%; Asian/Pacific Islander: 2.7%; International: 5.1%; Two or more: 1.2%. Gender: Men: 49.1% ( $n = 13,784$ ) and Female: 50.9% ( $n = 14,310$ ) (UK Fact Booklet, 2012). The study's participants were recruited from six campus-based LLPs. LLPs are programs in which undergraduate college students voluntarily enroll based upon academic interests. LLP members live together within the same dormitory, participate in social programming, and often are enrolled in some of the same academic classes as fellow LLP members (National Study of Living Learning Programs, 2007).

Three LLPs served collectively as the control group and three LLPs comprised the two intervention groups. Two of the intervention LLPs consisted of students who were interested in health-oriented professions. The third intervention LLPs consisted of participants who were first-generation college students. The Wellness LLP emphasized

the importance of a healthy lifestyle through nutrition, exercise, and other facets of health, the Kinesiology and Health Promotion (KHP) LLP consisted of students interested in health and/or wellness related professions or tracks, and the First Generation LLP was comprised of first generation college students. Intervention participants were recruited from a larger sample whose LLPs were comprised of the following number of total members:  $N = 27$  (Wellness LLP);  $N = 40$  (KHP LLP); and  $N = 79$  (First Generation LLP).

Among intervention participants, fifteen females attended three or more sessions, and eight males attended three or more sessions ( $n = 23$ ). Four females participated in one session only, and two males participated in only one session; these data were omitted from analysis because for intervention participants' data to be included in analysis, they had to both attend three or more sessions and complete the pre- and –post- survey ( $N = 15$ ). Those who participated in the research study as intervention participants by completing both the pre- and the –post- survey and consisted of the following numbers:  $n = 8$  (KHP/Wellness);  $n = 7$  (First Generation). Given the small sample size for the intervention groups, that there were no significant differences at baseline, and that they participated in identical intervention programming, it was deemed appropriate to combine the intervention groups for data analysis purposes ( $N = 15$ ).

The control group was comprised of students from a Fine Arts LLP, WIRED LLP, and Greenhouse LLP. The Greenhouse LLP was partnered with the College of Agriculture, the College of Arts and Sciences, and Food and Environment (CAFÉ), inviting students with an interest in both the environment and sustainability. The WIRED LLP offered a connection to rich experiences and interdisciplinary opportunities open to

all academic majors. The Fine Arts LLP was for students whose majors were within College of Arts and Sciences. The three LLPs from which the control group was recruited was part of a larger sample of LLP members, totaling:  $N = 131$  (WIRED LLP);  $N = 48$  (Fine Arts LLP); and  $N = 50$  (Greenhouse LLP) (personal communication with the university's LLP coordinator, March 1, 2016). There were seventeen control participants who took part in the study by completing both pre- and –post- measures.

Inclusion criteria for the study's participants were as follows: Participants belonged to an LLP chosen for the study, resided on-campus, lived in a dormitory with fellow LLP members, were undergraduate college students, and were 18 years or older. Exclusion criteria for study participants were Non-University of Kentucky students, and students who: did not reside on campus, were not in an LLP which had been chosen for the study, were not undergraduate college-students, and were not 18 years or older.

Table II

*Baseline Demographics for Control and Intervention Groups*

Variable	Int. #1	Int. #2	<i>p</i> Int.	Control	<i>p</i> Int. & Control
Gender	<i>n</i> = 5 males (31%) <i>n</i> = 11 females (69%)	<i>n</i> = 4 males (29%) <i>n</i> = 10 females (71%)	.88	<i>n</i> = 12 males (27%) <i>n</i> = 33 females (73%)	.76
Year in College	<i>n</i> = 16 freshmen (100%)	<i>n</i> = 13 freshmen (93%) <i>n</i> = 1 sophomores (7%)	.26	<i>n</i> = 42 freshmen (93%) <i>n</i> = 1 sophomores (7%)	.19
Age Mean (SD)	18 (0.00)	18.21 (.58)	.15	8.16 (.37)	.24

**Description of the College CHEF**

The intervention was developed through a combination of best practices and evidence-based strategies after conducting a PRECEDE-PROCEED model-driven needs assessment consisting of: a literature review, interviews with LLP stakeholders, a focus group with LLP participants, and a Qualtrics-administered survey to aid in the program planning process (Qualtrics, Inc). The information attained from the needs assessment was applied to an existing survey and program created by M. Condrasky of Clemson University's Department of Food, Nutrition, and Packaging Sciences Department after gaining permission from its creator (personal communication, March, 31, 2015). Additional details are provided in Chapter IV as part of the description of the full intervention.

Programming was driven by Albert Bandura's social cognitive theory and operationalized multiple constructs underlying the theory. SCT focuses on goal-setting

behavior, which was emphasized throughout programming in an effort to promote behavior change. The SCT purports that an individual's personal, behavioral, and environmental factors influence one another reciprocally and bidirectionally (Bandura, 1977). Thus, for intervention participants, this theory supports the idea that their past experiences, in combination with their exposure to the program and its influence collectively contribute to the impact that the College CHEF may have.

Constructs operationalized throughout programming to further strengthen its impact included: observational learning, in which individuals learn through watching others (Bandura, 1989); reinforcing cooking-related behavior displayed in class, both positively and through instructors correcting participants, to promote direct and vicarious reinforcements (McKenzie, Neiger, & Thackeray, 2012); outcome expectations were emphasized, in which participants anticipated the benefits of eating healthfully through eating the meal that they made at the end of each session. Outcome expectations purport that if individuals anticipate pleasurable effects of behavior change, they may be more likely to engage in the behavior (Bandura, 2004). Lastly, self-efficacy was promoted throughout programming, or the idea that if someone thinks they can take action, they are more inclined to do so, and more confident doing so (Bandura, 1977). Instructors sought to give participants the knowledge and skills to improve their self-efficacy with regard to the program's outcomes. This was done through reinforcing skills and information learned through verbal reviews and having participants demonstrate skills and techniques. Participating in meal preparation may increase an individual's self-efficacy for cooking and improve diet quality (Larson et al., 2006). Further, the more self-efficacious an individual feels, the higher the personal goals they may have a proclivity to set, and the

stronger their commitment to achieve those goals may be, all supporting the merit of emphasizing self-efficacy throughout the College CHEF (Locke & Latham, 1990). See Table III for SCT constructs operationalized in programming.

Table III

*SCT Constructs Operationalized in Programming*

Term	Definition
Reciprocal Determinism	There is an interaction between behavior, cognition and other personal factors, and environmental influences, which all influence one another bidirectionally. The factors may influence one another in different strengths and at different times (Bandura, 1989).
Behavioral Capability	If a person is to perform a behavior, they must know what the behavior is and have the skills to perform it (Bandura, 1997).
Observational Learning	Individuals learn new patterns of human behavior as well as cognitive skills by observing the behavior of others (Bandura, Grusec, & Menlove, 1966).
Reinforcements	Vicarious reinforcement occurs through observing others performing a behavior and associated consequences/praise/outcomes (e.g. when participants were corrected and guided with execution of cooking skills/techniques). Actions are largely regulated by anticipated associated consequences (Bandura, 1971). Individuals must carry out behaviors and receive direct reinforcement to ascertain if they feel that potential impediments are worth the outcomes associated with behavior change. (Bandura, 1977).
Expectations	Participants think, and thus can anticipate particular things to occur in specific situations. If individuals expect pleasurable effects associated with their behavior, they may be more likely to engage in the behaviors (Bandura, 2004). Efficacy expectations determine the amount of effort individuals will put forth and for how long they persist despite obstacles (Bandura, 1977).

Table III Continued

Self-Efficacy	An individual's beliefs in their ability to carry out behaviors produce specific outcomes. Is reflective of one's confidence in their ability to gain control over behavior, motivation, and environment. Driven by many factors, including prior experiences (Bandura, 1977).
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The College CHEF met weekly for four consecutive weeks throughout October 2015. Each intervention group met one time per week for two hours, from 4:00 to 6:00 PM. Programming took place on Tuesdays and Wednesdays on the University of Kentucky's campus in the 90 Building, in the Food Connection's kitchen, a state-of-the-art industrial kitchen with ample space for demonstrating, teaching, and hands-on cooking practice. Additional details of programming are provided in Chapter IV as part of the dissertation development process. The College CHEF was instructed by the PI who was a doctoral candidate in health promotion. Programming was also aided by a nutrition educator/dietician, who brought a level of expertise and credibility to the program that it would not have otherwise have had, as nutrition educators have been indicated as playing an impactful role with primary health prevention, particularly within college and universities (DeVilles, 1991). In addition, a senior-level college student who was majoring in dietetics aided all sessions. Both the nutrition educator and dietetic student met with the PI three times prior to program implementation to review all procedures, skills, and techniques to be taught within each session.

Each session of the College CHEF began with an attendance giveaway via raffle followed by: a review of topics from the previous week's session, a nutrition education information component, demonstration of skills, the practicing of skills with one-on-one

feedback from instructors, and the following of recipes and subsequent execution of skills necessary to prepare the session’s menu items. Each session, this was followed by “Breaking Bread”, during which participants and instructors sat together to eat the meal that they had prepared. The focus of the sessions is outlined in Table IV.

Table IV

*Weekly Sessions and Topics*

Session/Menu	Education	Skills
<p><b>One</b> Salsa with chips &amp; vegetables; chicken salad &amp; avocado; and fruit smoothies</p>	<p>Introduction; participant creation of class goal; attendance giveaway; benefits of today’s menu. Handout A: Mise en place; Handout B: Discuss roasting, sautéing, poaching. Handout C: Food safety and sanitation; Handout D: Meal planning &amp; prep, healthy snack ideas. Handout E: Recipe books. Discuss flavor building. Soft drink visual explanation. Show visuals of portion size. Hand out recipe cards.</p>	<p>Handout G: Knife skills. Handout H: Measurement practice. Handout I: Demonstrate how to use blender, how to execute all skills for today’s recipes.</p>
<p><b>Two</b> Chicken Tortilla Soup; coleslaw</p>	<p>Attendance giveaway; review of from previous session. Discussion of goal progress; Handout J: Food labels; Handout K: How to eat more fruits and vegetables; Handout L: Produce shelf life. Handout M: Color of fruits and vegetables and benefits. Handout N: best pre- and –post- workout foods. Distribute and review recipes.</p>	<p>Knife skills: dicing chopping. Using vinegar and hot sauce with cooking. How to break down a full chicken and related food safety. How to make broth from bouillon.</p>



Table IV Continued

**Three**

Baked sweet potatoes; salad with dressing; quesadillas	Attendance giveaway; Discussion of goal; Handout goal; Handout A: Benefits of today’s menu; Stocking dorm pantry; meal planning and preparation. <i>Cooking Matters at the Store</i> , focusing on unit prices, fresh and frozen produce, and shopping on a budget; distribute recipe cards.	Knife skills: chopping. Sautéing vegetables; mixing salad dressing ingredients; pan searing quesadillas.
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**Four**

Meatballs, marinara & pasta; fruit & oat bars.	Attendance incentive giveaway; Sess. 3 concepts; goal progress; Discuss overcoming barriers Discussion of fiber ; Blanching and poaching video; Review and distribute recipe cards.	Knife skills & mixing for meatballs; chopping, sautéing of vegetables; water simmering for pasta; mixing and measuring.
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**Evidence-Based Strategies within Programming**

**Setting a SMART goal.** Research indicates that goal setting is important in improving self-efficacy as it relates to behavior change. As such, at the beginning of the first session, intervention participants were asked to set one personal goal regarding what they would like to attain from participating in the College CHEF (Lock & Latham, 1990). The PI introduced and reviewed the concept of SMART goals, and asked that participants created a goal with these particular guidelines in mind. SMART goals are: Specific, Measurable, Attainable, Realistic, and Time-appropriate (Williams, 2012; CDC, 2003). Participants created and documented one SMART goal which was submitted to the PI. Individuals were encouraged to reflect on why they were participating in programming and what they hoped to gain as a result. Goals ranged and included those such as, “being able to cook a few healthy dinners after taking the class” though most revolved around gaining a basic skill set for cooking. The PI sent a personal email after each session

encouraging participants to engage in behavior that was in support of their SMART goal and applauded efforts taken in working toward their goal.

**Cooking Matters at the Store curriculum.** In a similar college-based cooking class as the College CHEF (Kerrison, 2014), the researcher incorporated evidence-based strategies from programming entitled *Cooking Matters at the Store*. Through this program, instructors were provided a script and handouts for participants including booklets, recruitment materials, and additional hands-on tools to help engage participants as they are led through an interactive grocery store tour to help them learn to shop for healthful food on a budget. In one culinary nutrition education intervention which incorporated *Cooking Matters at the Store*, the tour took place at the completion of hands-on cooking sessions, and included such components as instructors explaining and showing participants the breakdown of unit prices for fresh versus frozen vegetables (Share our Strength's Cooking Matters, n.d.). As a result, 89% of participants surveyed post programming cited saving money on food purchased at the grocery store as a result of the tour and participation in culinary nutrition education programming (Kerrison, 2014).

When asked during the second session of the College CHEF who would be interested in attending a grocery store-led tour, only one participant from each intervention group expressed interest. As such, the PI thought it would be most beneficial to present a modified version of the grocery store tour to class participants during the third session. The PI completed the online training and provided individuals with information and handouts focusing on: (1) shopping based on unit prices; (2) knowing when to purchase frozen versus fresh fruits and vegetables; (3) stocking the

pantry; (4) and useful tips for grocery shopping healthfully on a budget.

**Self-monitoring.** This encompasses intentional attention to some part of an individual's behavior and recording details of that behavior (Bandura, 1998). This was included throughout the program through individual's being reminded and encouraged of their goals each week. Participants were reminded both in class and via a weekly email, in which they were asked to reflect on their goal and if they were working toward that goal both in and out of class.

**Self-motivating incentives.** At the start of the first session, each student was given two Tupperware containers, which they were encouraged to clean and return weekly in order to take home leftovers from class. In addition, at the start of that session, as well as the three remaining sessions for each intervention group, two prizes were raffled off in an effort to incentivize attendance. Incentives varied weekly, but always included 1-\$10 gift card to be used at any campus dining facility. Other attendance giveaways included (1) measuring spoons; (2) Campus Recreation t-shirts and phone accessories; and (3) a University Health Services lunchbox containing a thermometer and a measuring cup. For the final session, two \$100 gift certificates to a local restaurant were awarded as incentive prizes. Participants had to have attended at least three of the four sessions to be eligible for the final drawing. In addition to attendance incentives, participants were able to make several servings of each recipe created weekly which they ate together as a group at the end of each session. Additionally, they were able to take remaining leftovers with them, further serving as self-motivating incentives for attending class.

**Providing feedback.** Providing feedback to participants, and observing and commenting on subsequent changes, helps to instill and promote self-efficacy, and

routinely took place throughout each session of the College CHEF (Bandura, 1991). The instructors strove to continually provide feedback to students and actively monitored change, observing to see if behaviors demonstrated by participants during classes changed after feedback was given.

**Efficacy expectations.** Efficacy expectations were emphasized, specifically performance accomplishments. Performance accomplishments are when individuals learn through personal experience in which they master either a difficult or prior feared task, hence enjoying an increase in self-efficacy. This seemed apparent as participants progressed throughout programming. This is an important construct which can help an individual in developing skills learned. Additionally, it can help with developing coping mechanisms to help with issues that one may encounter as they foster skills (Stretcher, deVellis, Becker, & Rosenstock 1986).

## **Study 2 Measures**

The instrument that was used as a pre-, -post- measure for the intervention and control groups from which study data were analyzed and reported was a survey previously tested for reliability and validity and driven by the social cognitive theory (Michaud, 2007).

**Reliability.** Reliability is a statistical measure of how reproducible a survey instruments' data are (Fink & Litwin, 1995). Test-retest reliability measures how reliable an instrument is by administering the same measure twice to the same group of individuals, over a period of time (Phelan & Wren, 2006). Test-retest reliability was established for all sections of the instrument through the utilization of the PROC CORR command for Pearson's correlation coefficient (Michaud, 2007). See Table V for

reliability of the original pilot test-retest reliability for each of the survey's subscales (Michaud, 2007).

Table V

*Reliability Pilot Test-Retest Reliability for Subscales*

Subscale	<i>r</i>	<i>p</i>
Cooking Attitudes Subscale	0.64	<b>.003*</b>
Cooking Behaviors Subscale	0.48	<b>.037*</b>
Produce Consumption Self-efficacy Subscale	0.72	<b>.0006*</b>
Cooking Self-efficacy Subscale	0.64	<b>.003*</b>
Self-efficacy for Using Basic Cooking Techniques Subscale	0.89	<b>&lt;.0001*</b>
Self-efficacy for Using Fruits, Vegetables, and Seasonings Subscale	0.43	.064
Knowledge of Cooking Terms & Techniques Subscale	0.75	<b>.0002*</b>

**\* Significant at  $p < 0.05$**   
(Michaud, 2007)

**Validity.** Research indicates that it is ideal to use instruments for research which have been previously validated, tested, and evaluated to gain reliable data (Larson et al., 2006). Having a valid and reliable survey instrument is an important indicator in determining the effectiveness of the intervention (Lin & Dali, 2012). Content validity, or the extent to which a measure appropriately represents facets of a particular construct, was previously tested with the instrument. The measure was deemed to have “adequate content validity” among individuals taking the survey as part of a pilot study (Michaud, 2007). Face validity, which refers to whether an instrument measures what it appears to measure, is not the strongest form of validity, but is often considered when determining the validity of an instrument (Phalen & Wren, 2006). Face validity was determined

through the PI, an expert college health promotion faculty member, and a registered dietician reviewing the measures and ensuring that each subscale was in alignment with the study's research goals and hypotheses (Phelan & Wren, 2006).

**Measures' subscales.** Survey questions and associated data analysis included were meant to gauge the impact that programming had on participants' attitudes, behaviors, self-efficacy, and knowledge related to healthy cooking and eating. The survey was divided into nine subscales: 1) Cooking Attitudes subscale; 2) Cooking Behavior subscale; 3) Fruit and Vegetable Consumption subscale; 4) Eating Behaviors subscale; 5) Fruit and Vegetables Consumption Self-efficacy subscale; 6) Cooking Self-efficacy subscale; 7) Self-efficacy for Using Basic Cooking Techniques subscale; 8) Self-efficacy for Using Fruits, Vegetables, and Seasonings subscale; and 9) Knowledge of Cooking Terms and Techniques subscale. The subscales were comprised of a total of forty-nine questions. In addition, there were twelve demographic questions. For the -post-survey, the same questions were included as were on the pre- survey, with the addition of ten process evaluation questions for intervention participants.

**Demographic variables.** Variables assessed with control and intervention participants were: age (years), college-level status (freshman/sophomore/junior/senior), gender (male, female, transgender, other), and race/ethnicity (White, non-Hispanic; Black, non-Hispanic; Hispanic or Latino; Asian or Pacific Islander; American Indian/Alaskan Native, or other) Member of Greek Life (Yes/No); Member of a campus-based athletic team (Yes/No), and Weight Status (Underweight/Normal/5-10 pounds overweight/11-20 pounds overweight/overweight by 20 pounds or more).

**The Cooking Attitudes subscale.** This subscale consisted of six statements

concerning the ease of cooking at home, cooking for health, and following recipes. For each statement, participants selected the extent to which they agreed or disagreed. An example of a statement was, “Meals made at home are affordable.” A 5-point Likert scale was used: Strongly Agree = 5; Agree = 4, Neither Agree nor Disagree = 3; Disagree = 2; and Strongly Disagree = 1. Items 1, 3, and 5 were reverse coded so that the negatively worded questions’ outcome reflected the appropriate Likert-scale rating. These statements were, “I do NOT like to cook because it takes too much time;” “Cooking is frustrating;” and, “It is too much work to cook.” For each of these items, the possible subscale range for responses was 6-30, with higher scores reflecting more positive attitudes toward cooking.

**The Cooking Behaviors subscale.** This subscale consisted of four statements pertaining to cooking using basic ingredients, convenience items, and with leftovers. For each statement, participants selected how many times per week they carried out that particular behavior. An example of a statement was, “Reheat or use leftovers in another meal”. For this subscale, Likert responses were coded as: Six to seven times per week = 5; Three to five times per week = 4; Two times per week = 3; Once each week = 2; and Not at all = 1. The possible point range for responses on the subscale was 4-20, with higher scores reflecting healthier cooking behaviors.

**The Fruit and Vegetable Consumption subscale.** This subscale consisted of two statements pertaining to how many times per week participants consumed the daily recommended servings of fruits and vegetables. An example of a statement was, “Consume at least five servings of vegetables per day.” For this subscale, Likert responses were coded as: Six to seven times per week = 5; Three to five times per week =

4; Two times per week = 3; Once each week = 2; Not at all = 1. The possible point range for this subscale was 2-10, with higher scores reflecting more frequent consumption of fruits and vegetables.

**The Eating Behaviors subscale.** This subscale consisted of three statements inquiring how many times per week participants ate breakfast, lunch, and dinner away from home. The subscale's directions asked respondents to indicate the extent to which they felt confident with each behavior. An example of a statement was, "Eat dinner away from home." For this subscale, Likert responses were coded as: Not at all = 5; Once each week = 4; Two times per week = 3; Three to five times per week = 2; and Six to seven times per week = 1. The possible point range for responses from the Eating Behaviors subscale was 3-15, with higher scores reflecting healthier eating behaviors.

**The Fruit and Vegetable Consumption Self-efficacy subscale.** This subscale consisted of three statements regarding how confident participants felt eating fruits and vegetables as a snack, at every meal and consuming nine half cup servings per day. For each statement, participants were asked to choose a response indicating the extent of confidence they felt. An example of a statement was, "indicate the extent to which you feel confident eating fruits or vegetables as a snack, even if everybody else were eating other snacks." For this subscale, Likert responses were coded as: Extremely confident = 5; Confident = 4; Neither confident nor unconfident = 3; Unconfident = 2; and Extremely unconfident = 1. The possible point range for responses on the Fruit and Vegetable Consumption Self-Efficacy subscale was 3-15, with higher scores indicating higher self-efficacy for fruit and vegetable consumption.

**The Cooking Self-efficacy subscale.** This subscale consisted of six statements



concerning how confident participants felt about performing certain cooking activities like following a recipe and using knife skills. For each statement, participants were asked to choose a response indicating their extent of confidence. An example of a statement was, “Indicate the extent to which you feel confident with using knife skills in the kitchen.” For this subscale, Likert responses were coded as follows: Extremely confident = 5; Confident = 4; Neither confident nor unconfident = 3; Unconfident = 2; Extremely unconfident = 1. The possible point range for responses on the Cooking Self-efficacy subscale was 6-30, with higher scores indicating higher self-efficacy for cooking.

**The Self-efficacy for Using Basic Cooking Techniques and Skills subscale.**

This subscale consisted of nine cooking skills and techniques questions of which participants were asked to select the extent of confidence they felt with performing these. An example of a skill was, “Boiling.” For this subscale, Likert responses were coded as follows: Extremely confident = 5; Confident = 4; Neither confident nor unconfident = 3; Unconfident = 2; Extremely unconfident = 1. The possible point range for the Self-efficacy for Using Basic Cooking Techniques and Skills subscale was 9-45, with higher scores indicating higher self-efficacy for using basic cooking techniques and skills.

**The Self-efficacy for Using Fruits, Vegetables, and Seasonings subscale.** This subscale was comprised of eight fruits, vegetables, and seasonings and prompted participants to select how confident they felt with cooking with these ingredients, which included root vegetables, herbs, and spices. For each food/seasoning item, participants were prompted to select their associated level of confidence. An example was, “Indicate the extent to which you feel confidence with using vinegar”. For this subscale, Likert responses were coded as follows: Extremely confident = 5; Confident = 4; Neither

confident nor unconfident = 3; Unconfident = 2; Extremely unconfident =1. The possible point range for the Self-efficacy for Using Fruits, Vegetables, and Seasonings subscale was 8-40 with higher scores indicating higher self-efficacy for using fruits, vegetables, and seasonings.

**The Knowledge of Cooking Terms and Techniques subscale.** This subscale consisted of eight multiple choice questions relating to basic cooking skills and techniques. Each multiple choice question had four possible responses, one of which was, “Don’t Know.” Those questions for which participants marked their response as “Don’t Know” were counted as incorrect. An example of a question with potential responses was, “A diced potato should be cut into: A: Long, thin matchstick pieces; B. Very small and uneven pieces; C. Cubes usually 1/4 to 3/4 inches in piece; or D. Don’t Know.” Responses were coded such that participants received a "0" for each incorrect answer and a "1" for each correct answer. The minimum possible score was zero and the maximum score was eight, with higher scores reflecting greater knowledge of cooking terms and techniques.

**Process evaluation.** On the –post- survey for the intervention group, there were ten process evaluation questions. The process evaluation piece included one question prompting participants to select their degree of satisfaction with the College CHEF. Three other questions asked participants to indicate how beneficial the program was in improving their cooking habits, and how beneficial both the handouts and educational components were. Additionally, participants were asked if they had made any of the recipes from class and if so, which recipe(s). Further, respondents were asked what they thought would be the most appropriate number of sessions for future programming. There

were three open-ended questions asking participants what they liked best about the College CHEF, what they thought could be improved, and to share any additional thoughts or concerns about programming. Of note, process evaluation questions were not evaluated for the purpose of the included manuscripts.

### **Study 2 Procedures**

In June 2015, the PI emailed an invitation to all LLP Directors to notify them of the proposed programming. Seven LLP directors expressed interest, initially two of whom were invited to participate as the intervention groups, and two of which were selected to serve as the control group. In August 2015, the PI met with representatives from all of the LLPs who had agreed to serve as part of the control or intervention groups to discuss procedures. Recruitment for the control groups consisted of individuals from the respective controls receiving an e-mail from their director, on behalf of the PI. It both explained programming and included an attached flyer which detailed the survey outcomes and the approximate dates they would be distributed. There was also information pertaining to the opportunity to participate in a follow-up cooking class, as well as to be eligible to win one of 5-\$20 VISA gift cards for completing all set of surveys. The funding for both the gift cards and the follow-up cooking classes were provided through University of Kentucky's Kinesiology and Health Promotion Department's Blanda Foundation.

Recruitment for the intervention groups consisted of the PI attending a mandatory back to school meeting for each LLP selected to be part of the intervention, during which programming was explained, followed by a question and answer session. It was emphasized that those wishing to sign up must be able to attend all four sessions.

Students were encouraged to sign up, providing both their name and email address, so that the PI could provide these email addresses to their respective LLP Director, who would relay all correspondence with the PI and participants, as outlined in IRB procedures. See Appendix C for documentation of IRB approval. Three weeks prior to programming, all LLP directors who had agreed to have their LLPs participate as either intervention or control groups received an email asking them to forward the invitation to participate to their respective LLP members. See Appendix D for the invitation email for LLP Directors. All LLP members who had signed up for programming for the intervention group and all members of the LLPs serving as control groups were emailed a survey invitation, sent on behalf of their director. See Appendix E for the email invitation to participate in the study.

Measures and data collection procedures were approved through IRB. The survey was administered to both the intervention and control groups at the same time, sent via a survey link by participants' respective LLP Director at the following times: (1) pre-survey: two weeks before programming started, and closed the day of the first session of the College CHEF, prior to its start); (2) post-survey: the day programming ended and remained open for two additional weeks; (3) and the 1-month follow-up survey was administered four weeks after programming ended and remained open for two weeks. An initial e-mail invitation was sent on September 21, 2015. The pre-survey was sent during the week of September 28<sup>th</sup>. The post-survey was sent on October 28, 2015. The 1-month follow-up survey was sent on November 20, 2015 though due to attrition with the intervention group, these data were not included as part of the study.

Three weeks before programming began, there were not enough KHP LLP

participants who had enrolled. The PI met with the Wellness LLP director to see if he would be interested in having the Wellness LLP participate as part of the intervention group, instead of as the control group. The director agreed, and sent a flier to all Wellness LLP students promoting programming, as well as recruited from a 1-credit core university course in which all Wellness LLP students were enrolled. As a result of this brief recruitment process, two students from the Wellness LLP enrolled. To compensate for the loss of the Wellness LLP as part of the control group, the PI contacted the directors from the WIRED and Fine Arts LLPs, both of whom had previously expressed interest in having their LLPs participate, but who were not originally chosen. Both the WIRED and Fine Arts LLP Directors agreed to have their LLPs participate as part of the control group, and forwarded a recruitment email on behalf of the PI to all of their LLP members. As such, the methods were modified to include three LLPs (WIRED, Fine Arts, and Greenhouse) collectively serving as the control group.

The link to the pre-survey was sent via email by the respective LLP director to all program participants the week of September 28, 2015. The email contained a survey cover letter and a link to complete the online survey via Qualtrics (Qualtrics, Inc). The cover letter noted that completion and submission of the survey determined consent to participate in the survey. See Appendix F for the survey cover letter and Appendix G for the waiver of documentation of informed consent. Intervention LLP Directors only forwarded the email containing the survey link to those who had signed up for programming. LLP members received a follow-up email one week after the initial email was sent, to increase response rates. Surveys were closed one week following this email reminder. Those not completing the survey by this time were considered non-responders

and their data were not included in the study.

Following the pre-survey, the College CHEF program was implemented October 6 through October 28, 2015. It was not required to participate in the proposed research study to participate in the College CHEF Program. Following the implementation of the College CHEF program (October 28, 2015), all control and intervention participants were sent an e-mail containing the link for the –post- survey; participants received a follow-up reminder email one week later. Surveys were closed one week following this email reminder. Similarly, a 1-month follow-up of the College CHEF Program occurred at the end of November 2015. Again, all participants were sent an e-mail inviting them to participate in the post- follow-up online survey via their respective LLP Director. Potential respondents received a follow-up email one week after the initial email was sent, in an effort to increase response rate.

Each pre-survey was matched with the appropriate post-survey, identifiable by a four-digit number of which the participant chose and entered at the beginning of each survey. The survey was generated using Qualtrics Labs, Inc. software, Version 12.018 (Qualtrics, Inc). Data were managed and stored on their site through the PI's UK account. Access to this account was via the PI's office computer, found on a secure, password protected server. Access to the Qualtrics site required an additional password. After responses were received, data were analyzed using SPSS version 23.0 (IBM Corp, 2013).

### **Protection of Human Subjects**

The investigator, dietician, and faculty advisor completed the CITI Training and gained the University of Kentucky's Institutional Review Board (IRB) approval to ensure compliance with all ethical considerations in the handling of data collection and analysis.

Additionally, a waiver of documentation for informed consent was approved for the study. IRB approval to conduct a study to evaluate outcomes associated with the College CHEF was received in July 2015.

### **Data Analysis for Study 2**

For demographic variables, means, standard deviations, and  $p$  values were reported and compared between intervention and control participants. Each pre-survey was matched with the appropriate post-survey, identifiable by a four-digit number of which the participant chose and entered at the beginning of each survey. Subscales were comprised of interval-level data. In order to analyze data, Likert scale scores were summed. Likert items are often combined to form an index, though some combinations of measures may be referred to as "summative scales" (Nardi, 2014). Scores were summed for each participant for each subscale for both pre- and –post- survey, recording results in Microsoft Excel version 6.3.9600, and transferring the information to SPSS to determine mean and standard deviation for each subscale both pre- and –post- for both groups, prior to conducting data analysis by subscale. Paired  $t$ -tests were conducted to assess changes among participants pre- to post-intervention. Differences between groups were assessed through the use of unpaired  $t$ -tests. Significance was set at  $p < .05$  apriori.

### **Summary**

Chapter III detailed study 1, which consisted of the primary and secondary needs assessment conducted as part of the program planning process to help with developing the College CHEF. Specifically, the research design, population, data collection, and data analysis were outlined for study 1. This was followed by an overview of study 2, which consisted of the implementation and evaluation of the College CHEF. This consisted of

detailing the research design, population, a description of programming, evidence-based strategies used throughout programming, measures, procedures, and data analysis plans. Study 1 is explained in detail throughout Chapter IV and the implementation and evaluation of study 2 is detailed throughout Chapter V and Chapter VI.



## CHAPTER 4

Manuscript 1: Development of “College CHEF,” a Campus-based, Culinary Nutrition Program

**Proposed Journal:** American Journal of Health Promotion  
[http://ajhp.allentrack.net/html/ajhp\\_author\\_instructions\\_010615.pdf](http://ajhp.allentrack.net/html/ajhp_author_instructions_010615.pdf)

## Abstract

**Purpose:** Describe the PRECEDE-PROCEED model-driven primary and secondary needs assessments which contributed to the development of the College CHEF program. **Design:** Non-experimental research design using a convenience sample. **Setting:** Large, southeastern public university. **Subjects:** Staff members ( $n = 2$ ) and freshmen students ( $n = 7$ ) affiliated with a health-orientated on-campus Living Learning Program (LLP) participated in interviews and a focus group to determine the components necessary for implementing programming. Forty-three students from college fitness courses completed an online survey to determine what should be included in a tailored cooking/nutrition program. **Measures:** Focus group and interview guides and an online survey administered via Qualtrics. **Analysis:** (1) Literature was reviewed to synthesize evidence-based programming strategies, results, and implications; (2) Focus group and interview responses were coded based on common themes; (3) Descriptive statistics were used to summarize cooking behaviors, attitudes, self-efficacy, and interest in culinary nutrition education programming. **Results:** Focus group participants and the majority (88%) of those who completed the survey were interested in participating in a program like the College CHEF. Consensus was that a weekly, multi-session program incorporating hands-on cooking and nutrition education would be ideal for a college-aged population; the secondary needs assessment was in support. **Conclusion:** On-campus LLPs provide ideal cohorts for hands-on culinary nutrition programming. An evidence-based program which provides instruction for cooking and eating healthfully is strongly supported.

**Key words:** program planning; cooking; nutrition; program; college.

### Indexing Key Words:

1. **Manuscript format:** Research
2. **Research purpose:** Program development
3. **Study design:** Non-experimental
4. **Outcome measure:** Analysis of responses and evidence-based strategies from needs assessment to develop a culinary, nutrition education program
5. **Setting:** College campus
6. **Health focus:** Nutrition/healthy cooking
7. **Strategy:** Education
8. **Target population age:** College-aged students 18 years and older (surveys and focus group) and adults (interviews)
9. **Target population circumstances:** Education level

## **Purpose**

In the U.S., more than one third (39.4%) of adults are obese, (Ogden et al., 2014) and more than one third of college students (36%) are overweight or obese (ACHA, 2015). The imbalance which exists between decreasing energy expenditure as a result of a lack of physical activity paired with high energy intake through diet serves as the main determinant of the present obesity epidemic (WHO, 2003). Proper nutrition, adequate physical activity, and maintaining a healthy body weight are important components of individuals' health. Combined, these factors can aid in decreasing one's risk of developing a number of health conditions including: hypertension, high cholesterol, diabetes, heart disease, cancer, and stroke (Healthy People 2020, 2014b). However, most Americans do not maintain a healthy diet and do not meet the recommendations for physical activity (US Department of Health and Human Services and USDA, 2005).

Current rates of obesity have been partially attributed to nutritional influences such as an increase in: snacking, eating away from the home, and large portion sizes as compared to previous generations (Duffey & Popkin, 2011; Piernas & Popkin, 2011). In addition, many college students are unaware of what constitutes certain foods as being nutritious. This, paired with the fact that many college students have an overall lack of general nutritional knowledge, are agents impacting the obesity rates of college students (Holden et al., 2014).

There have been significant, positive correlations among college students with nutrition knowledge and attitudes toward healthy eating and with nutrition attitudes and food habits. (Barzegari et al., 2011). In college students, of those who are knowledgeable of fruit, dairy, protein, and whole grain requirements, there is an increased likelihood of

meeting dietary guidelines. Further, when students are asked about food choices, nutritional knowledge is associated with making more healthful choices. Thus, knowledge of dietary guidelines is positively associated with healthier eating habits (Kolodinsky, Harvey-Berino, Berlin, Johnson, & Reynolds, 2007).

Hands-on cooking classes which incorporate nutrition education may provide a novel, impactful approach toward behavior change with adults' eating habits, as explored in one study of university faculty and staff. Culinary nutrition education programming which utilizes a skill-based approach, allowing for hands-on application, may be key in high attendance rates and may also result in gains in self-efficacy, attitudes, behavior, and knowledge as it relates to cooking and healthy eating (Meloche, 2003). A link exists between self-efficacy with cooking skills and healthful eating habits (Lawrence, Thompson, & Margetts, 2000). Though cooking and nutrition interventions for college students are limited, studies which have encompassed both nutrition and cooking in a hands-on format have been effective in improving cooking and eating behaviors, attitudes, knowledge and self-efficacy related to cooking skills and techniques and healthy eating practices (Levy & Auld, 2004; Warmin, 2009; Kerrison, 2014). These findings support the importance of programming to provide college students information and skills to positively influence their behavior, attitudes, knowledge, and self-efficacy with regard to healthy cooking and eating, in an effort to improve eating habits, general health, and obesity rates.

The PRECEDE-PROCEED model is one of the most commonly used models in program planning and was used to guide this research in an effort to determine what elements should be included in a culinary nutrition education program for college

students. This model is important in providing a framework to determine a community's needs (e.g., college students) and in planning and developing an intervention which addresses those needs (McKenzie et al., 2012). Program planning through the application of the PRECEDE-PROCEED model took place through four phases prior to the implementation of programming (i.e., PRECEDE), as depicted in Figure 2. These sequential systematic steps were taken to increase the effectiveness and sustainability of the culinary nutrition education program developed as a result of utilizing this model (Manios et al., 2012).

The needs assessments (both primary and secondary) occurred throughout phases 1-4 of the program planning process. This took place through assessing the priority population's needs by examining the genetic, behavior, environmental, predisposing, enabling, and reinforcing factors through a secondary needs assessment (Phases 1-3). Secondary needs assessments consist of locating data that has already been collected by someone else and is readily available to others. The primary needs assessment examined all factors influencing college students' cooking and eating habits, including underlying environmental, predisposing, enabling and reinforcing factors (Phases 1-3). Primary needs assessments consist of collecting primary data, or data that the researcher collects themselves, such as through surveys, a focus group, and interviews. (McKenzie et al., 2012). Phase four was the creation of the intervention considering all of the factors and needs and appropriate strategies from Phases 1-3.

There is no single strategy which works for encouraging all individuals to cook and eat healthier (Wolfson & Bleich, 2014). Thus, in order to provide evidence-based programming which fits the needs of college students living on-campus, it was important

to conduct both primary and secondary needs assessments (McKenzie et al., 2012). Therefore, the purpose of the study was to present the findings from a secondary and primary needs assessment in developing a campus-based, culinary nutrition program entitled, “The College CHEF: **Cooking Healthfully, Educating for Life-long Change.**”

### **Design**

Phase one of the planning process included an initial secondary needs assessment (SNA) conducted through a literature review, in order to determine risk factors as well as predisposing, enabling, and reinforcing factors for the target population. In addition, the SNA was used to identify evidence-based strategies and best practices for programming. The SNA was an important phase of the planning process, as results helped to select appropriate data collection strategies and identified gaps needing to be filled as part of the primary needs assessment (PNA).

Phase two of the study, which summarized the PNA, was non-experimental, utilizing a convenience sample for two semi-structured interviews and one focus group, and for online-administered surveys. The interviews, focus group, and surveys posed questions pertaining to contributing factors related to healthy eating and cooking among college students and what topics and components should be included in a culinary nutrition education program to help address the identified needs and contributing factors. Additionally, topics related to cooking and healthy eating attitudes, behavior, self-efficacy, and associated knowledge were gauged throughout both the surveys and focus group with the college students.

## **Setting and Participants**

The study occurred at a large, co-educational, southeastern public university. Focus group and interview participants were part of a health-oriented Living Learning Program (LLP) on the university's campus. LLPs are communities on-campus which place students with similar interests into the same residence halls, promoting student success and providing support through specialized programming and staff dedicated to helping each particular group (National Study of Living Learning Programs, 2007). Further, focus group participants resided on-campus in a dormitory with individuals from the same LLP, were undergraduate students, 18 years or older, and signed a consent form to agree to participate in the study. There were seven focus group participants, all of whom were female and freshmen.

A convenience sample of students was recruited from university activity classes to participate in the survey. All were undergraduate students, 18 years or older, and gave consent to participate in the study. Forty-three individuals completed the survey, 90% were female, 8% were male, and 2% identified as other. The mean age of survey respondents was twenty-two years old ( $SD = 5.76$ ). The two staff members who participated in the semi-structured interviews were associated with a health-oriented LLP at the university, were 18 years or older, and signed a consent form to agree to participate in the study. One staff member was a graduate student in health promotion and the other was a lecturer in the department.

## **Methods**

The purpose of a needs assessment is to collect information about the participants and that which relates to their health needs, as well as the capability of sites in supporting

programming to fit participants' needs (Fertman & Allensworth, 2010). As part of the program planning process, both the SNA and PNA were conducted. The SNA occurred during Phase 1 of the study and consisted of a literature review, resulting in a summary of risk factors and predisposing, enabling, and reinforcing factors, as well as evidence-based strategies and best practices for programming. The SNA was followed by phase two of the study, a PNA. The PNA for the study consisted of one focus group, two semi-structured interviews, and an online survey, which sought to determine what content should be included in programming, in an effort to guide program curriculum development.

### **Data Collection**

**Phase I of the study: Secondary needs assessment (SNA).** Data sources for the secondary needs assessment consisted of a literature review conducted by the PI to examine risk factors and predisposing, enabling, and reinforcing factors associated with eating and cooking habits of college students, as well as to investigate existing evidence-based culinary nutrition education programming. It was conducted through using EBSCOhost, an online reference system, and the following databases: (1) Academic Search Complete; (2) CINAHL; (3) ERIC; (4) MEDLINE; and (5) Psychology and Behavioral Sciences Collection. A combination of search terms included: college, college students, cooking, nutrition, classes, programs, interventions. Inclusion criteria for this literature review included: (1) primary research; (2) cooking and/or culinary nutrition education programs; (3) college or community based; (4) peer-reviewed and published in selected databases; (5) available in the English-language; and (6) outcome based.



**Phase II of the study: Primary needs assessment (PNA).** Data for the primary needs assessment were collected from two interviews, one focus group, and an online-administered survey. The PNA went through Phases 1-3 of the PRECEDE-PROCEED model, in collecting both quantitative and qualitative data to help develop programming. The interviews and focus group included questions pertaining to: barriers to cooking on-campus and ways to help overcome them, nutritional information and recipes to include in programming, and logistics such as dosage, duration, and space. The focus group and interviews were digitally recorded and later transcribed. Following the university's Institutional Review Board (IRB) approval in Spring 2015, the two staff members and all of the students from the health-oriented LLP ( $N = 47$ ) were emailed an invitation to participate in the study. Those who signed up received a follow-up reminder prior to their respective focus group and interviews; the focus group was 60 minutes in duration, and interviews were 45 minutes.

The online survey, administered through Qualtrics (Qualtrics Inc.) consisted of thirty four questions which pertained to healthy cooking and eating attitudes, self-efficacy, and behavior, as well as recommendations for campus-based, culinary nutrition education programming. These tied into phases 1-3 in the PRECEDE-PROCEED model in assessing needs and influential factors of the target population. To recruit individuals to complete the online survey, four course instructors were asked to forward an email inviting students from their activity classes ( $N = 320$ ) to participate. The email provided students with a link to an online survey in order to assess their needs with planning campus-based culinary nutrition education programming. A total of 43 students provided written consent and completed the survey.

## **Analysis Strategies**

Two analytic strategies were used; constant comparative analysis for the qualitative portion of the research study (focus group, interviews, and certain survey questions), and an analysis of descriptive statistics for relevant survey questions, as described below.

**Qualitative analytic strategies.** Qualitative data were collected through conducting: interviews, focus group, a literature review, and through surveys. Common themes were recorded and compared. The overall strategy used to approach data analysis was constant comparative analysis, originally developed for use in grounded theory methodology (Glaser & Strauss, 1967). This strategy focuses on taking one piece of datum, such as through one focus group, and comparing the information with similar findings from other aspects of the qualitative data collection. As such, similar experiences or ideas are compared to determine commonalities, and emerging themes. This results in creating more descriptive information, which can then be used in conjunction with the support from quantitative data (Glaser & Strauss, 1967). Qualitative data for this study were collected and compared for themes and concepts (Hatch, 2002).

**Quantitative analytic strategies.** Quantitative data were collected via online surveys. Frequencies for demographic variables were summarized. Descriptive statistics were used to determine the mean and standard deviation for each variable pertaining to cooking and healthy eating attitudes, behaviors, and self-efficacy. Data were analyzed using SPSS version 23.0 (IBM Corp, 2013).

## Results

### Phase 1: Findings from SNA

Nutrition education is widely used across multiple populations. However, interventions which encompass this topic paired with hands-on cooking instruction are rarely implemented for college students. Programs focusing on these topics are beneficial in improving college students' eating habits and diets (Lin & Dali, 2010). With college students, the primary reasons cited for not being able to prepare basic foods are that they (1) have not been taught (knowledge barrier) and (2) that they do not have an interest in learning (attitude barrier). However, if individuals are taught the necessary skills to prepare healthy foods, they are very likely to prepare them (Soliah et al., 2006). Further, research indicates that a lack of cooking skills, money for purchasing healthy food, and time to prepare and cook food are barriers for young adults with healthy cooking and eating (Larson et al., 2006). Please see Table VI for the epidemiological assessments and educational and ecological assessments results, outlining key findings related to contributing factors with college students and healthy eating.

When assessing theoretical underpinnings as part of the SNA, it was found that culinary nutrition education programming is typically rooted in the social cognitive theory, as observational learning plays a pivotal role in programming of this kind (Warmin, 2009; Kerrison, 2014). The SCT asserts that personal, behavioral, and environmental factors influence one another reciprocally (Bandura, 1977), an important component of programming when participants live and socialize with one another outside of the intervention. Further, operationalization of constructs of the SCT are impactful in promoting behavior change. Reinforcements are a construct of the SCT, and their

operationalization can be important in influencing outcomes with health promotion programming. Reinforcements can be direct, vicarious, or self-reinforcement (McKenzie et al., 2012). Outcome expectations are an important component of individuals actively engaging in behavior change. If individuals expect pleasurable effects of behavior change and associated benefits, they may be more likely to engage in the behavior (Bandura, 2004). Behavior is regulated by the associated social reaction it produces (Bandura, 2004). This could include the reaction participants in health promotion programming have in relation to their peers behavior change. Goal setting and providing feedback to students based on their actions are key in positively impacting self-efficacy (Locke & Latham, 1990; Schraw, Dunkle, & Bendixen, 1995). Personal health goals provide self-incentives and guides for health habits (Bandura, 2004).

## **Phase 2: Findings from PNA**

**Student focus group.** Students were enthusiastic about the prospect of a culinary, nutrition education program. Participants indicated that they would cook more frequently, but that unhealthy options are ubiquitous on-campus, and more convenient. However, they expressed that if they were taught how to make healthy, inexpensive convenient meals, they would cook more often. The majority of participants said that they did not know how to cook with the exception of noodle-based recipes (e.g. macaroni and cheese and ramen noodles). They indicated that providing recipes and ideas for how to incorporate lean meat into their everyday meals would be useful. One participant said the only way she knew how to incorporate grilled chicken in meals was to "buy pre-made chicken and throw it on a salad." The rest of the students agreed and indicated they would like to be taught both how to prepare chicken and lean beef, as well as how to follow a

few simple recipes through which they could incorporate lean meat. Further, students were interested in being taught nutritional information such as: how to read food labels, the amount of nutrients they need in their diet, the importance of fruits and vegetables, and how to shop for and prepare nutritious, inexpensive food. They thought that the use of visual learning tools (e.g. items to represent portion size) and hands-on teaching strategies would be the most engaging. They noted the importance of programming being interactive, so that they were actively included in the learning process. Participants unanimously agreed that they would like the sessions to be weekly and last two hours. They varied in their opinions of programming duration; 71% ( $n = 5$ ) felt there should be four sessions, 14% ( $n = 1$ ) felt sessions should consist of three sessions, and 14% ( $n = 1$ ) thought that there should be six or more sessions.

**Staff interviews.** Interviews indicated that staff felt as though students often ‘don’t know where to begin’ with cooking, so many choose convenience options for snacks and meals. Staff indicated that students should not only be taught how to follow and make a recipe, but taught why foods are nutritious, and where healthy food options can be found on-campus. They also felt that students would benefit from knowing what to eat pre- and -post- working out, including ways to incorporate protein in meals. Please see Table VII for a comparison of the PNA findings.

**Student survey.** Participants unanimously agreed ( $n = 40$ ) that nutritional information should be distributed as an ongoing component of a cooking class. When survey respondents ( $n = 39$ ) were asked to rate their cooking skills on a scale of 1 to 10, with 10 being the most skilled, there was a mean response rate of 5.26 ( $SD = 2.22$ ). Survey respondents collectively rated themselves comparatively higher when asked, "On

a scale of 1 to 10 with 10 being extremely confident, how confident do you feel following a recipe"? Of 42 respondents, the mean value was 7.83 ( $SD = 2.25$ ). When asked to respond to the statement, "I would cook more often if I felt more confident doing so" the mean value was 4.05 ( $SD = 1.06$ ).

The survey additionally included questions gauging cooking attitudes. Options for these questions were on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The statement from this scale with which respondents agreed the most strongly was, "Cooking is rewarding" with a mean of 4.33 ( $SD = .69$ ). The question, "I enjoy following recipes," had a mean value reported of 4.05 ( $SD = .76$ ). Further, the question "I enjoy cooking" had a mean response of 4.12 ( $SD = .77$ ) and, "I enjoy baking" had a mean value of 4.31 ( $SD = .66$ ).

With food-related behaviors, answer options ranged from strongly agree (5) to strongly disagree (1). Respondents' ( $n = 42$ ) overall mean for the question "I regularly eat foods I enjoy, even when they are not good for me" was 3.69 ( $SD = 1.02$ ). To the statement, "I make food choices based on ingredients listed on food labels," respondents ( $n = 42$ ) had a mean reported value of 3.26 ( $SD = 1.04$ ). To the statement, "I am able to identify what a portion size is for all food groups" respondents' mean value was 2.88 ( $SD = 1.05$ ). See Table VIII for a summary of survey findings.

### **Influence of SNA and PNA on Program Development**

The SNA and PNA findings' collectively contributed to the creation of the College CHEF and influenced the way in which it was implemented. The secondary needs assessment found (1) that there are a number of factors which influence college students' eating and cooking habits, many of which are modifiable; and (2) that theory-

driven, operationalized construct-based programming is impactful in culinary nutrition education programming. These findings were addressed as part of the College CHEF development in the following ways:

Participants were provided information on how to access healthy food on-campus and how to shop for and plan recipes with healthy groceries found off-campus (addressing behavioral and environmental risk factors). Participants were provided tips for meal planning, dorm-based cooking, and how to shop by unit prices in the grocery store. Programming also provided general nutritional knowledge on such topics as MyPlate, reading a food label, and the importance of fruit and vegetable consumption. Further, students were taught basic cooking techniques and skills (addressing predisposing, reinforcing, and enabling factors). Of note, only two intervention participants expressed interest in participating in an interactive grocery store trip. Thus, a modified version of the grocery store tour's pertinent points was presented to participants during the third session. The researcher completed the online training and provided information pertaining to (1) shopping based on unit prices; (2) knowing when to purchase frozen versus fresh fruits and vegetables; (3) stocking the pantry; (4) and useful tips for grocery shopping healthfully on a budget (Share our Strength's Cooking Matters, n.d.).

The SNA indicated that culinary nutrition programs most often utilize the social cognitive theory. The constructs of the SCT aligned with the goals and outcomes of the College CHEF, hence this theory-based approach was used in program implementation. Further, operationalized constructs such as goal setting, reinforcement, and providing feedback were all routinely incorporated, given their role in improving self-efficacy and

influencing health promotion programming (Locke & Latham, 1990; Schraw et al., 1995; McKenzie et al., 2012). Examples included: having students set goals at the first session and addressing their associated barriers and progress weekly both in class and through personalized emails, providing and encouraging direct, indirect, and vicarious reinforcement, and routinely providing feedback to students' through both the nutrition education session and hands-on portion of each session (McKenzie et al., 2012).

The primary needs assessment found that the main barriers with college students and cooking are time, money, and cooking ability. In addition, there is a need to cover foundational nutrition concepts in programming, including where to find healthy food options on-campus and how to shop for healthy food off-campus. Students reported a preferred dosage, duration, and format of programming, indicating aspects of previously conducted programming need to be modified to meet the needs and the priority population. Overall, it was indicated that students would prefer meeting four or five times, for two hours per session. They also felt that programming should be engaging and not "lecture-based".

The PNA results were incorporated into programming in a number of ways, not including those already addressed in the application of the SNA findings. The nutrition education sessions incorporated relevant, evidence-based handouts based on students' needs. Programming was offered once per week for two hours, for a total of four weeks. An interactive format was integrated throughout each lesson, in which students were constantly engaged and asked to demonstrate skills learned and answer nutrition and cooking questions. The weekly menu was curtailed based on students' preferences for incorporating lean protein, including variations of recipes for grilled chicken and multiple



recipes which could be made exclusively in the dorm room. Aspects of prior programming which were modified to optimize success were: the menu, which was adjusted based on what participants indicated was more feasible for them to routinely purchase, plan, and make; the inclusion of weekly verbal reviews; visual examples to relay nutritional concepts (e.g., portion size and sugar content in foods); emphasis on fruit and vegetable consumption; and dietician-led discussions of the nutritional content of foods made each session. See Table IX for a description of the content delivery by session.

### **Conclusion**

Given the lack of research conducted which detail the application of the PRECEDE-PROCEED model to develop appropriate content for campus-based culinary nutrition education programming, this manuscript contributes a unique program planning perspective. It was imperative to analyze the results, limitations, and implications from previously conducted culinary nutrition education programming. This provided evidence-based strategies and unearthed the needs of the priority population. There are no previous studies which have detailed the needs assessment process through the PRECEDE-PROCEED model in developing culinary nutrition education programming for college students. Previous research has indicated the importance of incorporating qualitative data in the health promotion program planning process, including conducting a primary needs assessment which aids in the development of goals and objectives, implementing the intervention, and conducting evaluation (Farquhar, Parker, Schulz, & Israel, 2006). The College CHEF, which came to fruition as a result of these steps, is therefore given credibility it might not have, had it not been rooted in evidence-based strategies

unearthed as a result of conducting a comprehensive needs assessment, guided by the PRECEDE-PROCEED model. Further, a needs assessment aids in ensuring that resources are allocated and used appropriately in planning and implementing programming.

The needs assessments were an integral component of the PRECEDE-PROCEED model in planning for the College CHEF, as it ensured that programming was developed which was evidence-based and tailored to the needs of its priority population. Future behavior change programs should utilize a program planning model, such as PRECEDE-PROCEED, to ensure that the program planning process is systematic, grounded in research, and that the program is suited to the needs of its priority population.

#### **SO WHAT? Implications for Health Promotion Practitioners and Researchers**

**What is already known on this topic?** The average college student has poor eating habits and low nutritional knowledge. However, providing students with evidence-based programming which incorporates both nutritional knowledge related to healthy eating and hands-on opportunities for applying basic cooking skills may be effective in improving related attitudes, behaviors, self-efficacy knowledge.

**What does this article add?** This is the first study examining a model-driven program planning process in developing a campus-based, culinary nutrition education program for college students. The application of the PRECEDE-PROCEED model in this study may be helpful in assisting others in understanding and applying program planning steps.

**What are the implications for health promotion practice or research?** Model-driven program planning is needed to develop culinary, nutrition education programs, so that they are appropriate and applicable to the needs of the priority population. Not all

programming is cookie-cutter and appropriate for all populations. This thorough process ensures that all aspects of programming collectively support its goals and address the needs of its priority population.

**Table VI**  
**SNA Epidemiological Assessment and Educational and Ecological Assessment**

<b>Factors</b>	<b>Research Findings</b>
Genetic Risk Factors	Consumption of fried foods may interact with genes related to obesity (Qi et al., 2014).
Behaviors Risk Factors	During the first year of college, some students in the U.S. report significant decreases in the amount of vegetables consumed and significant increases in the percentage of fat intake and alcohol consumption (Butler, Black, Blue, & Gretebeck, 2004).
Environmental Risk Factors	A lack of access to produce can contribute to college students not consuming the recommended number of fruits and vegetables (Casagrande, Wang, Anderson, & Gary, 2007).  Where a student lives affects their diet and diet-related health (Brevard & Ricketts, 1996).
Predisposing Factors	The top self-reported barrier of college students with eating healthfully is not having enough time (Benner-Kenagy, 2013).  A lack of nutritional knowledge is a factor in the increasing rates of obesity (Holden et al., 2014).
Reinforcing Factors	College students experiencing stress are more likely to engage in poor food habits, and less inclined to practice healthy food behaviors (Hudd et al., 2000).
Enabling Factors	A lack of cooking skills, money to purchase healthy food, and time to prepare and cook are barriers for young adults (Larson et al., 2006).  Taste, time sufficiency, convenience, and budget influence college students' eating habits (Horacek & Betts, 1998).

**Table VII**  
**Comparison of Results of PNA Findings/Themes which Emerged**

<b>Questions</b>	<b>Focus Group</b>	<b>Interviewees</b>	<b>Surveys</b>
What types of foods should be cooked in a campus-based program?	Chicken, vegetables pasta, marinara, lean protein.	Healthy snacks and breakfasts, healthy desserts.	Pasta, chicken, other meat, vegetables.
What facets of nutrition education should be included?	Time management, knowing why food is healthy, food labels.	Caloric content of foods, portion size, what foods are healthy, and incorporating protein.	Portion size, why foods are good for you & making healthy meals.
What are the main barriers with college students and cooking?	Kitchen access, transportation to store, time, money accessibility to unhealthy foods, inability to cook.	Transportation, adding protein to meals, cooking on a budget with limited time, money and tools.	67% time; 60% money; 48% cooking ability.

**Table VIII**  
**Mean, Standard Deviation, and Range of Survey Responses Related to**  
**Cooking and Eating Attitudes and Behaviors**

Survey Question ( <i>n</i> = 42)	Mean (SD)	Possible Range	Observed Range
Rate your cooking skills. ( <i>n</i> = 39)	5.26 (2.22)	1-10	1-10
How confident do you feel following a recipe?	7.83 (2.25)	1-10	1-10
Cooking is rewarding.	4.33 (.69)	1-5	3-5
I enjoy following recipes.	4.05 (.76)	1-5	2-5
I enjoy cooking.	4.12 (.77)	1-5	2-5
I enjoy baking.	4.31 (.66)	1-5	2-5
I would cook more often if I felt more confident doing so.	4.05 (1.06)	1-5	1-5
I regularly eat foods I enjoy, even when they are not good for me.	3.69 (1.02)	1-5	1-5
I make food choices based on ingredients listed on labels.	3.26 (1.04)	1-5	1-5
I am able to identify portion sizes for all food groups.	2.88 (1.05)	1-5	1-5

**Table IX**  
**College CHEF Content by Session\***

<b>Session</b>	<b>Program Content</b>
One	<p>Menu: Salsa served with vegetables and chips, chicken salad with avocado, and fruit smoothies.</p> <p>Topics</p> <ul style="list-style-type: none"> <li>– Class Introduction</li> <li>– Attendance incentive giveaway.</li> <li>– Discussion and creation of at least one class-related goal.</li> <li>– Benefits of today’s menu.</li> <li>– Introduction to mise en place.</li> <li>– Review of common cooking techniques including roasting, poaching, and sautéing.</li> <li>– Review of food safety and sanitation.</li> <li>– General tips for meal planning, grocery prep, and easy snack and recipe ideas.</li> <li>– Tips for incorporating spices with cooking.</li> <li>– Discussion of sugar content in soft drinks with visual representation.</li> <li>– Discussion of portion sizes for all food groups, with visual depiction of common sizes.</li> </ul> <p>Skills</p> <ul style="list-style-type: none"> <li>– Introduction to knife skills (chopping, dicing, how to smash and mince garlic, how to cut onions, celery, and avocado).</li> <li>– Measuring with measuring cup and spoons for liquid and dry ingredients.</li> <li>– How to use a food processor/blender.</li> <li>– Prepare meal from recipe cards. Go step by step with students in first demonstrating, then having them practice skills, providing feedback.</li> </ul>
Two	<p>Menu: Chicken tortilla soup &amp; coleslaw.</p> <p>Topics</p> <ul style="list-style-type: none"> <li>– Attendance incentives giveaway.</li> </ul>

## Table IX Continued

- Review of key concepts from previous session.
- Discussion of adherence to goal set last week- change in behavior, attitudes, knowledge, and/or self-efficacy from last week?
- Benefits of today's menu.
- Breakdown of a food label.
- Discuss: Why and how to incorporate more fruits and vegetables in their diets, produce shelf life and how that affects grocery shopping, colors of produce and associated benefits, and the best foods for pre and post working out.

### Skills

- Reinforce and practice knife skills.
- Demonstrate and execute how to pull apart chicken. Reinforce related food safety.
- Demonstration of how to make broth with bouillon. Students perform task.
- Chop and shred cabbage in food processor and discuss additives of vinegar and hot sauce for flavoring. Chop all vegetables, pull apart whole chicken, make broth, add vegetables, and follow remaining instructions on recipe cards.

Three      Menu: Baked sweet potatoes, salad with homemade dressing, vegetable quesadillas

### Topics

- Attendance incentives giveaway.
- Review of previous lesson.
- Discussion of adherence to goal, change in behavior, attitudes, knowledge, and/or self-efficacy from last week.
- Discuss nutritive benefits of today's menu.
- Discuss: stocking the dorm pantry, time management and planning with shopping, healthy food options on-campus, transportation options for grocery shopping.
- Review of “Cooking Matters at the Store”, focusing on shopping based on unit prices, knowing when to purchase frozen versus fresh fruits and vegetables, stocking the pantry, and useful tips for grocery shopping healthfully on a budget.



Table IX Continued

Skills

- Reinforce knife skills. Chop all vegetables for session. Follow recipe cards to prepare and sauté vegetables and cook in quesadillas, and for dressing, salad, and sweet potatoes.

Four

Menu: Oven-baked meatballs, homemade marinara with pasta and parmesan, and fruit/oat bars.

Topics

- Attendance incentives giveaway.
- Review of previous session.
- Discussion of adherence to goal, change in behavior, attitudes, knowledge, and self-efficacy from last week. Discussion of growth from first session.
- Discussion of fiber/ whole grains and how to incorporate them given cafeteria options.
- Discussion: MyPlate, blanching, and poaching.

Skills

- Reinforce knife skills by chopping garlic, jalapenos, tomatoes, and setting aside.
- Review steps for to make meatballs.
- Follow all instructions on recipe cards.

\* Each session consisted of a 30 minute education component, followed by a 75 minute hands-on component practicing and demonstrating cooking skills and techniques, followed by “Breaking Bread” in which students and instructors ate together.

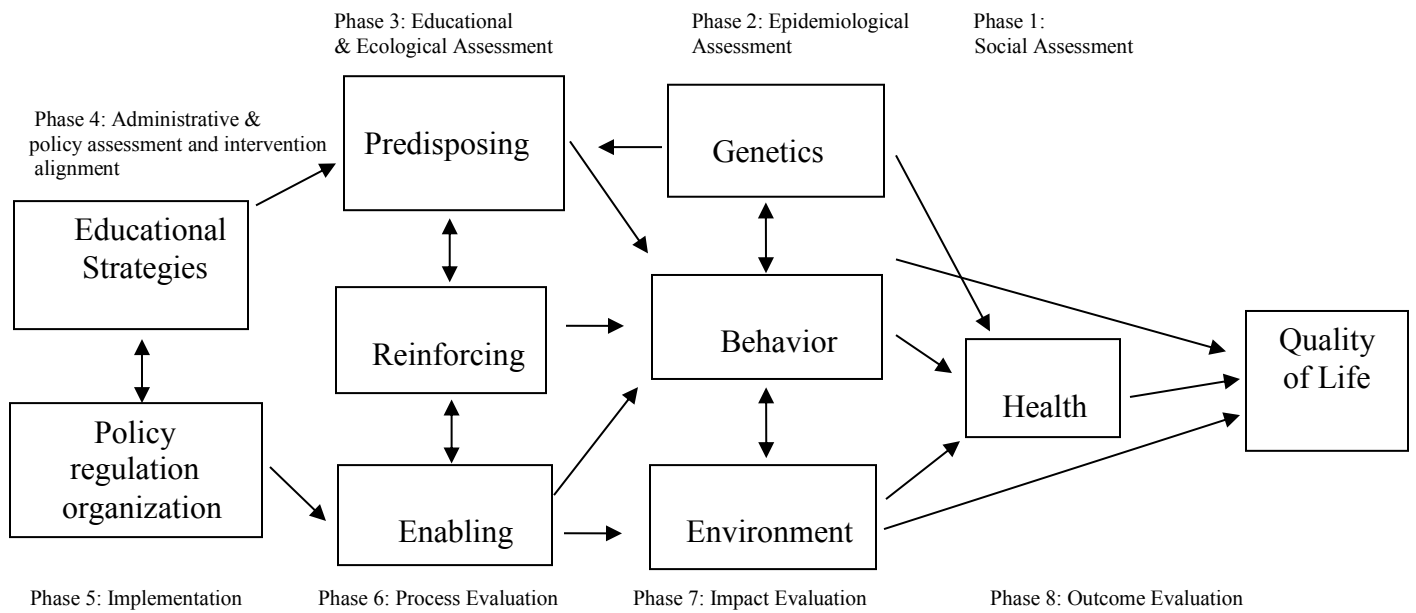


Figure 2. PRECEDE-PROCEED Model for the College CHEF

## CHAPTER 5

Manuscript 2: Impact Evaluation of "College CHEF," a Campus-based, Culinary Nutrition Education Program

**Proposed Journal:** Journal of American College Health  
<http://www.tandfonline.com/action/authorSubmission?journalCode=vach&page=instructions>

## Abstract

**Objective:** Evaluate the impact of the College CHEF to determine if there were significant differences pre- to -post- intervention with participants' attitudes, behaviors, and knowledge with healthy eating/cooking. **Participants:** College students from Living Learning Programs (LLPs) were recruited. Participants completing both pre- and post-measures were included in analysis: control ( $N = 17$ ) and intervention groups ( $N = 15$ ). **Methods:** Quasi-experimental pre-, post- design: surveys were administered to both groups at baseline and post-intervention in October/November 2015. **Results:** The intervention was successful at improving fruit and vegetable consumption ( $p = 0.03$ ) and knowledge of cooking terms and techniques ( $p = 0.000$ ), as compared to the control group. **Conclusions:** Campus-based culinary nutrition education programming has potential to impact college students' fruit and vegetable consumption and cooking knowledge. Future research should incorporate strategies such as: additional opportunities to engage in hands-on practice, an enrollment fee to incentivize attendance, cross-campus collaborations to create additional support for programming, and a longer duration of programming to help improve cooking attitudes and behaviors.

## BACKGROUND

Too few young adults participate in healthy behaviors such as eating nutritiously, which reduces the risk of obesity and associated morbidity and premature mortality (Epton et al., 2014). In the United States, more than one third of college students are overweight or obese (ACHA, 2015). Current rates of obesity in college students have been in part attributed to an increase in: snacking, eating away from home, and portion sizes (Duffey & Popkin, 2011; Piernas & Popkin, 2011). In general, college students do not meet the recommendations for daily fruit and vegetable intake, with 9 out of 10 students reportedly consuming less than five servings of fruits and vegetables per day (ACHA, 2015). College students are less aware than older adults of the health benefits associated with fruit and vegetable consumption and meeting dietary recommendations (Chung, Hoerr, Levine, & Coleman, 2006). Further, college students commonly underestimate what constitutes portion sizes (Brown & Oler, 2000).

In 2007, a study of college students' knowledge of dietary guidelines and food choices was conducted to determine if increased knowledge of dietary guidelines translated into healthy eating behaviors. Results found that knowledge of dietary guidelines for fruit, dairy, protein, and whole grains was associated with meeting daily dietary guideline requirements for those food groups. Thus, increased knowledge of dietary guidelines is positively associated with healthy eating patterns in college students. This supports the idea that individuals who are generally healthy eaters may have higher nutritional knowledge than those with less healthy eating habits (Kolodinsky et al., 2007). Another study found that participation in a college nutrition class prevented weight gain in freshmen, indicating that college-level nutrition education classes may support

participants in translating nutritional knowledge into dietary changes (Matvienko, Lewis, & Schafer, 2001).

In recent years, campus-based culinary nutrition education programs have emerged as a means to provide college students with nutritional information and cooking skills and techniques (Levy & Auld, 2004; Warmin, 2009; Kerrison, 2014). Although research examining this unique programming is limited, programs which have encompassed both nutrition and cooking in a hands-on format with college students have been effective in improving cooking and eating behaviors, attitudes, knowledge (Levy & Auld, 2004) and self-efficacy related to cooking skills and techniques and healthy eating practices (Warmin, 2009; Kerrison, 2014). Programming which emphasizes nutrition and incorporates hands-on cooking opportunities is more effective with improving outcomes than classes which only encompass nutrition education (Horodyski et al., 2004). When individuals are unable to prepare simple foods, it perpetuates the potential to become dependent on eating at restaurants and utilizing take-away options, which are often less nutritious than foods cooked at home (Soliah et al., 2006). Such evidence supports cooking programming as a means to teach college students skills to create healthy meals to improve their diet and health.

Cooking classes may be impactful in influencing participants' eating habits. One study reported that cooking skills were associated with meeting daily dietary recommendations for vegetable consumption in college students ( $p < 0.001$ ). This indicates that cooking classes aimed at the college population may play a role in participants meeting daily dietary recommendations (Kourajian & Stastny, 2015). In another study examining the cooking and dietary behaviors of adults ages twenty and

over, 8% of adults reported living in households where someone cooked dinner one time per week or less. In comparing individuals from these households with those from homes in which someone cooked dinner six to seven times per week, the latter were associated with lower consumptions of daily kilojoules (9,054 kJ versus 9,627 kJ;  $p = 0.002$ ), fat grams (81g versus 86g;  $p = 0.016$ ), and sugar (119g versus 135g;  $p < 0.001$ ) (Wolfson & Bleich, 2014). Thus, those who cook more frequently may have healthier diets than those who eat out more often, lending support to the merit of cooking to achieve healthier dietary practices.

Given these findings, further research is warranted to find additional support to substantiate the use of a tailored, evidence-based culinary nutrition education programming for college students. Therefore, the purpose of this study was to evaluate the impact of a campus-based culinary nutrition education program entitled, “The College CHEF: Cooking **H**ealthfully, **E**ducating **F**or Life-Long Change,” to determine if there was a significant difference from pre to –post- intervention with participants’ attitudes toward, behaviors with, and knowledge of healthy eating and cooking.

## **METHODS**

### **Research Design**

The study was a quasi-experimental, pre-test post-test design with a comparison group. A convenience sample was used for the intervention group comprised of students from three Living Learning Programs (LLPs), and a control group consisting of participants from three separate LLPs. Each individual LLPs' participants lived in the same dormitory on the campus where the study took place. LLPs are defined as programs where undergraduate college students live together within a residence hall, participating in academic and/or social programming (National Study of Living Learning Programs,

2007). LLP members have similar interests and/or academic majors, and typically take some college-credited classes together. Research indicates that participation in an LLP may lead to higher GPAs, an increased sense of community, and steady progress toward obtaining a degree (University of Kentucky, n.d.). This was a unique sample, as intervention students had opportunities outside of the program's environment to influence one another's food and cooking-related attitudes, behavior, and knowledge. The study was approved by the university's Institutional Review Board.

### **Setting, Program Recruitment, & Population**

The study occurred at a large, co-educational, southeastern public university. Four months prior to program implementation, the researcher sent an invitation to all LLP Directors on campus ( $N = 18$ ) to notify them of the opportunity to participate in the College CHEF. The researcher made clear that for intervention students, it was not required to participate in the research study to take part in the program. Seven LLP directors responded expressing interest, three of whom were invited to have their LLPs participate in programming, and three of whom were selected to serve as the control group. One of the intervention groups was comprised of two LLPs, both of which were for students interested in kinesiology/health/wellness professions. The other intervention group was selected as it represented first generation learners. Recruitment emails were sent out to the three intervention groups whose LLPs were comprised of the following number of total members:  $N = 40$  (Health LLP);  $N = 27$  (Wellness LLP); and  $N = 79$  (First Generation LLP).

The control groups were chosen based on which LLP directors were willing to comply with the survey deadlines and research procedures. Control group participants



were part of LLPs which were engineering, agriculture, and fine-arts oriented. Recruitment emails were sent out to the three control groups whose LLPs were comprised of the following number of total members:  $N = 131$  (WIRED LLP);  $N = 48$  (Fine Arts LLP); and  $N = 50$  (Greenhouse LLP) (personal communication with the university's LLP coordinator, March 1, 2016).

Control group participants included in the research study for data analysis purposes were those who completed both the pre- and -post- surveys, and for the intervention groups, those who completed both surveys and attended at least three of the four sessions. The justification for this decision was that if a participant attended fewer than three sessions, the survey would not be able to assess if changes from pre- to -post- were a result of program participation. Due to small sample size, the intervention groups were combined for data analysis purposes after determining there were no significant differences between intervention groups at baseline. This resulted in two groups: the intervention group ( $N = 15$ ); and the control group ( $N = 17$ ).

Two months prior to programming, the researcher met with representatives from each of the control and intervention LLPs to discuss recruitment procedures for the College CHEF. Recruitment for the intervention groups consisted of the researcher speaking at an LLP meeting one month before programming with two of the three LLPs. One of the LLPs which was part of the health-oriented intervention group was unavailable to meet, but the director, on behalf of the researcher, emailed all LLP members an explanation of programming, encouraging interested students to email the researcher to enroll. During the meetings for the other two intervention LLPs, a thorough description of the College CHEF was provided followed by a question and answer

session. Individuals were encouraged to sign up if they could commit to attending all four sessions.

Interested students provided their names and email addresses which the researcher sent to their respective LLP director, who relayed all email correspondence on the researcher's behalf. With regard to control group recruitment, the researcher emailed the control group LLP directors a flyer to forward to all of their LLP members. The flyer outlined the research study and provided information regarding the chance to win one of five \$20 gift cards for participating in the study, as well as the opportunity to participate in a follow-up cooking class. This class served as a token of appreciation to control group participants, took place once all surveys had been closed, and was not a part of the study.

Participants from the control and intervention groups resided on-campus in a dormitory with individuals from the same LLP, were undergraduate college students at the same public, co-educational university, and were 18 years or older. For the combined intervention groups, there were thirty participants who completed the baseline survey, twenty-four individuals who attended the first session, and fifteen who attended at least three sessions and completed the pre- and –post- survey. The inclusion of a survey question asking intervention participants to select how many sessions of the College CHEF they attended determined which intervention participants could be included in the study, as it was required that intervention participants attend three or more sessions to be included in data analysis ( $N = 15$ ). See Table X. With the control group, there were 47 participants who completed the baseline survey, and seventeen individuals who completed both the baseline and –post- survey. Table X depicts the demographics for the research participants included in data analysis. This included the participants eligible for

inclusion for the study from the control group ( $N = 17$ ) and the combined intervention groups ( $N = 15$ ).

### **Program Description**

The College CHEF was a social cognitive theory-driven, evidence-based culinary nutrition education program for college students which sought to improve attitudes, behaviors, and knowledge associated with healthy eating and cooking. College campus-based culinary nutrition programs often utilize the SCT, as observational learning and reciprocal determinism play a pivotal role in programming of this kind (Kerrison, 2014; Warmin, 2009). The SCT asserts that personal, behavioral, and environmental factors influence one another reciprocally (Bandura, 1977). Since participants within the intervention groups lived in the same dormitories and routinely interacted with one another through their living environment, there was an additional opportunity outside of the College CHEF for them to reciprocally influence one another with cooking and eating attitudes, behaviors, and knowledge. Observational learning, a SCT construct which purports that individuals learn new behaviors and cognitive skills from observing others, occurred continually throughout programming. The instructors made sure to routinely bring the participants' focus to the feedback that fellow LLP members were given in relation to skills performed to benefit the whole class.

The SCT constructs of reinforcements and expectations were emphasized throughout programming. Reinforcements occur directly, indirectly, and vicariously. Through providing feedback to participants and others witnessing and responding to feedback in the execution of their own skills, the three types of reinforcements were evident throughout sessions (McKenzie et al., 2012). Outcome expectations involve an

individuals' expectations that a pleasurable effect of behavior change and benefits will occur if they engage in a behavior, which makes them more likely to engage in that behavior (Bandura, 1977). The researcher sought to encourage outcome expectations through detailing the short and long term benefits associated with healthy cooking and eating, as well as the short-term reward of eating the meal they prepared at the end of each session.

Programming was developed through conducting primary and secondary needs assessments driven by the PRECEDE- PROCEED model the semester prior to implementation of the College CHEF. These findings were applied to an existing program previously created by M. Condrasky of Clemson University's Department of Food, Nutrition, and Packaging Sciences Department. Material was modified after gaining permission from its creator (personal communication, March, 31, 2015).

The College CHEF took place in a state-of-the-art kitchen housed on the university's campus. Four 2-hour sessions were held weekly over the course of one month for each intervention group. The sessions for both intervention groups were led by a health promotion doctoral student, and aided by a dietician/health educator employed through the college's University Health Services, as well as an undergraduate senior-level dietetic student, for a total of three instructors aiding each session. Both the nutrition educator and dietetic student met with the PI three times prior to program implementation to review all procedures and outline skills and techniques to be taught within each session. Content delivery and skill practice were intended to be identical between the two intervention groups. Each session began with a thirty minute nutrition education session, followed by a demonstration and subsequent execution of skills required to make the

recipes. The skills portion of each session lasted approximately 75 minutes. This was followed by “Breaking Bread,” during which all participants and instructors ate together. Participants and instructors dined at a large table during this portion of programming, sharing their experiences with making the session’s meal, as well as associated barriers and benefits.

At the start of each session, the researcher randomly chose two participants’ names from those in attendance, both of whom were awarded a small health-related prize to incentive attendance. Prizes included restaurant gift certificates, measuring cups and spoons, lunchboxes, and tee shirts from health-oriented organizations on campus. Following the attendance incentive giveaway, topics from the previous session were verbally reviewed. Participants were encouraged to share how they had applied concepts learned in class to their everyday life. They were also asked to reflect and discuss how the program was helping them achieve the personal program-related goal that they had set for themselves at the start of programming. The nutrition education session covered such topics as: understanding and applying MyPlate principles, how to interpret food labels, portion sizes, short and long term benefits associated with cooking and eating healthy foods, budgeting with grocery shopping, and meal planning and preparation. Skills taught included: recipe reading, how to hold and use cooking knives and how to utilize basic cooking tools and equipment, techniques for grilling, boiling, roasting, etc., and measuring and mixing. Weekly, students were provided supplemental handouts reinforcing topics covered in class, laminated recipe cards to reflect what had been made in class, reusable containers for their leftovers, and the meal that they made.

Of note, when asked during the second session who would be interested in

attending a grocery store-led tour, only one participant from each intervention group expressed interest. As such, a modified version of the grocery store tour was presented to participants during the third session. The researcher completed the online training and provided individuals with information and handouts focusing on: (1) shopping based on unit prices; (2) knowing when to purchase frozen versus fresh fruits and vegetables; (3) stocking the pantry; (4) and useful tips for grocery shopping healthfully on a budget.

### **Data Collection**

Surveys were administered to the intervention and control groups at the same times, in October 2015 for the pre-survey and in October/November 2015 for the –post-survey. The link to the pre-survey was emailed by LLP directors on behalf of the researcher two weeks before programming started and was closed the morning of the first session. The post-survey link was emailed to students at the end of the fourth session and remained open for two weeks. One week after each of the emails containing the survey links were sent, there was a follow-up reminder email distributed to all participants. Each participant chose a unique four-digit number which they were prompted to enter at the beginning of each survey. This allowed the researcher to match pre- and –post- surveys and to determine who attended three or more sessions, as this was a question participants answered on the –post- survey. For both surveys, after two weeks, those who had not completed the survey were considered non-responders and were not included in data analysis.

### **Measures**

The instrument that served as the pre- and -post- measure for the intervention and control groups was previously tested for reliability and validity, important in gaining

reliable, potentially generalizable data (Michaud, 2007; Larson et al., 2006). Survey questions sought to gauge participants' cooking and eating knowledge, attitudes, behaviors, and self-efficacy though for the purpose of this manuscript, the self-efficacy subscales are not included.

**The Cooking Attitudes subscale.** This subscale consisted of six statements concerning the ease of cooking at home, cooking for health, and following recipes. For each statement, participants selected the extent to which they agreed or disagreed. An example of a statement was, "I like trying new recipes." A 5-point Likert scale was used: Strongly Agree = 5; Agree = 4, Neither Agree nor Disagree = 3; Disagree = 2; and Strongly Disagree = 1. Items 1, 3, and 5 were reverse coded so that the negatively worded questions' outcome reflected the appropriate Likert-scale rating. These statements were, "I do NOT like to cook because it takes too much time;" "Cooking is frustrating;" and, "It is too much work to cook." For each of these items, the possible subscale range for responses was 6-30, with higher scores reflecting more positive attitudes toward cooking.

**The Cooking Behaviors subscale.** This subscale consisted of four statements pertaining to cooking using basic ingredients, convenience items, and with leftovers. For each statement, participants selected how many times per week they carried out that particular behavior. An example of a statement was, "Prepare meals from basic ingredients (fresh produce, raw chicken, etc.)." For this subscale, Likert responses were coded as: Six to seven times per week = 5; Three to five times per week = 4; Two times per week = 3; Once each week = 2; and Not at all = 1. The possible point range for responses on the subscale was 4-20, with higher scores reflecting healthier cooking behaviors.

**The Fruit and Vegetable Consumption subscale.** This subscale consisted of two statements pertaining to how many times per week participants consumed the daily recommended servings of fruits and vegetables. An example of a statement was, “Consume at least five servings of fruit per day.” For this subscale, Likert responses were coded as: Six to seven times per week = 5; Three to five times per week = 4; Two times per week = 3; Once each week = 2; Not at all = 1. The possible point range for this subscale was 2-10, with higher scores reflecting more frequent consumption of fruits and vegetables.

**The Eating Behaviors subscale.** This subscale consisted of three statements inquiring how many times per week participants ate breakfast, lunch, and dinner away from home. The subscale’s directions asked respondents to indicate the extent to which they felt confident with each behavior. An example of a statement was, “Eat breakfast away from home.” For this subscale, Likert responses were coded as: Not at all = 5; Once each week = 4; Two times per week = 3; Three to five times per week = 2; and Six to seven times per week = 1. The possible point range for responses from the Eating Behaviors subscale was 3-15, with higher scores reflecting healthier eating behaviors.

**The Knowledge of Cooking Terms and Techniques subscale.** This subscale consisted of eight multiple choice questions relating to basic cooking skills and techniques. Each multiple choice question had four possible responses, one of which was, “Don’t Know.” Those questions for which participants marked their response as “Don’t Know” were counted as incorrect. An example of a question with potential responses was, “What is the term for preparing all ingredients, gathering equipment, and organizing your work area before beginning to cook? A. Production Stage; B. Blanching; C. Mise en



place; or D. Don't Know." Responses were coded such that participants received a "0" for each incorrect answer and a "1" for each correct answer. The minimum possible score was zero and the maximum score was eight, with higher scores reflecting an increased knowledge of cooking terms and techniques.

**Demographic Variables.** There were twelve demographic questions which pertained to: age (in years), grade status (freshman/sophomore/junior/senior), gender (male, female, transgender, other), race/ethnicity (White, non-Hispanic; Black, non-Hispanic; Hispanic or Latino; Asian or Pacific Islander; American Indian/Alaskan Native, or other), Greek affiliation (sorority, fraternity, or neither), and participation as part of an on-campus athletic team were assessed.

### **Data Analysis**

Descriptive statistics were summarized for intervention and control group demographic variables, including mean, standard deviation, and relevant frequencies. See Table X for comparisons. Each of the survey's subscales was comprised of interval-level data. Scores from each separate subscale were summed for both groups to calculate composite scores, means and standard deviations at pre- and –post- survey. Means and standard deviations were also summarized for each subscales' individual items (Table XI). Group differences were assessed via paired *t*-tests reporting the significance within and unpaired *t*-tests reporting the significant between the control and combined intervention group for each subscale through comparing the mean differences in change scores pre- to –post-intervention (Table XII). Significance was set at  $p < .05$  apriori. Analysis was conducted in SPSS version 23.0 (IBM Corp, 2013).

## RESULTS

### Demographics

There were fifteen intervention and seventeen control group participants for a total of thirty two individuals. The mean age of the intervention group was 18.0 ( $SD = 0.00$ ) and the mean age of control group participants was 18.3 ( $SD = 0.59$ ). All intervention participants were freshmen, while the control group was comprised of 82% freshmen ( $n = 14$ ) and 18% sophomores ( $n = 3$ ). Gender varied between the groups, with the combined intervention group consisting primarily of females: 27% male ( $n = 4$ ) and 73% female ( $n = 11$ ), while the control group comprised primarily of males: 71% males ( $n = 12$ ), 29% females ( $n = 5$ ). There was a significant difference when comparing gender among the intervention and control groups for pre-, -post- completers ( $p = 0.01$ ). All control and intervention participants' defined their ethnicity as "White." In addition, 7% ( $n = 1$ ) of intervention group participants and 29% ( $n = 5$ ) of control group members identified as a member of a sorority or fraternity.

### Cooking Attitudes Subscale

Using paired  $t$ -tests, pre- ( $M = 24$ ;  $SD = 2.74$ ) to post-scores ( $M = 24$ ;  $SD = 3.76$ ) among intervention participants for the Cooking Attitudes subscale were not significant ( $p = 1.00$ ). Similarly, pre- ( $M = 23.94$ ;  $SD = 3.95$ ) to post-scores ( $M = 23.48$ ;  $SD = 4.22$ ) for control participants were not significant ( $p = 0.50$ ). Unpaired  $t$ -tests indicated that a comparison of mean change scores between groups was nonsignificant ( $p = 0.80$ ). See Table XI for a comparison of Cooking Attitude items and subscale scores pre-, -post- for intervention and control groups, and Table XII for comparisons between groups.

### **Cooking Behaviors Subscale**

Using paired *t*-tests, pre- ( $M = 9.07$ ;  $SD = 4.04$ ) to post-scores ( $M = 9.07$ ;  $SD = 3.73$ ) among intervention participants for the Cooking Behaviors subscale were not significant ( $p = 1.00$ ). Similarly, pre- ( $M = 9.65$ ;  $SD = 4.34$ ) to post-scores ( $M = 9.35$ ;  $SD = 3.72$ ) for control participants were not significant ( $p = 0.68$ ). Unpaired *t*-tests indicated that a comparison of mean change scores between groups was nonsignificant ( $p = 0.78$ ). See Table XI for a comparison of Cooking Behavior items and subscale scores pre-, -post- for intervention and control groups, and Table XII for comparisons between groups.

### **Fruit and Vegetable Consumption Subscale**

Using paired *t*-tests, pre- ( $M = 4.73$ ;  $SD = 2.71$ ) to post-scores ( $M = 6.13$ ;  $SD = 2.20$ ) among intervention participants for the Fruit and Vegetable Consumption subscale were significant ( $p = 0.008$ ). Pre- ( $M = 5.31$ ;  $SD = 3.03$ ) to post-scores ( $M = 4.82$ ;  $SD = 2.96$ ) for control participants were not significant ( $p = 0.74$ ). Unpaired *t*-tests indicated that a comparison of mean change scores between groups was significant ( $p = 0.03$ ). See Table XI for a comparison of Fruit and Vegetable Consumption items and subscale scores pre-, -post- for intervention and control groups, and Table XII for comparisons between groups.

### **Eating Behaviors Subscale**

Using paired *t*-tests, pre- ( $M = 7.27$ ;  $SD = 2.63$ ) to post-scores ( $M = 8.73$ ;  $SD = 3.20$ ) among intervention participants for the Eating Behaviors subscale were not significant ( $p = 0.16$ ). Similarly, pre- ( $M = 8.47$ ;  $SD = 1.74$ ) to post-scores ( $M = 8.12$ ;  $SD = 1.76$ ) for control participants were not significant ( $p = 0.36$ ). Unpaired *t*-tests indicated that a comparison of mean change scores between groups was nonsignificant ( $p = 0.11$ ). See Table XI for a comparison of Eating Behavior items and subscale scores pre-, -post- for

intervention and control groups, and Table XII for comparisons between groups.

### **Knowledge of Cooking Terms and Techniques Subscale**

Using paired *t*-tests, pre- ( $M = 5.29$ ;  $SD = 1.44$ ) to post-scores ( $M = 7.38$ ;  $SD = 1.18$ ) among intervention participants for the Knowledge of Cooking Terms and Techniques subscale were significant ( $p = 0.000$ ). Pre- ( $M = 5.40$ ;  $SD = 1.62$ ) to post-scores ( $M = 5.56$ ;  $SD = 1.70$ ) for control participants were not significant ( $p = 0.49$ ). Unpaired *t*-tests indicated that a comparison of mean change scores between groups was significant ( $p = 0.000$ ). See Table XI for a comparison of Knowledge of Cooking Terms and Techniques items and subscale scores pre-, -post- for intervention and control groups, and Table XII for comparisons between groups.

### **COMMENT**

The purpose of this study was to evaluate the impact of a campus-based, culinary nutrition education program to determine if there was a significant difference from pre- to –post- intervention with participants’ attitudes, behaviors with, and knowledge of healthy eating and cooking. Findings from this study indicate significant improvements in fruit and vegetable consumption and knowledge of cooking skills and techniques among intervention participants. These results are encouraging given that most students do not consume the recommended number of fruits and vegetables per day and that increased nutritional knowledge is associated with healthy eating patterns in college students (ACHA, 2015; Kolodinsky et al., 2007).

The nutrition education portion of each session emphasized where to find healthy food options on campus, as well as simple ways to incorporate fruits and vegetables into one's diet. However, it may have been impactful to have an additional session in which

intervention participants were guided on a grocery store tour to further enforce principles from class pertaining to shopping for nutritious food on a budget. Previous programming which included evidence-based information through the application of the *Cooking Matters at the Store* curriculum indicated that participants who are led through a grocery store tour have a better understanding of concepts such as food shopping based on unit prices (Kerrison, 2014). Helping participants apply information learned in sessions in a practical way such as grocery shopping may have further reinforced concepts learned, and had the ability to impact long-term sustainability associated with changing nutrition behaviors.

Although basic knife and cooking skills were reviewed and reinforced throughout sessions, there was not a statistically significant change in improved cooking behaviors. Additional opportunities to allow for hands-on practice may contribute to improved cooking behaviors and should be incorporated into future interventions. A greater emphasis on the application of relevant cooking skills is key in improving associated behavior (Cutler, 2004). In future programming, creating as many opportunities as possible for participants to apply skills learned in class may have the ability to impact behavior, and should be taken into consideration.

The program's emphasis on hands-on cooking skills and dispensing pertinent nutritional knowledge, including the benefits of and how to incorporate more fruits and vegetables into one's diet may have contributed to the significant improvements in fruit and vegetable consumption and knowledge of cooking terms and techniques among the intervention participants. These areas were further emphasized throughout programming by a number of tactics including: showing physical examples of fruit and vegetable

portions, encouraging participants to try new fruits and vegetables during sessions, and providing simple ideas for how to incorporate fruits and vegetables into meals that participants commonly eat. These tactics were supported by previous literature which indicates that individuals who have more nutritional knowledge, such as understanding the benefits of fruits and vegetables, may eat more nutritiously (Kolodinsky et al., 2007). Further, research indicates that programming which incorporates both nutrition education and hands-on cooking is more impactful with improving related outcomes than those which do not provide hands-on application (Horodynski et al., 2004). The hands-on practice and application throughout the skills portion of programming may have contributed to intervention participants' significant increases in the knowledge of cooking terms and techniques.

To increase the impact that future programming may have, SCT constructs should be operationalized with the target audience in mind. Outcome expectations, or reinforcing the short- and long-term benefits of healthy eating, should be integrated consistently throughout programming. Outcome expectations provide individuals the ideal that they will benefit from engaging in behavior, like cooking and eating healthfully, which makes them more likely to do what is necessary to overcome barriers in working toward behavior change (Bandura, 2004). Another SCT construct, reinforcement, could further be utilized by providing constant feedback to participants so that they can learn from the feedback both they and their fellow LLP members received. This could be supported by having more instructors to provide additional one-on-one attention. Additional instructors would also be beneficial given that with the College CHEF, many participants had a very basic skill level and needed more individualized attention than could be provided.

Further, the Breaking Bread portion of programming seemed impactful, through instructor observation, in building participant-instructor rapport. This element should continue to be reinforced in future programming.

One explanation for the lack of a significant difference pre- to –post- on the Cooking Attitudes subscale for the intervention group is that the mean score was fairly high at baseline (Mean = 24; *SD* = 3.74; Range = 18-28). This is reinforced by previous research, which has indicated that college students have generally positive attitudes toward cooking (Brown & Eggett, 2004). Future research can capitalize on college students' positive attitudes toward cooking by encouraging them to participate in programming. This could be done through providing a homemade, healthy snack during recruiting, to further support positive attitudes toward cooking and encouraging students to enroll. Additionally, if programming were not volunteer-based, but incorporated into a credited class, it might help in encouraging positive attitudes toward programming. This is surmised given that since college students are often overcommitted, if they receive college credit for participating, it might make attendance less of a burden and improve attitudes toward cooking.

Moreover, non-significant findings for the eating and cooking behaviors measured as part of the study may be attributed in part to the campus environment. A college campus provides ease of accessibility to unhealthy foods, which for some college students is more appealing, especially when they view peers enjoying less healthy options (Levitsky et al., 2004). In addition, students tend to perceive less healthy options as less expensive, all of which may contribute to the cooking and eating behaviors of college students (Deliens et al., 2014). Though college students know that fast food is often less

healthy, they see it as easy, time-saving, and convenient (Brown & Eggett, 2004). Future programming should further emphasize budgeting, meal planning, and preparing healthy convenience food items in an effort to improve cooking attitudes and behaviors.

Cross-campus collaboration with health/wellness programming is gaining popularity as a means to create partnerships and resources to enhance college students' well-being (Fullerton, 2011). In that spirit, it may be of value for future programming to consider collaborating with on-campus organizations/departments. Freshman orientation-type courses could incorporate culinary, nutrition education programming as part of a life skills module. Also, future programming might seek out the collaborative opportunity to partner with an agriculture department/organization in an effort to have participants contribute to cultivating food which they could cook. Additionally, a dietetic department could provide 1-on-1 nutritional counseling for intervention participants in an effort to expand on nutritional knowledge learned through programming in an applicable, personalized manner.

Incentivizing behavior change programs may jumpstart individuals' initial motivation toward making decisions in support of a healthier lifestyle. Thus, providing additional incentives to promote participation in programming may be impactful. Providing incentives for completion of both pre- and –post- surveys would not only aid researchers in collecting data, but may aid individuals in a greater likelihood of behavior change (Gneezy, Meier, & Rey-Biel, 2011). In addition, programming which requires participants to pay a small enrollment fee may be beneficial in improving attendance, given that participants may feel more committed to their investment. A previous behavior change-oriented study indicated that if participants were asked to pay a small fee to help



cover the cost of behavior change-promoting tools, the ownership associated with the fee may contribute to an improvement in behavior (Krezanoski, Comfort, & Hamer, 2010). Additionally, future programming which charged participants an enrollment fee could potentially be used toward purchasing incentives associated with completion of the program.

Limitations for this study include: a small, convenience sample, a lack of follow-up measures to determine long-term sustainability of programming, and more females than males from the intervention group who completed the pre-, -post- measures and attended three or more sessions. Gaps exist to determine the impact of culinary, nutrition education programming on men, as fewer males historically participate in programming of this kind often at a ratio of 2:1 women to men (Lin & Dali, 2012). Though it is promising that more men participated in the College CHEF than typically do in similar programming, the majority of those who attended three or more sessions and completed the pre- and -post- survey were females (67%,  $n = 10$ ). Future programming should incorporate recruitment tactics which encourage men to enroll, such as recruiting from groups which are male-based like men's athletic teams, fraternities, and dormitories with all male residents. Future studies should also include follow-up measures to determine the sustainability of programming's impact. Given the attrition issues associated with intervention participants, if incentives were tied to both the completion of follow-up and pre-, -post- measures, it may increase attendance if participants knew there was an associated incentive. Future campus-based culinary nutrition programming could also incorporate follow-up communication monthly or bi-monthly for the year following programming to encourage students with outcomes related to programming. A program

entailing more than four sessions (i.e. five or six) could allow for participants to have additional practice with applying skills and knowledge learned, which could improve associated outcomes. Further research is warranted to determine recommendations for dose and duration of similar programming on a college campus. Further, if programming were part of a class for college credit and attendance was mandatory, it may improve attrition issues, as was indicated in previous, similar programming (Warmin, 2009; Kerrison, 2014).

The findings from this study support the implementation of campus-based culinary nutrition education programming to support college students in improving their knowledge of cooking terms and techniques and their fruit and vegetable consumption. To further enhance cooking attitudes and behaviors as well as healthy eating, culinary programming should include: a small enrollment fee, incentives for pre-, post- measure completion, a longer duration, additional instructors and opportunities to engage in hands-on practice, and cross-campus collaborations. The positive outcomes from this study reinforce the need for campus-based culinary nutrition education programming in an effort to improve college students' behaviors, attitudes, and knowledge with healthy eating and cooking.

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TABLE X. Demographics for Control and Intervention Groups Included in Data Analysis

	Intervention Group ( <i>N</i> = 15)	Control Group ( <i>N</i> = 17)
Gender		
Male	27 % ( <i>n</i> = 4)	71% ( <i>n</i> = 12)
Female	73 % ( <i>n</i> = 11)	29% ( <i>n</i> = 5)
Ethnicity	100% ( <i>n</i> = 15)	100% ( <i>n</i> = 15)
White		
Year in College		
Freshman	100% ( <i>n</i> = 15)	82% ( <i>n</i> = 14)
Sophomore		18% ( <i>n</i> = 3)
Age (SD)	18 (0.0)	18.3 (0.59)

TABLE XI. Scale and Item-by-Item Comparison Pre-, -Post-, within Control and Intervention Groups Using Paired *t*-tests

Scale/Items	Intervention ( <i>N</i> = 15)		<i>p</i>	Control ( <i>N</i> = 17)		<i>p</i>
	-Pre-	-Post-		-Pre-	-Post-	
<b>Cooking Attitudes</b>	24 (3.74)	24 (3.76)	1.00	23.94 (3.95)	24.38 (4.22)	0.50
I do NOT like to cook because it takes too much time.	3.67 (1.35)	3.60 (1.12)		3.71 (1.16)	3.65 (1.46)	
Meals made at home are affordable.	4.07 (0.88)	3.93 (0.88)		4.06 (0.56)	4.12 (1.13)	
Cooking is frustrating.	3.73 (0.88)	4.07 (0.96)		3.88 (0.93)	3.59 (1.33)	
I like trying new recipes.	4.20 (0.94)	4.20 (0.12)		4.35 (0.86)	4.00 (1.32)	
It is too much work to cook.	4.0 (1.07)	3.73 (1.03)		3.41 (1.14)	3.53 (1.42)	
Making meals at home helps me to eat more healthfully.	4.33 (0.90)	4.47 (0.64)		4.29 (0.69)	4.06 (1.30)	
<b>Cooking Behaviors</b>	9.07 (4.04)	9.07 (3.73)	1.00	9.65 (4.34)	9.35(3.72)	0.68
Prepare meals from basic ingredients.	2.33 (1.35)	2.03 (1.06)		2.24 (1.49)	2.24 (1.39)	
Prepare meals using convenience items.	2.53 (1.30)	2.03 (1.06)		2.53 (1.46)	2.47 (1.23)	
Reheat or use leftovers in another meal.	1.80 (1.01)	2.40 (1.06)		2.76 (1.03)	2.53 (1.07)	
Use fresh and convenience items in combination to prepare a meal at home.	2.20 (1.27)	2.20 (1.21)		2.06 (1.25)	2.12 (1.22)	
<b>FV Consumption</b>	4.73 (2.71)	6.13 (2.20)	<b>0.008*</b>	5.31 (3.03)	4.82 (2.96)	0.74

Table XI Continued

Consume at least five servings of fruit per day.	2.40 (2.3)	3.01 (1.22)		2.53 (1.66)	2.47 (1.46)	
Consume at least five servings of vegetables per day	1.45 (1.29)	3.01 (1.10)		2.47 (1.62)	2.36 (1.54)	
<b>Eating Behaviors</b>	7.27 (2.63)	8.73 (3.20)	0.16	8.47 (1.74)	8.12 (1.76)	0.36
Eat breakfast away from home.	3.53 (1.41)	4.0 (1.20)		4.35 (1.00)	4.00 (1.12)	
Eat lunch away from home.	1.73 (0.88)	2.27 (1.49)		2.06 (0.83)	1.88 (0.58)	
Eat dinner away from home.	1.87 (0.92)	2.47 (1.13)		2.06 (0.83)	2.24 (1.00)	
<b>Knowledge</b>	5.29 (1.44)	7.33 (1.18)	<b>0.000*</b>	5.40 (1.62)	5.56 (1.7)	0.49

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Frequency of Correct Answers for Knowledge Subscale

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	Int. –Pre-	Int. –Post-	Cnt. –Pre-	Cnt. –Post-
Blanching	47%	80%	52%	77%
Sautéing	67%	100%	82%	82%
Dicing	87%	93%	82%	88%
Simmering	87%	100%	88%	77%
Roasting	3%	93%	41%	36%
Mise en place	20%	80%	6%	12%
Measuring	80%	93%	94%	94%
Measuring	87%	93%	94%	84%

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\*  $p < 0.05$

TABLE XII. Unpaired *t*-tests' Significance between Groups: Intervention (*N* = 15) and Control (*N* = 17)

Scale	Intervention Change Score Mean Difference ( <i>SD</i> )	Control Change Score Mean Difference ( <i>SD</i> )	<i>t</i> -test Difference Control & Intervention ( <i>p</i> )
Cooking Attitudes	0.00 (4.05)	0.31 (2.70)	0.80
Cooking Behaviors	0.00 (3.06)	-0.3 (2.85)	0.78
FV Consumption	1.4 (1.76)	-0.18 (2.16)	<b>0.03*</b>
Eating Behaviors	1.47 (3.87)	-0.35 (1.54)	0.11
Knowledge	2.40 (1.45)	0.18 (1.02)	<b>0.000*</b>

\* *p* < 0.05

## CHAPTER 6

Manuscript 3: The Effect of a Campus-based Culinary, Nutrition Education Program, “College CHEF,” on College Students' Self-efficacy with Cooking Skills and Nutrition Behaviors

**Proposed Journal:** American Journal of Health Education  
<http://www.shapeamerica.org/publications/journals/ajhe/authorguidelines.cfm>

## Abstract

**Background:** Most college students have poor dietary habits. Self-efficacy is important in promoting positive behavior change and may be an impactful construct with college students' eating and cooking habits. **Purpose:** To evaluate the impact of a campus-based culinary nutrition education program, the College CHEF, to determine if there was a significant difference pre- to -post- intervention on participants' self-efficacy for cooking skills and techniques and fruit and vegetable (FV) use and consumption.

**Methods:** College students from campus-based Living Learning Programs (LLPs) were recruited in a quasi-experimental study to participate in intervention ( $N = 15$ ) and control groups ( $N = 17$ ). Intervention groups participated in four hands-on cooking/nutrition sessions. Pre- and -post- surveys were administered to both groups. **Results:** Intervention participants reported significant improvements as compared to the control group for the Self-Efficacy for using Fruits, Vegetables, and Seasonings subscale ( $p = 0.015$ ).

**Discussion:** Future research should explore the various means to promote self-efficacy (i.e., vicarious experiences, performance outcomes, verbal persuasion, and physiological feedback) as part of similar programming. A longer duration of programming may also improve program outcomes. **Translation to Health Education Practice:** Findings support the implementation of similar programming to improve college students' self-efficacy for using fruits, vegetables, and seasonings with cooking to promote healthier eating and cooking behaviors and attitudes. Health researchers/educators are encouraged to further emphasize the four main facets to promote self-efficacy and increase the duration of programming to allow additional opportunities for hands-on practice.



## Background

Of college students in the United States, 35% are considered overweight and/or obese (ACHA, 2015). Further contributing to overweight and obesity in college students, only 6.5% of college students consume five or more fruits and vegetables per day; evidence indicates that consuming the daily recommended number of fruits and vegetables may decrease the risk for obesity (WHO, 2016; ACHA, 2015). Obese individuals are at an increased risk for: hypertension, dyslipidemia, type 2 diabetes, heart disease, stroke, gallbladder disease, osteoarthritis, some types of cancer, low quality of life, and mortality (NIH, 2013; National Heart, Lung, and Blood Institute and National Institute of Diabetes and Digestive Kidney Disease, 1998). The etiology of overweight and obesity is often a result of multiple factors, but in the end, is determined by one's long-term balance between energy consumption and expenditure (Jebb & Moore, 1999). One study found a significant relationship between the frequency of skipping breakfast ( $p = 0.048$ ), snacking between breakfast and lunch ( $p = 0.044$ ), and obesity in young women (bin Zaal, Musaiger, & D'Souza, 2009). This emphasizes the importance of young adults understanding and adhering to recommended dietary practices and guidelines in order to decrease one's risk and/or the prevalence of overweight and obesity. In a study reporting results from a focus group with college students, when participants were asked to recount recent fruit and vegetable consumption, the majority incorrectly thought that they were eating the daily recommended fruits and vegetables, as they were underestimating appropriate portion sizes (Hartman et al., 2013). Thus, the number of college students consuming the recommended amount of fruits and vegetables per day may be even lower than existing data indicate.

When individuals leave home to attend college, their healthy dietary habits often decrease (Harris, Gordon-Larsen, Chantala, & Udry, 2006) and their unhealthy dietary habits tend to worsen (Grace, 1997). This may contribute to college students gaining weight during their first year of college (Anderson et al., 2003). Conveniently, college campuses provide an ideal environment in which to promote behavior change and educate students on the importance of making healthy behaviors become life-long habits (Sparling, 2007). Campus-based programming which incorporates both cooking and nutrition education components has emerged as a means to improve cooking and eating behaviors, attitudes, knowledge, and self-efficacy related to cooking skills and techniques and healthy eating practices (Levy & Auld, 2004; Warmin, 2009; Kerrison, 2014). When education is combined with other factors such as a skill-based approach and emphasis on self-efficacy and goal achievement, behavior change is more likely to occur (Lockwood & Wohl, 2012).

Self-efficacy is an important construct of the SCT and refers to individuals' beliefs in their ability to carry out behaviors to produce specific outcomes. SCT suggests that self-efficacy is a key component to behavior change (Strong et al., 2008). Culinary nutrition education programming often utilizes the SCT, as it purports that learning occurs within a social context with an influence of cognitive, behavioral, and environmental factors, and that much of what is learned is gained through the observation of others (Warmin, 2009; Kerrison, 2014; Bandura, 1977). Since cooking classes largely rely on observation and subsequent skill practice, the use of this theory is practical.

It has been indicated that participating in meal preparation may increase an individual's self-efficacy for cooking and simultaneously improve diet quality of

adolescents (Larson et al., 2006). Self-efficacy aids with achieving one's goal as it perpetuates planning and behavioral initiative. Those who boast self-efficacy tend to feel more comfortable with trying a new and/or difficult behavior, and often put more into working toward and maintaining a behavior (Brug et al., 1995). The more self-efficacious an individual feels, the higher the personal goals they are inclined to set, and the stronger their commitment to behavior to achieve those goals (Locke & Latham, 1990). In previous studies, it has been reported that self-efficacy has routinely been associated with fruit and vegetable consumption and a decrease in fat intake in adults (Brug et al., 1995; Anderson, Winett, Wojcik, & Williams, 2010). Steptoe and colleagues found that improvements in fruit and vegetable consumption over a one year period of time were predicted by changes in knowledge, encouragement, anticipated regret, and self-efficacy (Steptoe et al., 2004). Thus, an individual's self-efficacy may be impactful in fruit and vegetable consumption. Given the impact that self-efficacy may have with behavior change, constructs operationalizing self-efficacy should be incorporated and emphasized in nutrition programming among college students.

There are four sources of information that individuals utilize to judge their self-efficacy: performance outcomes, verbal persuasion, vicarious experiences, and physiological feedback. Performance outcomes and/or mastery experience, according to Bandura (1977), are the most important determinant of self-efficacy and refers to if one has previously performed a task and done well, they are likely to have increased self-efficacy with performing that task in the future. Verbal persuasion is the ideal that individuals' behavior can be impacted by verbal praise related to performing a task. Using verbal persuasion may positively encourage individuals to make more of a

concerted effort (Redmond, 2010). Vicarious experiences purport that people's self-efficacy can increase or decrease based on observing others' performances. Watching someone succeed at a task can improve the observer's self-efficacy with that same task (Bandura, 1977), particularly among those with whom the individual identifies. Lastly, physiological feedback refers to sensations that people may feel and how the perception of those sensations impact their self-efficacy, such as increased heart rate and anxiety (Bandura, 1977; Redmond, 2010). These four sources of self-efficacy were emphasized throughout programming to optimize improvement in related self-efficacy outcomes.

### **Purpose**

The purpose of this study was to evaluate the impact of the College CHEF, "Cooking Healthfully, Educating For Life-Long Change" to determine if there was a significant difference from pre- to post-intervention of participants' self-efficacy for: 1) fruit and vegetable consumption, 2) cooking, 3) using basic cooking techniques, and 4) using fruits, vegetables, and seasonings.

### **Methods**

#### **Research Design**

The study's design was a quasi-experimental, pre-test post-test design which utilized a control group and convenience sample. An intervention group was comprised of college students from three LLPs, and a control group consisted of participants from three LLPs, for a total of six LLPs involved in the study. LLPs are programs in which undergraduate college students live and participate in academic and/or social programming within the same dormitory (National Study of Living Learning Programs, 2007). This provided a distinctive sample for the study, as program participants had

occasions beyond programming to impact one another's self-efficacy with cooking, using cooking techniques, and with fruit and vegetable use and consumption.

### **Setting & Population**

The research study took place at a large, co-educational, southeastern public university. Participants lived on-campus in a dormitory with individuals from the same LLP, were undergraduate college students at the university, and were 18 years or older. Table XIII provides the demographic summary for participants. Due to small sample size and after comparing for baseline characteristics, intervention groups were combined for data analysis purposes. For the combined intervention groups, there were thirty participants who completed the baseline survey, twenty-four total individuals who attended the first session and fifteen participants who attended at least three sessions and completed the pre- and –post- surveys. Within the control group, there were forty seven participants who completed the baseline survey and seventeen who completed both the baseline and –post- survey.

### **Program Recruitment**

Four months prior to the implementation of the College CHEF, the researcher emailed an invitation to all of the university's LLP Directors ( $N = 18$ ) detailing the study. Seven LLP directors emailed to express interest, three of whom were invited to participate as part of the intervention group, and three of whom were invited as the control group. One of the intervention groups was comprised of two LLPs, both of which were for students interested in health-related professions. Control groups were chosen based upon which LLP directors were amenable to having their LLP participate and who were willing to adhere to the study's requirements. Control participants belonged to

LLPs geared toward those interested in fine-arts, engineering, and agriculture fields of study.

Intervention recruitment consisted of the researcher speaking at LLP meetings in which information regarding the College CHEF was provided. It was also made clear to LLP members that they could participate in programming and opt not to be a part of the research study. Students interested in participating provided their contact information. The researcher emailed this information to each LLP director who forwarded all study-related email correspondence to participants. Control group recruitment consisted of the researcher sending an email to LLP directors which included a flyer. Control group directors were asked to email all LLP members the flyer, as well as to post it on bulletin boards throughout their dorm. The flyer outlined the study and contained information about an upcoming cooking class meant to serve as a thank you for their contribution to the research study; the cooking class occurred after the research study had ended.

### **Program Description**

The College CHEF was a campus-based culinary nutrition education evidence-based program driven by the social cognitive theory. SCT focuses on goal-setting behavior, enforced throughout sessions to promote and reinforce behavior that could be maintained over time. SCT also focuses on the importance of self-efficacy, which can be an integral component of behavior change (Strong et al., 2008). Several SCT constructs were operationalized throughout programming in an effort to maximize the impact of using this theory. Specific SCT constructs operationalized are outlined as follows.

*Reciprocal determinism* is the interaction between behavior, cognition and other personal factors, and environmental influences, which all impact one another bidirectionally

(Bandura, 1989). There was an opportunity for intervention participants to influence one another with cooking and eating additionally through their at-home habits. Personal factors such as prior knowledge and experience had the ability to influence individuals and their fellow participants (Bandura, 1977).

*Observational learning* consists of individuals learning new behaviors and cognitive skills from observing others (Bandura, 1989). Through working in small groups and modeling cooking skills and fruit and vegetable and seasoning use in class, it was intended that participants would learn new skills and techniques from observing these behaviors.

*Behavioral Capability* asserts that if a person is to perform a behavior, they must know what the behavior is and have the skills to perform it (Bandura, 1997). The instructors sought to continually model and aid participants with cooking skills.

*Reinforcements*. Direct reinforcement consisted of instructors offering verbal feedback to participants based on answering questions, executing skills, and employing technique. Vicarious reinforcements involved individuals observing fellow participants receiving feedback. Self-reinforcement pertained to participants reflecting on the goal that they had set during the first session. Instructors reinforced each week that participants should reflect upon progress made in working toward their goal and they should focus on taking pride in their accomplishments in reaching that goal (McKenzie et al., 2012).

*Expectations* are an important component of individuals actively engaging in behavior change. If people expect pleasurable effects of behavior change and associated benefits, they may be more likely to engage in the behavior (Bandura, 2004). Efficacy expectations determine the amount of effort that individuals will put forth and for how

long they will persist in spite of obstacles (Bandura, 1977). These were reinforced throughout programming when the instructors discussed the positive effects of eating and cooking healthfully. In addition, participants had the outcome expectation of creating a meal to be enjoyed at the end of each session.

*Self-efficacy* is reflective of one's confidence in their ability to gain control over personal behavior, motivation, and their environment. It is driven by a number of factors, including one's prior experiences (Bandura, 1977). Instructors sought to give participants the knowledge and skills necessary to improve their self-efficacy with regard to the program's outcomes. This was done through continually reinforcing skills and knowledge through verbal reviews, and having participants demonstrate skills and techniques learned in class. This can be impactful as it has the potential to influence other facets related to self-efficacy (Bandura, 1977).

The College CHEF was held weekly in 2-hour increments for a total of four weeks. All sessions took place in a brand-new campus-based kitchen intended for programming of this kind; the College CHEF's participants to use the space. Participants had workspace to execute cooking skills and techniques in groups of two. Each workspace included a portable burner, cutting boards, knives, pots, pans, and other basic cooking tools and equipment. In addition, there were individual desks and a podium for sitting and lecturing during the nutrition education component, and a table and chairs where participants could sit and eat at the end of each session.

The classes were led by a health education doctoral candidate and aided by a dietician/health educator employed through the campuses' health services and an undergraduate senior-level dietetic student. Both the nutrition educator and dietetic



student met with the PI three times prior to program implementation to review all procedures, skills, and techniques to be taught within each session. The instructors sought to ensure that the intervention sessions mirrored one another. At the beginning of each session, two randomly chosen participants were awarded attendance incentives. Local businesses and on-campus establishments had been contacted asking for donations oriented toward promoting health. Giveaways included: campus dining gift cards, measuring tools, lunchboxes, fitness-related tee shirts, thermometers, and for the final session, two-\$100 gift cards to a local health-oriented restaurant.

The nutrition education session consisted of an interactive review of nutrition information and skills/techniques. Further, participants were encouraged to both share how they were applying concepts learned in class to their daily lives and to discuss progress in working toward a personal class-related goal they had established for themselves at the start of the College CHEF. The nutrition education portion covered topics such as: MyPlate principles and how to apply them, identifying and understanding portion sizes, recognizing the components of a food label in relation to daily dietary recommendations, benefits associated with healthy eating, where to find fruits, vegetables, and other healthy foods on campus, budgeting, meal planning, meal preparation, and overcoming barriers associated with healthy cooking and eating. Program strategies reinforced outcome expectations throughout the education component of each session, in hopes that if participants were informed of the positive outcomes associated with eating and cooking healthfully, that they would be motivated to more readily engage in the behaviors.

This was followed by a hands-on component where participants carried out skills learned to prepare two to three recipes per session. Skills taught and executed included: recipe reading, how to properly hold and use various types of knives for multiple types of cuts, measuring, mixing, and how to combine all of these skills and techniques in order to create a meal. Throughout, behavioral capability was promoted through reinforcing skills and techniques. Further, feedback from the instructors served as reinforcements to participants in promoting improved self-efficacy and behavior change. Throughout all facets of programming, observational learning occurred through which new behaviors and skills were observed and translated into participants' practice.

### **Data Collection**

Online surveys were administered via Qualtrics (Qualtrics, Inc.) to both groups at the same time. The link to the pre-survey was emailed to all intervention and control LLPs by their respective LLP director on behalf of the researcher two weeks prior to programming and the survey was closed the morning of the first session of the College CHEF. The post-survey link was emailed to students at the end of the fourth session, with the survey remaining open for two weeks. One week after both of the emails containing the survey links were sent, a reminder was emailed to all participants, so as to improve response rate. Those not completing either survey after two weeks were considered non-responders, and their associated data were not included in the study.

### **Measures**

The instrument which served as the study's pre- and -post- measures had previously been tested for reliability and validity (Michaud, 2007). Survey questions and associated data analysis included were meant to gauge the impact that programming had

on participants' self-efficacy related to healthy cooking and eating. There were a total of four self-efficacy subscales on the survey comprised of a total of twenty-six questions and twelve demographic questions. For the -post- survey, the same subscale and demographic questions were included. All subscales questions asked participants to rank their responses on a 5-point Likert-scale. For all subscales, Likert responses were coded as: Extremely confident = 5; Confident = 4; Neither confident nor unconfident = 3; Unconfident = 2; and Extremely unconfident = 1.

**Demographic Variables.** Variables assessed with control and intervention participants were: age (years), college-level status (freshman/sophomore/junior/senior), gender (male, female, transgender, other), and race/ethnicity (White, non-Hispanic; Black, non-Hispanic; Hispanic or Latino; Asian or Pacific Islander; American Indian/Alaskan Native, or other).

**The Fruit and Vegetable Consumption Self-efficacy subscale.** This subscale consisted of three statements regarding how confident participants felt eating fruits and vegetables as a snack, at every meal and consuming nine half cup servings per day. For each statement, participants were asked to choose a response indicating the extent of confidence they felt. An example of a statement was, "indicate the extent to which you feel confident with eating fruits and vegetables at every meal, every day." The possible point range for responses on the Fruit and Vegetable Consumption Self-efficacy subscale was 3-15, with higher scores indicating higher self-efficacy for fruit and vegetable consumption.

**The Cooking Self-efficacy subscale.** This subscale consisted of six statements concerning how confident participants felt about performing certain cooking activities

like following a recipe and using knife skills. For each statement, participants were asked to choose a response indicating their extent of confidence. An example of a statement was, “Indicate the extent to which you feel confident with planning nutritious meals.” The possible point range for responses on the Cooking Self-efficacy subscale was 6-30, with higher scores indicating higher self-efficacy for cooking.

**The Self-efficacy for Using Basic Cooking Techniques and Skills subscale.**

This subscale consisted of nine cooking skills and techniques statements of which participants were asked to select the extent of confidence they felt with performing each, including boiling, simmering, and sautéing. An example of a skill was, “Grilling.” The possible point range for the Self-efficacy for Using Basic Cooking Techniques and Skills subscale was 9-45, with higher scores indicating higher self-efficacy for using basic cooking techniques and skills.

**The Self-efficacy for Using Fruits, Vegetables, and Seasonings subscale.** This subscale was comprised of eight questions pertaining to self-efficacy for using fruits, vegetables, and seasonings. Statements prompted participants to select how confident they felt with cooking with these ingredients, which included root vegetables, fruits, herbs, and spices. For each food/seasoning item, participants were prompted to select their associated level of confidence. An example was, “herbs (ex: basic, thyme).” The possible point range for the Self-efficacy for Using Fruits, Vegetables, and Seasonings subscale was 8-40 with higher scores indicating higher self-efficacy for using fruits, vegetables, and seasonings.

**Data Analysis**

Scores from each item and subscale were calculated for both the intervention and

control groups to determine composite scores, means and standard deviations at pre- and post- survey. Paired *t*-tests were conducted to assess changes among participants pre- to post-intervention. Differences between groups were assessed through change scores. Significance was set at  $p < .05$  apriori. Analysis was conducted in SPSS version 23.0 (IBM Corp, 2013).

## Results

### Demographics

There were a total of thirty two participants included in data analysis: seventeen control group and fifteen combined intervention participants. The mean age of the intervention group was 18 ( $SD = 0.00$ ) with a mean age for control group participants of 18.3 ( $SD = 0.59$ ). All intervention participants were freshman, while the control group consisted of 82% freshmen ( $n = 14$ ) and 18% sophomores ( $n = 3$ ). The majority of the intervention group consisted of females, though there were no significant differences at baseline before combining these groups for data analysis purposes: 27% male ( $n = 4$ ) and 73% female ( $n = 11$ ), while the control group consisted primarily of males: 71% males ( $n = 12$ ), 29% females ( $n = 5$ ). All control and intervention participants' reported their ethnicity as "White."

**Fruit and Vegetable Consumption Self-efficacy subscale.** Using paired *t*-tests, pre- ( $M = 8.8$ ;  $SD = 3.5$ ) to post-scores ( $M = 10.4$ ;  $SD = 3.02$ ) among intervention participants for the Fruit and Vegetable Consumption Self-efficacy subscale were significant ( $p = .04$ ). Pre- ( $M = 9.24$ ;  $SD = 3.85$ ) to post-scores ( $M = 9.18$ ;  $SD = 3.13$ ) for control participants were not significant ( $p = 0.17$ ). Unpaired *t*-tests indicated that a comparison of mean change scores between groups was nonsignificant ( $p = 0.11$ ). See

Table XIV for a comparison of Fruit and Vegetable Consumption Self-efficacy items and subscale scores pre-, -post- for intervention and control groups, and Table XV for comparisons between groups.

**Cooking Self-efficacy subscale.** Using paired *t*-tests, pre- ( $M = 24.23$ ;  $SD = 4.4$ ) to post-scores ( $M = 25.33$ ;  $SD = 3.31$ ) among intervention participants for the Cooking Self-efficacy subscale were not significant ( $p = 0.27$ ). Similarly, pre- ( $M = 21.24$ ;  $SD = 6.50$ ) to post-scores ( $M = 22.8$ ;  $SD = 5.42$ ) for control participants were not significant ( $p = 0.96$ ). Unpaired *t*-tests indicated that a comparison of mean change scores between groups was nonsignificant ( $p = 0.80$ ). See Table XIV for a comparison of Cooking Self-efficacy items and subscale scores pre-, -post- for intervention and control groups, and Table XV for comparisons between groups.

**Self-efficacy for Using Basic Cooking Techniques and Skills subscale.** Using paired *t*-tests, pre- ( $M = 31.27$ ;  $SD = 6.0$ ) to post-scores ( $M = 37.2$ ;  $SD = 5.94$ ) among intervention participants for the Self-efficacy for Using Basic Cooking Techniques and Skills subscale were significant ( $p = .006$ ). Pre- ( $M = 31.18$ ;  $SD = 10.55$ ) to post-scores ( $M = 32.24$ ;  $SD = 7.85$ ) for control participants were not significant ( $p = 0.90$ ). Unpaired *t*-tests indicated that a comparison of mean change scores between groups was nonsignificant ( $p = 0.20$ ). See Table XIV for a comparison of Self-efficacy for Using Basic Cooking Techniques and Skills items and subscale scores pre-, -post- for intervention and control groups, and Table XV for comparisons between groups.

**Self-efficacy for Using Fruits, Vegetables, and Seasonings subscale.** Using paired *t*-tests, pre- ( $M = 25.80$ ;  $SD = 5.66$ ) to post-scores ( $M = 33.4$ ;  $SD = 5.37$ ) among intervention participants for the Self-efficacy for Using Fruits, Vegetables, and

Seasonings subscale were significant ( $p = .001$ ). Pre- ( $M = 27.47$ ;  $SD = 8.57$ ) to post-scores ( $M = 27.59$ ;  $SD = 7.83$ ) for control participants were not significant ( $p = 0.12$ ). Unpaired  $t$ -tests indicated that a comparison of mean change scores between groups was significant ( $p = 0.015$ ). See Table XIV for a comparison of Self-efficacy for Using Fruits, Vegetables, and Seasonings items and subscale scores pre-, -post- for intervention and control groups, and Table XV for comparisons between groups.

### **Discussion**

The purpose of this study was to evaluate the impact of a campus-based culinary nutrition education program, the College CHEF, to determine if there were significant differences from pre- to -post-intervention with participants' self-efficacy for cooking skills and techniques and fruit and vegetable use and consumption. Findings from this study indicated significant improvements in self-efficacy for using fruits, vegetables, and seasonings in the intervention group as compared to the control group and additional significant improvements within the intervention group for self-efficacy of fruit and vegetable consumption, self-efficacy for using basic cooking techniques, and self-efficacy for using fruits, vegetables, and seasonings. These results are promising given that the majority of college students do not engage in regular consumption of the daily recommended fruits and vegetables (ACHA, 2015) and that a lack of cooking skills serves as a main barrier with young adults carrying out healthy dietary practices (Larson et al., 2006). In addition, results are encouraging as self-efficacy impacts sustained behavior change. Also, an increase in self-efficacy supports individuals in feeling more comfortable in the future with trying new associated tasks, and exerting more effort toward them (Bandura, 1977; Brug et al., 1995). Given that many students within the

intervention group had high self-efficacy scores at baseline, they may have associated higher motivation and persistence in general, which may have impacted the hypothesized improvement in the related self-efficacy outcomes as compared to the control group. Future research is warranted to include a broader segment of the college population, not just those who volunteer for such a program.

Bandura (1993) suggests that self-efficacy beliefs affect college students by increasing their motivation and persistence to master challenging tasks. In the words of Gandhi, “If I have the belief that I can do it, I shall surely acquire the capacity to do it even if I may not have it at the beginning.” A previous campus-based cooking program found that improvement in cooking skills in college students was associated with increased vegetable consumption ( $p < 0.001$ ), lending support to cooking skills as a means to improve self-efficacy with fruit and vegetable consumption (Kourajian & Stastny, 2015). Another intervention, which used the same measures as the College CHEF, found that three of the eight indexes/scales on the pre- and -post- tests showed significant differences between the treatment and control groups: Cooking Self-efficacy ( $p = 0.002$ ), Self-efficacy for Using Basic Cooking Techniques ( $p < 0.0001$ ), and Self-efficacy for Using Fruits, Vegetables, and Seasonings (Warmin, 2009). More significant findings in this study as compared to the College CHEF may have been attributed to the fact that reported values were reflective of within intervention pre-, -post- group scores, not as compared to the control group. Further, the study was comprised of six sessions, further supporting a longer duration to allow for more hands-on practice in an effort to promote cooking self-efficacy (Warmin, 2009).

Since three of the self-efficacy subscales were not significant for the intervention



group as compared to the control group, it is important to determine what additional strategies could be incorporated to improve these areas for future programming. With previous programming, it was determined that improvements in self-efficacy subscales were associated with increased cooking terms and technique knowledge with participants which translated into improved cooking behaviors, as the more participants know about cooking, the more likely they are to cook, and the more self-efficacious they may feel (Warmin, 2009). This lends support to additional emphasis on imparting knowledge through a nutrition education component to improve cooking behaviors and related self-efficacy with participants. Further, those participants with lower self-efficacy may have dropped out of programming. Future research may incorporate additional tactics to improve self-efficacy to combat this. In addition, follow-up measures should encourage participants to share ways in which they could have been helped to feel more self-efficacious with participating in programming.

With using basic cooking techniques, there were several items for intervention participants which improved significantly from pre- to -post-, even though the subscale itself did not have significant improvements. These included: sautéing ( $p = 0.00$ ), stir-frying ( $p = .001$ ), and roasting ( $p = .001$ ). Previous research indicates that spending extra time with instruction to ensure that concepts which may not be as familiar to college students are adequately covered may be beneficial in significantly improving their understanding (Warmin, 2009). Programming emphasized sautéing and stir-frying through a hands-on approach in three of the four sessions, and demonstrated and discussed roasting on multiple occasions, perhaps explaining the reason why there were significant improvements in these areas. Items from the subscale which did not

significantly improve such as boiling, simmering, and poaching, were not adequately practiced by all participants in programming; poaching was only discussed due to time constraints and not everyone brought their soup to a boil, only a simmer. Thus, not all participants were able to practice the technique of "boiling." In future programming, researchers should ensure that all techniques and skills being measured are adequately covered with opportunity to practice so that participants might feel more efficacious in these areas. This is especially important given that a link exists between self-efficacy with cooking skills and healthful eating habits (Lawrence et al., 2000).

As previously mentioned, a longer duration of programming may be necessary to allow for individuals to have more practice with executing basic techniques, which may contribute to increased self-efficacy in this area. The potential effectiveness of increasing the duration of programming is supported by previous behavior change research which indicates that longer interventions tend to be more effective in improving outcomes (Hendrickson & Chaiken, 1993). Increasing the duration to one or two additional sessions, for a total of five or six instead of four, may allow for extra time to practice skills and receive feedback, potentially leading to self-efficacy gains (Bandura, 1977). However, programs of a longer duration need to be evaluated to determine benefits versus barriers to implementation. Further, attrition needs to be considered, so programs of a longer duration need to be balanced with appropriate recruitment and retention strategies.

The four sources of information which aid in improving self-efficacy should be further reinforced throughout future programming. Performance outcomes were enhanced by positively contributing to participants' experiences in class through making the

experience engaging and entertaining. With regard to verbal persuasion, instructors continually provided positive verbal feedback when participants performed tasks correctly during programming, to aid in individuals' self-efficacy gains. Vicarious experiences were present when instructors praised participants' execution of tasks, they brought attention to it for fellow participants to observe. Lastly, physiological feedback occurred when participants' personal reactions to programming, such as increased heart rate as a reaction to excelling at a task, had the ability to impact their performance within sessions. Physiological feedback, though the least impactful of the four facets and difficult to measure, still had the ability to make individuals more self-efficacious. If participants felt excited and motivated by physiological feedback, it had the potential to make them more confident in carrying out skills and techniques (Bandura, 1977). This could be enhanced in future programming by asking participants' to reflect on physiological feedback at the end of each session, and encouraging them to channel those feelings into continued practice, in an effort to become more efficacious and elicit similar, stronger feedback. Additional ways to build self-efficacy through these four sources should be capitalized upon, in an effort to help participants address and work on overcoming impediments related to healthy eating and cooking (Bandura, 2004). This may include having additional instructors to provide more frequent reinforcement and verbal persuasion, which may improve outcomes for students. Self-efficacy may take a while to develop, further necessitating the need for longer programming and follow-up and to determine if improve self-efficacy translated into changed behaviors. Another way to promote self-efficacy might be to further build upon vicarious reinforcement by having upperclassmen participate in programming. This might allow for freshman-level

participants to be influenced by the actions and attitudes of slightly older peers.

Previous research with adolescents indicates that perceived fruit and vegetable consumption barriers, such as not having enough time or money to eat healthy food can be overcome, which can lead to an increase in self-efficacy with fruit and vegetable consumption (Bruening, Kubik, Kenyon, Davey, & Story, 2010). The College CHEF's sessions sought to provide participants with information and skills on how to plan, budget, shop for, and cook healthy meals in an effort to help participants in overcoming perceived associated barriers. Given that there were significant improvements pre- to - post- for self-efficacy for using fruits, vegetables, and seasonings, it can be surmised that intervention participants were provided information to help them in feeling more self-efficacious in overcoming barriers associated with incorporating fruits, vegetables, and seasonings when cooking. However, to further improve self-efficacy in these areas, it may be of value for future programming to emphasize and measure additional constructs for overcoming obstacles associated with healthy cooking and eating, such as through observational learning and reinforcing expectations. These could be further incorporated through reinforcing the benefits of healthy eating and cooking throughout the nutrition education and cooking skills components of class. Observational learning could be promoted through having all participants demonstrate each skill learned immediately after the instructor demonstrates. This may enhance observational learning and vicarious learning among participants' peers.

Cross-campus collaborations are a means to promote cohesiveness and provide resources among organizations/departments to support college students' well-being, such as through behavior change, and may be beneficial in future programming (Fullerton,

2011). Such examples of collaborations include: offering the College CHEF through a campus-based, credited nutrition education course, as research suggests that a credited freshman-level college class in which students were instructed and given opportunities to carry out cooking skills and techniques may be significant improvements with participants' food preparation skills and in increasing self-efficacy with vegetable consumption (Kobler, 2013). Credited nutrition education classes which teach college students how to cook through hands-on practice and/or through having participants view instructional videos may be effective in promoting fruit and vegetable consumption (Brown et al., 2011). Also, having dietetic students/staff offer individualized nutrition counseling for participants, emphasizing ways to incorporate fruits and vegetables into one's diet in relation to their personal dietary needs may be beneficial.

The positive findings from this study support the implementation of campus-based culinary nutrition education programming with future strategies to impact self-efficacy. Given that self-efficacy is a key component of behavior change, improved associated outcomes are promising, especially given that there were significant results in such a short amount of time (Strong et al., 2008). Considerations for future programming include: ensuring that all skills/techniques included within the measures are adequately practiced in class, increased strategies to improve self-efficacy throughout programming by ensuring that the four mechanisms which support self-efficacy are continually emphasized and encouraged, cross-campus collaborations providing additional resources in support of creating a campus culture which promotes healthy nutrition behaviors and skills, incorporating programming into a credited-nutrition education course, a longer duration of programming to allow participants additional opportunities to carry out skills

learned to promote self-efficacious beliefs, and the incorporation of follow-up measures to assess long-term impact.

### **Limitations**

Limitations for this study included 1) small sample size which required the combination of intervention groups; 2) self-reported outcomes, 3) more females than males completing the surveys 4) large standard deviations associated with some of the change score differences' between and within groups for varying scales and 5) a homogenous study sample, as both intervention and control groups were comprised of participants who all identified as "White."

The space where programming was held was only able to support 25 participants, limiting sample size. However, less participants than this number enrolled, and due to attrition issues as the sessions progressed, there was ample space for intervention participants. The baseline comparison of demographics between intervention groups to ensure that there were no significant differences was important prior to combining intervention groups for data analysis purposes. Also, ensuring that programming was as identical as possible between the two intervention groups supported the justification of combining intervention groups. However, further process evaluation could be conducted during each session to reinforce the similarities. Self-reporting of outcomes related to behavior serves as a limitation in these kinds of studies, but it was the only feasible way to assess programming's impact. Generalizability for both gender and different racial/ethnic groups must be considered given that 1) the number of participants completing the measures for the intervention group were overwhelmingly female (73% female, 27% male), though far more males than females completed the pre- and -post-

measures for the control group (71% male, 29% female) and 2) 100% of participants identified as “White” ethnicity.

### **Translation to Health Education Practice**

The findings from this study support health educators in implementing future campus-based culinary nutrition education programming. Healthy Campus 2020 supports initiatives which promote healthy behavior, including strategies which aim to improve nutrition and weight status among college students, further lending merit to the College CHEF and its findings (Healthy Campus 2020). College campuses provide a distinctive setting in which to offer health education programming in an effort to promote positive behavior change. For many students, college marks the first time they independently make major lifestyle choices, and they may become more adaptable to behavior change (Sparling, 2007). Effective, innovative strategies to be considered in future programming to further promote self-efficacy may include: reinforcing strategies meant to improve self-efficacy, including goal-setting and measuring of goal-attainment with regard to self-efficacy, and cross-campus collaborations to promote a culture of healthy nutrition options, behaviors, and skills. Such partnership may occur through offering nutritional counseling to program participants and partnering with an agriculture department to allow students to learn more about the benefits of cooking and eating whole foods in an effort to boost related self-efficacy. In addition, the Breaking Bread strategy in which participants and instructors dined together at each session’s end seemed important to building rapport. Future research might measure the impact of this strategy on group dynamics. In addition, future research may incorporate questions on the measures which assess additional behaviors related to cooking outside of the dorm environment. Further,

health researchers/educators are encouraged to implement and evaluate a longer duration of programming in order to allow individuals more opportunities to practice skills learned to promote self-efficacy.



TABLE XIII  
Demographics for Combined Intervention Group ( $N = 15$ ) and Control Group ( $N = 17$ )

<i>Variable</i>	<i>Intervention Group</i>	<i>Control Group</i>
Gender		
Male	27 % ( $n = 4$ )	71% ( $n = 12$ )
Female	73 % ( $n = 11$ )	29% ( $n = 5$ )
Age: Mean ( <i>SD</i> )	18.0	18.3 (0.59)
Ethnicity		
White	100% ( $n = 15$ )	100% ( $n = 17$ )
Year in College		
Freshman	100%	82% ( $n = 14$ )
Sophomore		18% ( $n = 3$ )

TABLE XIV  
Self-efficacy Subscale Comparison with Paired *t*-tests Pre-, -Post-test within Control  
(*N* = 17) and Intervention Groups (*N* = 15)

<i>Scale/Items</i>	<i>Pre-Test</i>		<i>Post-Test</i>		<i>p</i>
	<i>Mean (SD)</i>	<i>Range (Observed)</i>	<i>Mean (SD)</i>	<i>Range (Observed)</i>	
<b>Intervention</b>					
<b>FV Consumption SE</b>	8.8 (3.5)	3-15	10.4 (3.02)	5-15	<b>0.04*</b>
1. Eat FV at every meal, every day.	3.27 (1.33)		3.33 (1.29)		
2. Eat F or V as snack, even if everybody else were eating other snacks.	2.73 (1.44)		3.53 (1.13)		
3. Eat the recommended 9 half cup servings of FV per day.	2.47 (1.36)		3.33 (1.08)		
<b>Cooking Self-Efficacy</b>	24.23 (4.4)	16-30	25.33 (3.31)	21-30	0.27
1. Cook from basic ingredients.	3.93 (1.33)		4.07 (0.59)		
2. Follow a written recipe.	4.47 (0.83)		4.40 (0.51)		
3. Prepare dinner from items you currently have in your pantry and refrigerator.	4.07 (1.22)		4.07 (0.80)		
4. Use knife skills in the kitchen.	4.2 (0.77)		4.53 (0.84)		
5. Plan nutritious meals.	3.33 (1.4)		4.13 (0.84)		
6. Use basic cooking techniques.	4.27 (0.88)		4.4 (0.51)		
<b>SE Using Basic</b>	31.27 (6.0)	22-45	37.2 (5.94)	31-45	<b>0.006*</b>
<b>Cooking Techniques</b>					
1. Boiling	4.53 (0.92)		4.6 (.80)		
2. Simmering	3.60 (1.45)		4.4 (.63)		
3. Sautéing	2.40 (1.35)		4.4 (.83)		
4. Stir-frying	2.80 (1.26)		4.27 (.80)		
5. Grilling	3.7 (1.3)		4.00 (1.00)		
6. Poaching	2.27 (1.1)		3.53 (1.41)		
7. Baking	4.4 (0.99)		4.4 (.83)		
8. Roasting	2.67 (1.29)		4.13 (.83)		
9. Microwaving	4.93 (0.26)		4.93 (0.26)		
<b>SE FV &amp; Seasonings</b>	25.8 (5.66)	16-39	33.4 (5.37)	25-40	<b>0.001*</b>
1. Fresh or frozen vegetables	3.93 (1.10)		4.20 (0.94)		

Table XIV Continued

2. Root vegetables	3.53 (1.13)	4.4 (0.63)
3. Fruit	4.13 (0.92)	4.2 (1.01)
4. Herbs	3.13 (1.13)	4.4 (0.74)

Table XIV Continued

5. Spices	3.33 (1.23)	4.53 (0.64)
6. Vinegars	2.33 (0.98)	3.87 (0.92)
7. Citrus juices	2.73 (1.16)	4.07 (1.03)
8. Hot sauces	2.73 (1.33)	4.00 (0.93)

**Control**

<b>FV Consumption SE</b>	9.24 (3.85)	3-15	9.18 (3.13)	4-15	0.17
1. Eat FV at every meal, every day.	3.29 (1.49)		3.18 (1.51)		
2. Eat F or V as snack, even if everybody else were eating other snacks.	3.29 (1.49)		3.53 (1.23)		
3. Eat the recommended 9 half cup servings of FV per day.	2.65 (1.37)		2.46 (1.46)		

<b>Cooking SE</b>	21.24 (6.5)	6-30	22.8(5.42)	15-30	0.96
1. Cook from basic ingredients.	3.35 (1.37)		3.71 (1.16)		
2. Follow a written recipe.	3.88 (1.36)		4.35 (0.61)		
3. Prepare dinner from items you currently have in your pantry and refrigerator.	3.29 (1.53)		3.71 (1.21)		
4. Use knife skills in the kitchen.	3.35 (1.46)		3.17 (1.33)		
5. Plan nutritious meals.	3.59 (1.30)		.53 (1.12)		
6. Use basic cooking techniques.	4.06 (1.07)		4.06 (0.83)		

**SE Basic**

<b>Cooking Techniques</b>	31.18 (10.55)	3-43	32.24 (7.85)	23-45	0.90
1. Boiling	4.47 (1.07)		4.41 (0.80)		
2. Simmering	3.71 (1.16)		3.53 (1.07)		
3. Sautéing	3.18 (1.47)		3.29 (1.26)		
4. Stir-frying	3.47 (1.28)		3.63 (1.15)		
5. Grilling	3.22 (1.45)		3.47 (1.28)		
6. Poaching	2.47 (1.23)		2.63 (1.20)		
7. Baking	4.18 (1.01)		4.35 (0.70)		
8. Roasting	3.06 (1.25)		3.18 (1.38)		
9. Microwaving	4.71 (0.77)		4.82 (0.39)		

Table XIV Continued

<b>SE FV &amp; Seasonings</b>		9-40	27.59 (7.83)	16-40	0.12
1. Fresh or frozen vegetables	27.47 (8.57)		3.71 (1.16)		
2. Root vegetables	3.53 (1.18)		3.76 (1.15)		
3. Fruit	3.71 (1.31)		3.76 (1.15)		
4. Herbs	3.76 (1.15)		3.65 (1.17)		
5. Spices	3.53 (1.33)		3.65 (1.17)		
6. Vinegars	3.53 (1.46)		3.12 (1.17)		
7. Citrus juices	3.06 (1.20)		3.00 (1.22)		
8. Hot sauces	3.00 (1.19)		3.24 (1.25)		
	3.35 (1.37)				

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\* Significant difference within group ( $p < 0.05$ )

TABLE XV  
 Change Scores within Intervention ( $N = 15$ ) and Control ( $N = 17$ ) Groups and  
 Significance between Groups Using Unpaired  $t$ -tests

<i>Scale</i>	<i>Intervention Mean Difference (SD)</i>	<i>Control Mean Difference (SD)</i>	<i>p</i>
FV Consumption SE	1.6 (2.8)	-.06 (2.84)	0.11
Cooking SE	1.07 (3.58)	1.59 (7.42)	0.80
SE Basic Techniques	6.00 (7.2)	1.06 (13.46)	0.20
SE FV & Seasonings	7.6 (7.38)	0.12 (9.03)	<b>0.015*</b>

\* Significant difference between groups ( $p < 0.05$ )

## CHAPTER 7

### DISCUSSION AND CONCLUSIONS

The purpose of this study was to develop, implement, and evaluate a campus-based culinary nutrition education program, The College CHEF, in an effort to impact intervention participants through four main outcomes: cooking and eating 1) attitudes; 2) behaviors; 3) self-efficacy; and 4) knowledge. This chapter will include a summary of results from the development, implementation, and evaluation of the College CHEF.

#### **Summary of Results**

A primary and secondary needs assessment driven by the PRECEDE-PROCEED model aided the program planning process in developing the College CHEF. The secondary needs assessment consisted of a literature review which synthesized evidence-based programming strategies, results, and implications. The primary needs assessment was comprised of a focus group, interviews, and a Qualtrics survey (Qualtrics Inc.). Findings from the SNA identified the social cognitive theory as an ideal model to utilize in implementing programming. Findings determined genetic, behavioral, and environmental risk factors and associated barriers to address throughout programming. Findings included such information as: college students have a proclivity to eat less vegetables during the first year of college and consume fattier foods, and a lack of access to fruits and vegetables causes students to consume less than the daily recommended amount. Programming addressed ways to access fruits and vegetables on campus and to incorporate them in easy, budget-friendly meals that could be made in the dorm. The SNA also identified evidence-based strategies ideal for the target population when implementing campus-based, culinary nutrition education programming. Findings from

the PNA determined facets related to nutrition education, hands-on cooking skills and techniques, and evidence-based strategies to be included in programming, such as the inclusion of information related to portion size, food labels, and recipe reading, and the importance of programming being engaging and hands-on. Findings also helped in determining the appropriate dosage and duration for the College CHEF (four times, 2-hours each time), and barriers which should be addressed within sessions such as meal planning and budgeting. It was also concluded that campus-based LLPs provide an ideal sample with which to implement programming.

### **Manuscript 1 Findings' Influence on Programming**

- Program was SCT-driven and operationalized SCT constructs including reinforcements, outcome expectations, goal-setting, and feedback.
- Barriers were addressed associated with: attitude and knowledge of healthy eating/cooking, budgeting, meal planning, and basic cooking skills/techniques.
- Programming incorporated: visual learning tools, hands-on strategies, and nutrition education information pertaining to: understanding food labels, identifying proper portion sizes, understanding why foods are healthy, and how to follow recipes.
- The College CHEF was implemented over the course of four, 2-hour sessions held over the course of one month.
- Programming focused on teaching intervention participants about nutrition education and basic cooking skills and techniques. Participants were actively engaged, with the College CHEF incorporating SCT constructs to support gains related to program outcomes.

### **Manuscript 2 Findings**

- As a result of programming, intervention participants had significant improvements within group for: fruit and vegetable consumption ( $p = 0.008$ ) and knowledge of cooking terms and techniques ( $p = 0.000$ ).
- As compared to the control group, intervention participants also had significant improvements with: fruit and vegetable consumption ( $p = 0.03$ ) and knowledge of cooking terms and techniques ( $p = 0.00$ ).

### **Manuscript 3 Findings**

- As a result of programming, intervention participants had significant improvements within group for: self-efficacy for fruit and vegetable consumption ( $p = 0.04$ ), self-efficacy for using basic cooking techniques ( $p = 0.06$ ) and self-efficacy for using fruits, vegetables, and seasonings ( $p = 0.01$ ).
- As compared to the control group, intervention participants also had significant improvements with: self-efficacy for using fruits, vegetables, and seasonings ( $p = 0.015$ ). Please see Appendix H for a research design matrix detailing the outcomes of the study by manuscript for the study's research questions and associated hypotheses.

### **Contributions to the Literature**

This study added a unique perspective to existing culinary nutrition education programming in the following ways:

- Programming was developed as a result of conducting primary and secondary needs assessment, driven by the PRECEDE-PROCEED-model. This consisted of a combination of: 1) feedback provided by students and staff from the same



college via surveys, a focus group, and interviews; 2) results from conducting a literature review; and through 3) applying these findings toward a previously existing facilitator's guide/survey, used in campus-based culinary nutrition education programming. To the knowledge of the researcher, the model-driven program planning process for this facet of health programming has not previously been documented, providing a distinct perspective into the development of campus-based, culinary nutrition education programming.

- The College CHEF's participants were campus-based Living Learning Program members. As such, intervention participants had the opportunity to influence one another's attitudes, behaviors, knowledge, and self-efficacy both within the realm of programming and additionally within their living and academic environments. This concept of reciprocal determinism is an underlying component of the social cognitive theory and was an important factor within programming. Given the limited research reporting the impact of culinary nutrition education programming on college students, especially as it applies to those who both live and are enrolled in classes together further reciprocally influencing one other outside of programming, this study's findings provided distinctive contributions to the field of health promotion/health education.
- Additionally, participants received a considerable amount of one-on-one feedback given the small size of the intervention group, which may have provided a greater opportunity for skill building in a short period of time.
- Research indicates that behavior change must be realistic for program participants, and that a small, realistic, measurable goal, may help individuals

achieve their goal (Pratt & Bowman, 2008). Programming was goal-oriented. Intervention participants were sent weekly personalized emails to encourage progress toward their personalized program-associated SMART goal. The goal was established at the start of the first session, and the importance of goal-setting and outcome expectations were emphasized throughout the sessions. However, goal progress and goal completion were not measured, which future research might consider.

- The program's emphasis on hands-on cooking skills, observational learning, reinforcements, and dispensing pertinent nutritional knowledge, including the benefits of and how to incorporate fruits and vegetables into one's diet, may have contributed to improvements in intervention participants' fruit and vegetable consumption and knowledge of cooking terms and techniques. Improvements related to participants' outcomes may lead to maintaining a normal weight and reducing one's risk of chronic disease, both of which are important obesity prevention measures (Haynes-Maslow, Parsons, Wheeler, & Leone, 2013). The impact that programming may have in perpetuating life-long healthy eating and cooking habits is especially important given the numerous conditions and diseases associated with increased BMI and obesity, such as cardiovascular disease, diabetes, some types of cancer, and musculoskeletal disorders, among others (WHO, 2015). Follow-up measures are an important component in assessing participants to determine the sustainability of programming's impact, and should be incorporated in future research.

## **Limitations**

Previous research suggests that females may have higher participation rates in health promotion programming than men (Spilman, 1988). The College CHEF intervention participants who both attended three or more sessions and completed the pre- and –post- measures were predominantly female (67% female,  $n = 10$ ). Future programming may aim to incorporate recruitment tactics which appeal to men, such as both male and female researchers conducting recruiting. Further, additional attendance giveaways and pre-, -post- measure completion incentives could be provided that are incentivizing to males and females. Another study limitation was the homogeneity of the sample size, as 100% ( $N = 32$ ) of both control and intervention group participants identified with a “White” ethnicity. Future research should recruit participants from multiple organizations on campus which are more heterogeneous in nature, in an effort to make findings more generalizable. Recruiting from multiple campus-based organizations may result in attracting participants who live both on and off campus. This may be of value, as those students who live on campus, such as the LLP participants involved in the College CHEF, had limited access to a dorm-based kitchen. Since each floor of each dorm shared one small kitchen, this could have served as a barrier in participants carrying out skills and techniques learning in class.

For the intervention group, there were twenty-four individuals who attended the first session, and fifteen who attended at least three sessions and completed the pre- and –post- survey, resulting in a 38% attrition rate for intervention participants. With the control group, there were 47 participants who completed the baseline survey, and seventeen individuals who completed both the baseline and –post- survey, resulting in a

64% attrition rate for control participants. If future programming were incorporated as part of a class for credit, this might help in higher attendance rates. Lastly, the College CHEF's intervention and control participants comprised a small, convenience sample, making generalizability problematic. Future studies should aim to utilize a randomized controlled trial and to have larger intervention and control groups from more heterogeneous campus-based groups, so that results may be more generalizable.

### **Implications for Researchers and Health Promotion Professionals**

Based on findings from the evaluation of the College CHEF, the following implications should be considered for future programming:

- Nonsignificant findings with participants' eating and cooking behaviors and cooking attitudes may be partially attributed to the college environment, in which unhealthy food options are ubiquitous, and students are likely to be negatively influenced by their peers' food choices. Hence, college students do not necessarily make the healthiest choices with regard to cooking and eating behaviors (Levitsky et al., 2004). Further incorporation of practical application of budgeting, meal planning, and weekly food preparation may be applicable for programming of this kind, so that students feel prepared to eat healthfully among a myriad of unhealthy options.
- Given that there were significant improvements pre- to -post- for self-efficacy for using fruits, vegetables, and seasonings, it can be deduced that intervention participants were provided information to help them in feeling more self-efficacious in overcoming barriers associated with incorporating fruits, vegetables, and seasonings when cooking. However, to ensure that the SCT is

evaluated in its entirety, future programming should measure additional SCT constructs with intervention strategies incorporated throughout programming to target these constructs. Emphasizing constructs such as reinforcements and self-regulation may aid in overcoming obstacles associated with healthy cooking and eating.

- Kober (2013) indicated that a credited freshman-level seminar course which taught and allowed for practice of cooking skills and techniques had significant improvements with participants' food preparation skills and with increasing self-efficacy with vegetable consumption. These findings lend merit to the incorporation of programming like the College CHEF in credited nutrition education classes for college students, perhaps providing more incentive for attendance if receiving college credit. This is important to consider, given the attrition rates associated with the College CHEF.
- Research indicates that higher attendance rates within behavior change programs are associated with more desirable outcomes (Murnan, 2009). Unfortunately, there were College CHEF intervention participants who did not attend enough sessions to be eligible to have their data included in analysis; attrition was an issue in programming. Previous campus-based, culinary nutrition education programming did not specifically mention tactics employed to encourage attendance, but their attendance rates were much higher than the College CHEF; 97.7% of participants remained in programming. This may have been attributed to students receiving credit for completion of programming, further lending support to including programming as part of a credited course (Warmin, 2009).

- Behavior change is likely to occur when skills are taught, carried out, and rewarded over a number of sessions. Offering multiple sessions of behavior-change programming, especially with additional instructors to promote one-on-one interaction with participants may provide participants additional opportunities for practice and receiving feedback (Pratt & Bowman, 2008). It was visible from the first to last session of the College CHEF that participants overall seemed more at ease carrying out skills and techniques, so additional time for practice might result in further improvement with program outcomes.
- The Breaking Bread component of each session of the College CHEF in which participants and instructors sat together to enjoy the meal that they created and talked about the process, appeared to be beneficial in building rapport with instructors and students. Future research might measure the impact of this strategy on group dynamics, possibly through follow-up process evaluation questions.
- There were two intervention participants who were vegetarians, and last minute accommodations had to be made to create vegetable stock instead of chicken broth for the soup recipe, as neither expressed that they were a vegetarian prior to that session. In the future, inquiring prior to programming starts of any dietary preferences would be appropriate. Instructors could plan accordingly by having pre-planned accommodations for those with gluten sensitivity, diabetes, or those who are vegetarian or vegan.
- It is important to note that programming had a significant impact on participants, who attended either three or four sessions. If programming of this duration can

have significant results in multiple facets related to healthy cooking and eating, an increased duration can potentially be more impactful.

- It would be beneficial to have additional instructors so that participants could work by themselves instead of in groups, as they did with the College CHEF, so that they have more opportunities for hands-on practice and mastery of skills. An online component may also support programming, through which participants could receive personalized feedback regarding goal adherence and support, as well as be provided information regarding meal planning and grocery shopping on a budget, for example. There could also be a facet of the online component through which participants could interact with health coaches and/or nutrition students who could further aid them by providing one-on-one feedback related to their personal dietary preferences and class-related goal. Also, short in-class quizzes could be given weekly to participants to review previous sessions' material, with incentives for those with the highest scores. Additionally, more visuals could be provided to aid students with understanding nutritional concepts, such as MyPlate.

### **Future Research**

The findings from this study aim to support health educators in implementing future campus-based culinary, nutrition education programming. College campuses offer a distinctive setting through which to provide health education and health promotion programming. For many, leaving home to attend college is associated with the ability to independently make major life choices for the first time (Sparling, 2007). Further, typical

college-aged students are often susceptible to influence by their peers as it pertains to eating habits, both positive and negative (Wlaschin, 2011).

College campuses and health education researchers must seize the opportunity to promote positive behavior change through offering programming for students to improve their cooking and eating attitudes, behaviors, knowledge, and self-efficacy. Researchers are encouraged to build upon lessons learned from implementing the College CHEF to strengthen future programming. Future research should recruit from a variety of groups, such as LLPs, to create a more heterogeneous and larger sample. Future researchers are also encouraged to conduct needs assessments as part of a model-driven program planning process in developing programming, such as took place with the College CHEF. This ensures that appropriate evidence-based strategies are tailored to the needs of the program population. Future programs could incorporate an interactive grocery store tour at the culmination of programming, such as the evidence-based *Cooking Matters at the Store* curriculum, which teaches students about shopping healthfully on a budget. This could allow for practical application of information learned through programming (Share our Strength's Cooking Matters, n.d.).

Future programming should include follow-up surveys to aid in determining the long-term sustainability of improvements associated with program outcomes (Buchanan, 2000). Follow-up measures might also include questions pertaining to intervention participants' ongoing use of skills and techniques learning in class outside of the dorm environment, such as at home over school breaks. Future research might include follow-up communication with intervention participants who stopped attending programming to aid in determining how associated barriers might be addressed in future programming.



Barriers may include factors such as a lack of interest and/or confidence, embarrassment with regard to their skill level, or general conflicts with the time programming was offered. Future programming might add additional variables of interest to measures assessing programming impact. There were visible changes with intervention participants that were not properly assessed through the College CHEF measures, such as shifts in enthusiasm.

The attrition rates associated with the College CHEF indicated that it may be difficult for college-aged students to routinely attend a program of this kind voluntarily. The lower attendance rates made evaluation more difficult, resulted in a smaller sample size, and thus decreased the potential that programming had to impact participants. Findings from this study indicate the need to additionally incentivize attendance. Incentives for completion of pre-,–post- measures may be of merit for inclusion in future studies, given that there were participants who attended three or more sessions who did not complete both sets of surveys. A small monetary incentive may have encouraged them to do so. There have been mixed feelings about incentivizing behavior change among health researchers, but it has been suggested through a previous study that small incentives provided as part of behavior change programming may help participants with initial motivation (Gneezy et al., 2011). Thus, if incentives are provided in an effort to encourage survey completion, it might not only improve attendance rates, but also provides researchers with valuable survey data.

Applying for grant funding and seeking donations for incentives from local businesses and on-campus organizations which are appropriate and appealing for participants might improve attendance rates. While the researcher did reach out to a

number of campus and off-campus organizations, there were limited attendance-related incentives. However, the incentives awarded throughout programming seemed to entice participants to attend, especially for the final session in which 2-\$100 gift cards to a local restaurant were awarded. Additionally, if incentives are advertised explicitly as part of programming recruitment, it might entice more individuals to enroll. Further, a small enrollment fee for program participation, meant to incentive attendance might be impactful in future programming. Requiring a small enrollment fee of \$10-15 per participant to help cover the cost of equipment, supplies, and incentives, may result in participants feeling more ownership toward their investment in programming, which may result in them investing more into their participation in sessions (Krezanoski et al., 2010).

Cross-campus collaboration to support programming and its sustainability could be incorporated through partnering with an agriculture department, providing participants the opportunity to learn about the process and associated benefits of cultivating and cooking with whole, organic foods in an effort to further improve self-efficacy gains in these areas. In an effort to both promote cross-campus collaboration and improve program outcomes, future programming might also include opportunities for practitioners to be engaged. This could entail offering one-on-one nutritional services to program participants, as research suggests that nutrition-related behavior change programming should be tailored to individuals' needs. Personalized nutrition counseling could be available to participants as a component of programming to provide them with information regarding their personal nutritional needs and how to create and adhere to goals associated with improving their dietary intake (Perkins-Porras et al., 2005). Further, collaboration with a campus-based health promotion department could support

programming. Health promotion students could serve as health coaches to further encourage participants and provide them with resources and tools to improve their outcomes associated with programming. Thus, cross-campus collaboration with a health-related department to offer participants personalized counseling and/or coaching may be an impactful, innovative component of future programming. Also, recruitment procedures tailored toward an increased number of male participants, and having a more heterogeneous sample, may be beneficial in improving generalizability of the study's results.

Future research with campus-based culinary nutrition education programming could utilize randomized control trials, the gold standard of research design in which participants are randomly assigned to a research group, to include students who live both on and off campus (Harris et al., 2004). Additionally, SCT constructs could be measured, such as goal progress through setting a SMART goal through maintaining a daily log related to goal adherence and barriers. Intervention participants could also keep a food log to track their progress with eating and cooking behaviors, of which instructors could monitor and provide feedback. Related questions could also be included on –post-measures to assess participants change in these SCT-driven constructs in an effort to promote behavior change.

### **Conclusion**

Innovative strategies to be considered in future culinary, nutrition education programming may include: cross-campus collaboration to include dietetic counseling and/or health coaching and the incorporation of programming as part of a credited, nutrition education course, a longer duration to allow for additional hands-on practice to

lend itself to potential improvement with program outcomes, promotion of the four facets to encourage self-efficacy, an enrollment fee to create a sense of ownership in programming and to use to purchase incentives associated with completion of -pre-, -post- measures, and additional instructors to allow for more individualized attention in an effort to emphasize SCT constructs in support of behavior change.

Appendix A

Research Design Matrix

<b>Manuscript</b>	<b>Research Questions and Related Hypotheses</b>	<b>Independent Variables</b>	<b>Dependent Variables</b>	<b>Types of scales</b>	<b>Analysis</b>
1	RQ1- How does the summary of secondary needs assessment findings influence the development of the College CHEF program?	SNA summary	College CHEF program	N/A	Constant Comparative Analysis
1	RQ2- How does the summary of findings from formative focus groups with college students influence the development of the College CHEF program?	Focus group findings	College CHEF program	N/A	Constant Comparative Analysis
1	RQ3- How does the summary of findings from interviews with campus stakeholders influence the development of the College CHEF program?	Interview group findings	College CHEF program	N/A	Constant Comparative Analysis
1	RQ4- How does the summary of findings from surveys with college students influence the development of the College CHEF program?	Survey findings	College CHEF program	N/A	Constant Comparative Analysis; Mean (SD)
1	RQ5- What are the goals of the College CHEF program?	N/A	N/A	N/A	N/A
1	RQ6- What tailored evidence based intervention strategies are included in the College CHEF?	N/A	N/A	N/A	N/A

<b>Manuscript</b>	<b>Research Questions and Related Hypotheses</b>	<b>Independent Variables</b>	<b>Dependent Variables</b>	<b>Types of scales</b>	<b>Analysis</b>
2	RQ7 What is the impact of the College CHEF (pre- to -post-) on participants' attitudes toward healthy cooking?				
2	H7.1- Intervention group participants will have significant improvements in attitudes toward healthy cooking (pre- to -post-).	Intervention	Cooking Attitudes	5-point Likert-scale total score	Paired <i>t</i> -tests
2	H7.2- Control group participants will not have a change in attitudes toward healthy cooking (pre- to -post-).	Control	Cooking Attitudes	5-point Likert-scale total score	Paired <i>t</i> -tests
2	H7.3- Intervention participants will have significant improvements in attitudes toward healthy cooking, as compared to the control group (pre- to -post-).	Intervention/Control	Cooking Attitudes	5-point Likert-scale total score	Unpaired <i>t</i> -tests
2	RQ8- What is the impact of the College CHEF (pre- to -post-) on participants' cooking behavior?				
2	H8.1- Intervention group participants will have significant improvements with cooking behavior (pre- to -post-).	Intervention	Cooking Behavior	5-point Likert-scale total score	Paired <i>t</i> -tests

2	H8.2- Control group participants will not have a change with cooking behavior (pre- to -post-).	Control	Cooking Behavior	5-point Likert-scale total score	Paired <i>t</i> -tests
2	H8.3- Intervention participants will have significant improvements with cooking behavior as compared to the control group (pre- to -post-).	Intervention/Control	Cooking Behavior	5-point Likert-scale total score	Unpaired <i>t</i> -tests
2	RQ9- What is the impact of the College CHEF (pre- to -post-) on participants' fruit and vegetable consumption?				
2	H9.1- Intervention group participants will have significant improvements with fruit and vegetable consumption (pre- to -post-).	Intervention	Fruit and Vegetable Consumption	5-point Likert-scale total score	Paired <i>t</i> -tests
2	H9.2- Control group participants will not have a change with fruit and vegetable consumption cooking (pre- to -post-).	Control	Fruit and Vegetable Consumption	5-point Likert-scale total score	Paired <i>t</i> -tests
2	H9.3- Intervention participants will have significant improvements with fruit and vegetable consumption, as compared to the control group, (pre- to -post-).	Intervention/Control	Fruit and Vegetable Consumption	5-point Likert-scale total score	Unpaired <i>t</i> -tests
2	RQ10-What is the impact of the College CHEF (pre- to -post-) on participants' eating behaviors?				

2	H10.1- Intervention group participants will have significant improvements with healthy eating behaviors (pre- to -post-).	Intervention	Eating Behaviors	5-point Likert-scale total score	Paired <i>t</i> -tests
2	H10.2- Control group participants will not have a change with healthy eating behaviors (pre- to -post-).	Control	Eating Behaviors	5-point Likert-scale total score	Paired <i>t</i> -tests
2	H10.3- Intervention participants will have significant improvements with healthy eating behaviors, as compared to the control group (pre- to -post-).	Intervention/Control	Eating Behaviors	5-point Likert-scale total score	Unpaired <i>t</i> -tests
2	RQ11- What is the impact of the College CHEF (pre- to -post-) on participants' knowledge of cooking terms and techniques?				
2	H11.1- Intervention group participants will have significant improvements with knowledge of cooking terms and techniques (pre- to -post-).	Intervention	Knowledge of Cooking Terms and Techniques	Multiple-Choice Answers	Paired <i>t</i> -tests
2	H11.2- Control group participants will not have a change with knowledge of cooking terms and techniques (pre- to -post-)	Control	Knowledge of Cooking Terms and Techniques	Multiple-Choice Answers	Paired <i>t</i> -tests
2	H11.3- Intervention participants will have significant improvements with knowledge of cooking	Intervention/Control	Knowledge of Cooking Terms and Techniques	Multiple-Choice Answers	Unpaired <i>t</i> -tests



	terms and techniques, as compared to the control group (pre- to -post-).				
<b>Manuscript</b>	<b>Research Questions and Related Hypotheses</b>	<b>Independent Variables</b>	<b>Dependent Variables</b>	<b>Types of scales</b>	<b>Analysis</b>
3	RQ12- What is the impact of the College CHEF (pre- to -post-) on participants' self-efficacy for fruit and vegetable consumption?				
3	H12.1- Intervention group participants will have significant improvements with self-efficacy for fruit and vegetable consumption (pre- to -post-).	Intervention	Fruit and Vegetable Consumption Self-efficacy	5-point Likert-scale total score	Paired <i>t</i> -tests
3	H12.2- Control group participants will not have a change with self-efficacy for fruit and vegetable consumption (pre- to -post-)	Control	Fruit and Vegetable Consumption Self-efficacy	5-point Likert-scale total score	Paired <i>t</i> -tests
3	H12.3- Intervention participants will have significant improvements with self-efficacy for fruit and vegetable consumption, as compared to the control group, (pre- to -post-).	Intervention/Control	Fruit and Vegetable Consumption Self-efficacy	5-point Likert-scale total score	Unpaired <i>t</i> -tests
3	RQ13- What is the impact of the College CHEF (pre- to -post-) on participants' cooking self-efficacy?				
3	H13.1- Intervention	Intervention	Cooking Self-	5-point Likert-	Paired <i>t</i> -tests

	group participants will have significant improvements with cooking self-efficacy (pre- to -post-).		efficacy	scale total score	
3	H13.2- Control group participants will not have a change with cooking self-efficacy (pre- to -post-).	Control	Cooking Self-efficacy	5-point Likert-scale total score	Paired <i>t</i> -tests
3	H13.3- Intervention participants will have significant improvements with cooking self-efficacy, as compared to the control group, (pre- to -post-).	Intervention/Control	Cooking Self-efficacy	5-point Likert-scale total score	Unpaired <i>t</i> -tests
3	RQ14- What is the impact of the College CHEF (pre- to -post-) on participants' self-efficacy for using basic cooking techniques?				
3	H14.1- Intervention group participants will have significant improvements with self-efficacy for using basic cooking techniques (pre- to -post-).	Intervention	Self-efficacy for Using Basic Cooking Techniques	5-point Likert-scale total score	Paired <i>t</i> -tests
3	H14.2- Control group participants will not have a change with self-efficacy for using basic cooking techniques (pre- to -post-).	Control	Self-efficacy for Using Basic Cooking Techniques	5-point Likert-scale total score	Paired <i>t</i> -tests
3	H14.3- Intervention participants will have significant improvements with self-efficacy for using basic cooking	Intervention/Control	Self-efficacy for Using Basic Cooking Techniques	5-point Likert-scale total score	Unpaired <i>t</i> -tests

	techniques, as compared to the control group, (pre- to -post-).				
3	RQ15- What is the impact of the College CHEF (pre- to -post-) on participants' self-efficacy for using fruits, vegetables, and seasonings?				
3	H15.1- Intervention group participants will have significant improvements with self-efficacy for using fruits, vegetables, and seasonings (pre- to -post-).	Intervention	Self-efficacy for Using Fruits, Vegetables, and Seasonings	5-point Likert-scale total score	Paired <i>t</i> -tests
3	H15.2- Control group participants will not have a change with self-efficacy for using fruits, vegetables, and seasonings (pre- to -post-).	Control	Self-efficacy for Using Fruits, Vegetables, and Seasonings	5-point Likert-scale total score	Paired <i>t</i> -tests
3	H15.3- Intervention participants will have significant improvements with self-efficacy for using fruits, vegetables, and seasonings, as compared to the control group, (pre- to -post-).	Intervention/Control	Self-efficacy for Using Fruits, Vegetables, and Seasonings	5-point Likert-scale total score	Unpaired <i>t</i> -tests

Appendix B

The College CHEF Pre-, -Post- Survey

<b><u>Cooking Attitude Subscale</u></b>						
<b>DIRECTIONS: For each item below, indicate the extent to which you agree or disagree with the statement about cooking.</b>						
		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly agree</b>
	I do NOT like to cook because it takes too much time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Meals made at home are affordable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Cooking is frustrating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	I like trying new recipes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	It is too much work to cook.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Making meals at home helps me to eat more healthfully.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Cooking Behaviors Subscale**

**DIRECTIONS: For the items below, think about your usual cooking habits.  
Select ONE box for EACH question.**

<b>How often did you do the following ?</b>	<b>Not at all</b>	<b>Once each week</b>	<b>1 to 2 times each week</b>	<b>Several times each week</b>	<b>About everyday</b>
Prepare meals from basic ingredients (fresh produce, raw chicken, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prepare meals using convenience items (bagged salad, pre-shredded carrots).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reheat or used leftovers in another meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Use fresh and convenience items in combination for home meal preparation (e.g. a bagged salad with rotisserie chicken).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
---	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

**Fruit and Vegetable Consumption Subscale**

**DIRECTIONS:** For the items below, think about your usual eating habits.  
Select **ONE** box for **EACH** question.

	<b>How often do you do the following?</b>	<b>Not at all</b>	<b>Once a week</b>	<b>1 to 2 times each week</b>	<b>Several times each week</b>	<b>About everyday</b>
	Consume at least five servings of fruit per day.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Consume at least five servings of vegetables per day.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Eating Behaviors Subscale**

**DIRECTIONS:** For the items below, think about your usual eating habits.  
Select **ONE** box for **EACH** question.

	<b>How often do you do the following?</b>	<b>Not at all</b>	<b>Once a week</b>	<b>One to two times each week</b>	<b>Several times each week</b>	<b>About everyday</b>
	Eat breakfast away from home.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Eat lunch away from home.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Eat dinner away from home.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Fruit and Vegetable Consumption Self-Efficacy Subscale**

**DIRECTIONS:** For each item below, indicate the extent to which you feel confident about performing the particular activity. Select ONE box for EACH question.

		<b>NOT at all confident</b>	<b>NOT very confident</b>	<b>Neither confident nor unconfident</b>	<b>Confident</b>	<b>Extremely confident</b>
	Eat fruits and vegetables at every meal, every day.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Eat fruits or vegetables as a snack, even if everybody else were eating other snacks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Eat the recommended 9 half cup servings of fruits and vegetables each day.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**Cooking Self-Efficacy Subscale**

**DIRECTIONS:** For each item below, indicate the extent to which you feel confident about performing the particular activity. Select ONE box for EACH question.

		<b>NOT at all confident</b>	<b>NOT very confident</b>	<b>Neither confident nor unconfident</b>	<b>Confident</b>	<b>Extremely confident</b>
	Cook from basic ingredients (ex: fresh tomatoes, raw ground beef).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Follow a written recipe (ex: preparing fresh salsa from tomatoes, onion, garlic, jalapeno peppers).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Prepare dinner from items you currently have in your pantry and refrigerator.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Use knife skills in the kitchen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Plan nutritious meals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Use basic cooking techniques.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Self-Efficacy for Using Basic Cooking Techniques Subscale**

**DIRECTIONS:** For each item below, indicate the extent to which you feel confident about performing the particular activity. Select ONE box for EACH question.

		<b>NOT at all confident</b>	<b>NOT very confident</b>	<b>Neither confident nor unconfident</b>	<b>Confident</b>	<b>Extremely confident</b>
--	--	-----------------------------	---------------------------	--	------------------	----------------------------

	<b>Boiling</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Simmering</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Sautéing</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Stir-frying</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Grilling</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Poaching</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Baking</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Roasting</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Microwaving</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Self-Efficacy for Using Fruits, Vegetables, and Seasonings Subscale**

**DIRECTIONS:** For each item below, indicate the extent to which you currently feel confident about preparing the following foods. Select ONE box for EACH question.

		<b>NOT at all confident</b>	<b>NOT very confident</b>	<b>Neither confident nor unconfident</b>	<b>Confident</b>	<b>Extremely confident</b>
	Fresh or frozen green vegetables (ex: zucchini, cabbage)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Root vegetables (ex: potatoes, carrots)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fruit (ex: peaches, strawberries)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Herbs (ex: basil, thyme)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Spices (ex: cayenne pepper, ground mustard)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Vinegars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Citrus juice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Hot sauces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Knowledge of Cooking Terms and Techniques Evaluation Subscale**

**DIRECTIONS:** For questions below, indicate what you believe is the best answer by checking the box next to your response. Select ONE answer for EACH question.

**Cooking peaches briefly in boiling water then cooling in ice water to remove the skins is an example of:**

- Blanching
- Poaching
- Broiling
- Don't know

**If a recipe tells you to sauté an onion, you should cook it:**

- In a basket set above boiling water.
- In a pan with a small amount of hot oil.
- In a pan with a small amount of water.
- Don't know.

**A diced potato should be cut into:**

- Long, thin matchstick size pieces.
- Very small and uneven pieces.
- Cubes usually  $\frac{1}{4}$  to  $\frac{3}{4}$  inch in size.
- Don't know.

**Water is simmering when:**

- Steam begins to form.
- Tiny bubbles collect on the bottom and sides of the pan.
- Bubbles rise rapidly and break on the surface.
- Don't know.

**Sweet potatoes are roasting when they are:**

- Cooked by dry heat in a hot oven.
- Cooked in a hot oven with liquid in the pan.
- Cooked in a covered pan with a small amount of liquid.
- Don't know.

**What is the term for preparing all ingredients, gathering equipment, and organizing your work area before beginning to cook?**

- \* Production stage
- \* Blanching
- \* Mise en place
- \* Don't know

**DIRECTIONS: Use the following recipe to indicate what you believe is the best answer. Please select ONE answer by checking the box next to your response.**

**Orange Smoothie**

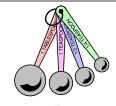


1 cup fat free vanilla yogurt  
½ cup sweet potatoes, cooked, cooled and mashed  
1 cup orange juice  
½ tsp vanilla extract  
1 cup ice

In a blender, crush ice. Add remaining ingredients and blend on high until smooth. Serve immediately. Yield: 2 smoothies.

**How would you accurately measure 1 cup of orange juice for this recipe?:**

- Set a liquid measuring cup on a level surface, bend down and pour in the juice to desired level
- Hold a dry measuring cup at eye level and pour in juice from another container to desired level
- Set a dry measuring cup on a level surface, bend down and pour the juice to desired level
- Don't know

**Which is best for measuring the vanilla extract in this recipe?**

- \* 
- \* 
- \* 
- \* Don't know

**Demographic Information**

**What is your age?**

\_\_\_\_\_ years

**What is your gender?**

- Female
- Male
- Transgender
- Other

**How do you describe yourself?**

- Black, not of Hispanic origin
- White, not of Hispanic origin
- Hispanic/Latino
- Asian or Pacific Islander
- American Indian/Alaskan Native
- Other (Please specify): \_\_\_\_\_

**What is your major?**

\_\_\_\_\_

**What college are you in?**

- College of Agriculture, Food and Environment
- College of Arts & Sciences
- College of Business & Economics
- College of Communication & Information
- College of Dentistry
- College of Design
- College of Education
- College of Engineering
- College of Fine Arts
- College of Health Sciences
- College of Law
- College of Medicine
- College of Nursing
- College of Pharmacy
- College of Public Health
- College of Social Work

**What year in college are you presently enrolled?**

- Freshman
- Sophomore
- Junior
- Senior

**Of which LLP are you a part? (Please choose one).**

- KHP
- First Generation
- Greenhouse
- Wellness

**What is your present work/employment status?**

- Employed full time
- Employed part time
- Unemployed

**Are you a part of Greek Life on campus?**

- Yes, I am in a sorority
- Yes, I am in a fraternity
- No, I am not in a sorority or fraternity

**Are you an athlete?**

- Yes
- No

**If you are an athlete, of what team are you a part?**

\_\_\_\_\_

**Are you a first generation student?**

- Yes
- No

**How would you describe your current weight status?**

- Underweight
- Normal weight
- Overweight by 5-10 pounds
- Overweight by 11-20 pounds
- Overweight by more than 20 pounds
- Prefer not to answer

\_\_\_\_\_

For the following question, please answer it once you are taking this survey for the second time, once the cooking classes have ended.

**How many sessions of the four "College CHEF" sessions did you attend?**

- One
- Two
- Three
- Four

**Additional Process Evaluation Questions included on the Post- Survey for Intervention Participants:**

DIRECTIONS: For the item below, indicate the extent to which you feel satisfied.

Select ONE choice for EACH question.

1. How satisfied were you with the College CHEF overall?

- Very dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Very satisfied

DIRECTIONS: For the items below, indicate the extent to which you agree.

Select ONE choice for EACH question.

2. The College CHEF was overall beneficial in improving my cooking habits.

- Strongly disagree
- Somewhat disagree
- Somewhat agree
- Strongly agree

3. The handouts given during each session were beneficial.

- Strongly disagree
- Somewhat disagree
- Somewhat agree
- Strongly agree

4. The education session at the beginning of each session was beneficial.

- Strongly disagree
- Somewhat disagree



- Somewhat agree
- Strongly agree

5. Have you tried any of the recipes made in class?

- Yes
- No

6. If you have tried recipes from class, which recipes(s) have you tried? (Please select all that apply)

- Salsa
- Chicken salad
- Smoothies
- Coleslaw
- Chicken Tortilla Soup
- Quesadillas
- Baked Sweet Potatoes
- Salad Dressing
- Salad
- Meatballs
- Marinara
- Fruit and oat bars

7. For future programming, how many sessions would you suggest the program entail for participants to get the most out of their experience?

- Two sessions
- Three sessions
- Four sessions
- Five sessions
- Six or more sessions

8. What did you like best about the program?

9. What do you think could be improved with the program?

10. Please share any additional thoughts or concerns you have about the College CHEF.

## Appendix C

### Documentation of IRB Approval



Office of Research Integrity  
IRB, IACUC, RDRC  
315 Kinkead Hall  
Lexington, KY 40506-0057  
859 257-9428  
fax 859 257-8995  
[www.research.uky.edu/ori/](http://www.research.uky.edu/ori/)

#### EXEMPTION CERTIFICATION

MEMO: Jennifer McMullen, MA  
Kinesiology - Health Promotion  
134 Seaton Ct  
0219  
PI phone #: (240)595-9520

FROM: Institutional Review Board  
c/o Office of Research Integrity

SUBJECT: Exemption Certification for Protocol No. 15-0603-X4B

DATE: August 10, 2015

On August 7, 2015, it was determined that your project entitled, *Impact of a campus-based culinary nutrition program on college students*, meets federal criteria to qualify as an exempt study.

Because the study has been certified as exempt, you will not be required to complete continuation or final review reports. However, it is your responsibility to notify the IRB prior to making any changes to the study. Please note that changes made to an exempt protocol may disqualify it from exempt status and may require an expedited or full review.

The Office of Research Integrity will hold your exemption application for six years. Before the end of the sixth year, you will be notified that your file will be closed and the application destroyed. If your project is still ongoing, you will need to contact the Office of Research Integrity upon receipt of that letter and follow the instructions for completing a new exemption application. It is, therefore, important that you keep your address current with the Office of Research Integrity.

For information describing investigator responsibilities after obtaining IRB approval, download and read the document "PI Guidance to Responsibilities, Qualifications, Records and Documentation of Human Subjects Research" from the Office of Research Integrity's IRB Survival Handbook web page [<http://www.research.uky.edu/ori/IRB-Survival->

[Handbook.html#PIresponsibilities](#)]. Additional information regarding IRB review, federal regulations, and institutional policies may be found through ORI's web site [\[http://www.research.uke.edu/ori\]](http://www.research.uke.edu/ori). If you have questions, need additional information, or would like a paper copy of the above mentioned document, contact the Office of Research Integrity at (859) 257-9428.

## Appendix D

### Invitation Email to LLP Directors for Control and Intervention Groups

[DATE]

Hello, [LLP Director],

My name is Jennifer McMullen and I am a doctoral student at the University of Kentucky. The purpose of this email is to let you know about a research study, Impact of a Campus-based Culinary Nutrition Program on College Students, which aims to evaluate how an on-campus multi-session culinary nutrition program influences college students' associated knowledge, attitudes, behaviors, and self-efficacy by seeking responses from both participants and non-participants.

I plan to implement a multi-session, healthy nutrition/cooking class with Living Learning Programs (LLPs) on campus and evaluate the effectiveness by implementing a pre-, post- and follow-up survey to both participants of programming, as well as students who did not participate in programming, for comparison purposes. This survey will assist in determining what works best in this type of programming.

My hope is that you will assist me by sending out the following recruitment email to students in your LLP. If your particular LLP is participating in the College CHEF Programming, I would ask that you send the e-mails only to those participating in programming. If your LLP is not participating in programming, I would ask that you please forward the e-mails to all students in your respective LLP. I will follow-up with another e-mail one week later which will include a link requesting the students to complete a 10-15 minute online survey. My goal is to have 100 students, approximately half of whom participate in programming and half who do not participate in programming, complete the survey, so your willingness to invite your students to participate would be greatly appreciated.

Please let me know at your convenience if you would be willing to share the initial email below and/or feel free to directly forward on to your students. I would then ask that you forward a second e-mail to all students participating in programming on my behalf which will provide a survey link; I will e-mail this to you the week of September 28th. I will then send a follow-up e-mail one week later inviting students to please complete the survey if they have not already. A similar process will take place asking students to complete a post- survey once programming is over at the end of October, and with a 1-month follow-up survey in November.

You are welcome to contact me at any time with additional questions, [jennifer.e.mcmullen@uky.edu](mailto:jennifer.e.mcmullen@uky.edu) or 240-595-9520. Thank you in advance for your assistance with this important project.

Sincerely,

Jennifer McMullen, M.A., Ph.D. Candidate  
Department of Kinesiology and Health Promotion  
College of Education, University of Kentucky  
PHONE: 240-595-9520, E-MAIL: [jennifer.e.mcmullen@uky.edu](mailto:jennifer.e.mcmullen@uky.edu)

## Appendix E

### Email Invitation to Participate in Study

September 21, 2015

Hello.

My name is Jennifer McMullen and I am a doctoral candidate at the University of Kentucky. The purpose of this email is to let you know about a research study, Impact of a Campus-based Culinary Nutrition Program on College Students, which aims to evaluate how an on-campus multi-session culinary nutrition program influences college students' associated knowledge, attitudes, behaviors, and self-efficacy by seeking responses from both participants and non-participants. You were identified as a student living in the XX LLP and you are being invited to complete a set of three surveys.

You will receive an e-mail with a link to the pre-survey during the week of September 28th, an e-mail with a link to the post-survey will be sent during the week of October 28, 2015 and an e-mail with a link to the 1- month follow-up survey will be sent at the end of November 2015.

You are welcome to contact me at any time with additional questions,  
jennifer.e.mcmullen@uky.edu

Thank you in advance for your assistance with this important project.

Sincerely,

Jennifer McMullen, M.A., Ph.D. Candidate

Department of Kinesiology and Health Promotion  
College of Education  
University of Kentucky  
PHONE: 240-595-9520  
E-MAIL: jennifer.e.mcmullen@uky.edu

## Appendix F

### Survey Cover Letter

[INSERT DATE]

Hello.

My name is Jennifer McMullen and I am a doctoral candidate at the University of Kentucky. The purpose of this email is to let you know about a research study, Impact of a Campus-based Culinary Nutrition Program on College Students which aims to evaluate how an on-campus multi-session culinary nutrition program influences college students' associated knowledge, attitudes, behaviors, and self-efficacy by seeking responses from both participants and non-participants. You were identified as a student living in the [INSERT LLP] and you are being invited to complete a set of three surveys.

Your responses may help us understand more about what will work best for a campus-based nutrition/cooking class. We hope to receive completed questionnaires from about 100 current University of Kentucky students, so your answers are important to us. Of course, you have a choice about whether or not to complete the survey, but if you do participate, you are free to skip any questions or discontinue at any time. Your consent to participate in the study is determined by the completion and submission of the survey.

The survey will take approximately 10-15 minutes to complete. [INSERT LINK]  
There are no known risks to participating in this study.

Your response to the survey is confidential. We will keep private all research records that identify you to the extent allowed by law. However, there are some circumstances in which we may have to show your information to other people. We may be required to show information which identifies you 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.

Please be aware, while we make every effort to safeguard your data once received from the online survey/data gathering company, given the nature of online surveys, as with anything involving the Internet, we can never guarantee the confidentiality of the data while still on the survey/data gathering company's servers, or while en route to either them or us. It is also possible the raw data collected for research purposes may be used for marketing or reporting purposes by the survey/data gathering company after the research is concluded, depending on the company's Terms of Service and Privacy policies.

If you have questions about the study, please feel free to ask; my contact information is given below. If you have complaints, suggestions, or questions about your rights as a research volunteer, contact the staff in the University of Kentucky Office of Research Integrity at 859-257-9428 or toll-free at 1-866-400-9428.

Thank you in advance for your assistance with this important project.  
Sincerely,

Jennifer McMullen, M.A. and Ph.D. Candidate in Health Education

Life Fitness Teaching Assistant  
Department of Kinesiology and Health Promotion  
College of Education  
University of Kentucky  
PHONE: 240-595-9520  
E-MAIL: [jennifer.e.mcmullen@uky.edu](mailto:jennifer.e.mcmullen@uky.edu)



## Appendix G

### Waiver Requirement for Documentation of Informed Consent

If you are requesting IRB approval for waiver of the requirement for documentation of informed consent (i.e. telephone survey or mailed survey, internet research, or certain international research), **your research activities must fit into one of two regulatory options:**

- 1) The only record linking the participant and the research would be the consent document, *and* the principal risk would be potential harm resulting from a breach of confidentiality (i.e., a study that involves participants who use illegal drugs).
- 2) The research presents no more than minimal risk to the participant *and* involves no procedures for which written consent is normally required outside of the research context (i.e. a cover letter on a survey, or a phone script).

**Check the box next to the option below that best fits your study, and explain in the space provided how your study meets the criteria for the selected regulatory option.**

Note: The IRB cannot waive the requirement for documentation or alter the consent form for FDA-regulated research unless it meets Option #2 below. FDA does not accept Option #1.

Note: Even if a waiver of the requirement for documentation is approved by the IRB, participants must still be provided oral or written (e.g., cover letter) information including all required and appropriate elements of consent.

<input type="checkbox"/> <b>Option 1</b> a) The only record linking the participant and the research would be the consent document. <hr/> b) The principal risk would be potential harm resulting from a breach of confidentiality (i.e., a study that involves participants who use illegal drugs). <hr/> Under these conditions, each participant must be asked whether (s)he wants to sign a consent form; if the participant agrees to sign a consent form, only an IRB approved version should be used.
---

<input type="checkbox"/> <b>Option 2</b> a) The research presents no more than minimal risk to the participant. No more than minimal risk to the participant anticipated. Information collected is not sensitive in nature and relates to the feasibility of implementing a cooking program. <hr/> b) The research involves no procedures for which written consent is normally required outside of the research context (i.e. a cover letter on a survey, or a phone script).  An online survey will be administered. <hr/>
---

## Appendix H

### Research Design Matrix with Outcomes

<b>Man #</b>	<b>Research Questions and Related Hypotheses</b>	<b>Outcome(s)</b>	<b>Independent Variables</b>	<b>Dependent Variables</b>	<b>Types of scales</b>	<b>Analysis</b>
1	RQ1- How does the summary of secondary needs assessment findings influence the development of the College CHEF program?	SNA results indicated that program should: Be SCT-driven; Include operationalization of SCT constructs: reinforcements, outcome expectations, goal setting, and feedback; Address barriers associated with: attitude and knowledge of healthy eating/cooking, budgeting, and meal planning; Teach basic cooking skills.	SNA summary	College CHEF program	N/A	Constant Comparative Analysis
1	RQ2- How does the summary of findings from formative focus groups with college students influence the development of the College CHEF program?	Focus group results indicated that program should educate participants about time management, knowing why food is healthy, and understanding food labels. Barriers to be addressed in programming: transportation to store, time, money, accessibility of unhealthy food, inability to cook healthy food. Programming should incorporate visual learning tools and hands-on strategies.	Focus group findings	College CHEF program	N/A	Constant Comparative Analysis
1	RQ3- How does the summary of findings from interviews with campus stakeholders influence the	Interview results indicated that programming should include information about: caloric content of foods, portion control, knowing what foods are healthy, and how to incorporate	Interview group findings	College CHEF program	N/A	Constant Comparative Analysis

	development of the College CHEF program?	protein into meals. Barriers to be addressed: transportation, how to cook healthfully on a budget, with limited space and tools.				
1	RQ4- How does the summary of findings from surveys with college students influence the development of the College CHEF program?	Survey results indicated that programming should focus on: how to improve participants' attitudes and self-efficacy toward cooking, how to identify portion size, how to read a food label, how to follow recipes.				
1	RQ5- What are the goals of College CHEF program?	To improve participants' attitudes, behaviors, self-efficacy and knowledge as related to healthy cooking and eating.	N/A	N/A	N/A	N/A
1	RQ6- What tailored evidence based intervention strategies are included in the College CHEF?	SNA and PNA indicated that programming should: include hands-on practice, be SCT-driven, operationalize SCT constructs in an effort to achieve program goals, utilize a previously validated survey, and build upon an existing culinary, nutrition-education program.	N/A	N/A	N/A	N/A
<b>Man u.</b>	<b>Research Questions and Related Hypotheses</b>	<b>Outcome(s)</b>	<b>Independent Variables</b>	<b>Dependent Variables</b>	<b>Types of scales</b>	<b>Analysis</b>
2	RQ7- What is the impact of the College CHEF (pre- to -post-) on participants' attitudes toward healthy cooking?					
2	H7.1- Intervention group participants	Pre- ( $M = 24$ ; $SD = 2.74$ ) to post-scores ( $M = 24$ ; $SD = 3.76$ ) among	Intervention	Cooking Attitudes	5-point Likert-	Paired <i>t</i> -tests

	will have significant improvements in attitudes toward healthy cooking (pre- to -post-).	intervention participants were not significant ( $p = 1.00$ ).			scale total score	
2	H7.2- Control group participants will not have a change in attitudes toward healthy cooking (pre- to -post-).	Pre- ( $M = 23.94$ ; $SD = 3.95$ ) to post-scores ( $M = 23.48$ ; $SD = 4.22$ ) for control participants were not significant ( $p = 0.50$ ).	Control	Cooking Attitudes	5-point Likert-scale total score	Paired $t$ -tests
2	H7.3- Intervention participants will have significant improvements in attitudes toward healthy cooking, as compared to the control group (pre- to -post-).	A comparison of mean change scores between groups was nonsignificant ( $p = 0.80$ )	Intervention/Control	Cooking Attitudes	5-point Likert-scale total score	Unpaired $t$ -tests
2	RQ8- What is the impact of the College CHEF (pre- to -post-) on participants' cooking behavior?					
2	H8.1- Intervention group participants will have significant improvements with cooking behavior (pre- to -post-).	Pre- ( $M = 9.07$ ; $SD = 4.04$ ) to post-scores ( $M = 9.07$ ; $SD = 3.73$ ) among intervention participants were not significant ( $p = 1.00$ ).	Intervention	Cooking Behavior	5-point Likert-scale total score	Paired $t$ -tests
2	H8.2- Control group participants will not have a change with cooking behavior (pre- to -post-).	Pre- ( $M = 9.65$ ; $SD = 4.34$ ) to post-scores ( $M = 9.35$ ; $SD = 3.72$ ) for control participants were not significant ( $p = 0.68$ ).	Control	Cooking Behavior	5-point Likert-scale total score	Paired $t$ -tests

2	H8.3- Intervention participants will have significant improvements with cooking behavior as compared to the control group (pre- to -post-).	A comparison of mean change scores between groups was nonsignificant ( $p = 0.78$ ).	Intervention/Control	Cooking Behavior	5-point Likert-scale total score	Unpaired $t$ -tests
2	RQ9- What is the impact of the College CHEF (pre- to -post-) on participants' fruit and vegetable consumption?					
2	H9.1- Intervention group participants will have significant improvements with fruit and vegetable consumption (pre- to -post-).	Pre- ( $M = 4.73$ ; $SD = 2.71$ ) to post-scores ( $M = 6.13$ ; $SD = 2.20$ ) among intervention participants were <b>significant</b> ( $p = 0.008$ ).	Intervention	Fruit and Vegetable Consumption	5-point Likert-scale total score	Paired $t$ -tests
2	H9.2- Control group participants will not have a change with fruit and vegetable consumption cooking (pre- to -post-).	Pre- ( $M = 5.31$ ; $SD = 3.03$ ) to post-scores ( $M = 4.82$ ; $SD = 2.96$ ) for control participants were not significant ( $p = 0.74$ ).	Control	Fruit and Vegetable Consumption	5-point Likert-scale total score	Paired $t$ -tests
2	H9.3- Intervention participants will have significant improvements with fruit and vegetable consumption, as compared to the control group,	A comparison of mean change scores between groups was <b>significant</b> ( $p = 0.001$ ).	Intervention/Control	Fruit and Vegetable Consumption	5-point Likert-scale total score	Unpaired $t$ -tests

	(pre- to -post-).					
2	RQ10-What is the impact of the College CHEF (pre- to -post-) on participants' eating behaviors?					
2	H10.1- Intervention group participants will have significant improvements with healthy eating behaviors (pre- to -post-).	Pre- ( $M = 7.27$ ; $SD = 2.63$ ) to post-scores ( $M = 8.73$ ; $SD = 3.20$ ) among intervention participants were not significant ( $p = 0.16$ ).	Intervention	Eating Behaviors	5-point Likert-scale total score	Paired $t$ -tests
2	H10.2- Control group participants will not have a change with healthy eating behaviors (pre- to -post-).	Pre- ( $M = 8.47$ ; $SD = 1.74$ ) to post-scores ( $M = 8.12$ ; $SD = 1.76$ ) for control participants were not significant ( $p = 0.36$ ).	Control	Eating Behaviors	5-point Likert-scale total score	Paired $t$ -tests
2	H10.3- Intervention participants will have significant improvements with healthy eating behaviors, as compared to the control group (pre- to -post-).	A comparison of mean change scores between groups was nonsignificant ( $p = 0.11$ ).	Intervention/Control	Eating Behaviors	5-point Likert-scale total score	Unpaired $t$ -tests
2	RQ11- What is the impact of the College CHEF (pre- to -post-) on participants' knowledge of cooking terms and techniques?					
2	H11.1- Intervention group participants will have	Pre- ( $M = 5.29$ ; $SD = 1.44$ ) to post-scores ( $M = 7.38$ ; $SD = 1.18$ ) among intervention participants	Intervention	Knowledge of Cooking Terms and Techniques	Multiple-Choice Answer	Paired $t$ -tests

	significant improvements with knowledge of cooking terms and techniques (pre- to -post-).	<b>were significant</b> ( $p = 0.000$ ).			rs	
2	H11.2- Control group participants will not have a change with knowledge of cooking terms and techniques (pre- to -post-)	Pre- ( $M = 5.40$ ; $SD = 1.62$ ) to post-scores ( $M = 5.56$ ; $SD = 1.70$ ) for control participants were not significant ( $p = 0.49$ ).	Control	Knowledge of Cooking Terms and Techniques	Multiple-Choice Answers	Paired $t$ -tests
2	H11.3- Intervention participants will have significant improvements with knowledge of cooking terms and techniques, as compared to the control group (pre- to -post-).	A comparison of mean change scores between groups was <b>significant</b> ( $p = 0.000$ ).	Intervention/Control	Knowledge of Cooking Terms and Techniques	Multiple-Choice Answers	Unpaired $t$ -tests
<b>Manu.</b>	<b>Research Questions and Related Hypotheses</b>	<b>Outcome(s)</b>	<b>Independent Variables</b>	<b>Dependent Variables</b>	<b>Types of scales</b>	<b>Analysis</b>
3	RQ12- What is the impact of the College CHEF (pre- to -post-) on participants' self-efficacy for fruit and vegetable consumption?					
3	H12.1- Intervention group participants will have significant improvements with self-efficacy for fruit and vegetable	Pre- ( $M = 8.8$ ; $SD = 3.5$ ) to post-scores ( $M = 10.4$ ; $SD = 3.02$ ) among intervention participants were <b>significant</b> ( $p = .04$ ).	Intervention	Fruit and Vegetable Consumption Self-efficacy	5-point Likert-scale total score	Paired $t$ -tests

	consumption (pre- to -post-).					
3	H12.2- Control group participants will not have a change with self-efficacy for fruit and vegetable consumption (pre- to -post-)	Pre- ( $M = 9.24$ ; $SD = 3.85$ ) to post-scores ( $M = 9.18$ ; $SD = 3.13$ ) for control participants were not significant ( $p = 0.17$ ).	Control	Fruit and Vegetable Consumption Self-efficacy	5-point Likert-scale total score	Paired $t$ -tests
3	H12.3- Intervention participants will have significant improvements with self-efficacy for fruit and vegetable consumption, as compared to the control group, (pre- to -post-).	A comparison of mean change scores between groups was nonsignificant ( $p = 0.11$ ).	Intervention/Control	Fruit and Vegetable Consumption Self-efficacy	5-point Likert-scale total score	Unpaired $t$ -tests
3	RQ13- What is the impact of the College CHEF (pre- to -post-) with participants' cooking self-efficacy?					
3	H13.1- Intervention group participants will have significant improvements with cooking self-efficacy (pre- to -post-).	Pre- ( $M = 24.23$ ; $SD = 4.4$ ) to post-scores ( $M = 25.33$ ; $SD = 3.31$ ) among intervention participants were not significant ( $p = .27$ ).	Intervention	Cooking Self-efficacy	5-point Likert-scale total score	Paired $t$ -tests
3	H13.2- Control group participants will not have a change with cooking self-efficacy (pre- to -post-).	Pre- ( $M = 21.24$ ; $SD = 6.50$ ) to post-scores ( $M = 22.8$ ; $SD = 5.42$ ) for control participants were not significant ( $p = 0.96$ ).	Control	Cooking Self-efficacy	5-point Likert-scale total score	Paired $t$ -tests
3	H13.3-	A comparison of mean	Intervention/Control	Cooking	5-	Unpaired



	Intervention participants will have significant improvements with cooking self-efficacy, as compared to the control group, (pre- to -post-).	change scores between groups was nonsignificant ( $p = 0.80$ ).	ontrol	Self-efficacy	point Likert-scale total score	$t$ -tests
3	RQ14- What is the impact of the College CHEF (pre- to -post-) with participants' self-efficacy for using basic cooking techniques?					
3	H14.1- Intervention group participants will have significant improvements with self-efficacy for using basic cooking techniques (pre- to -post-).	Pre- ( $M = 31.27$ ; $SD = 6.0$ ) to post-scores ( $M = 37.2$ ; $SD = 5.94$ ) among intervention participants were <b>significant</b> ( $p = .006$ ).	Intervention	Self-efficacy for Using Basic Cooking Techniques	5-point Likert-scale total score	Paired $t$ -tests
3	H14.2- Control group participants will not have a change with self-efficacy for using basic cooking techniques (pre- to -post-).	Pre- ( $M = 31.18$ ; $SD = 10.55$ ) to post-scores ( $M = 32.24$ ; $SD = 7.85$ ) for control participants were not significant ( $p = 0.90$ ).	Control	Self-efficacy for Using Basic Cooking Techniques	5-point Likert-scale total score	Paired $t$ -tests
3	H14.3- Intervention participants will have significant improvements with self-efficacy for using basic cooking techniques, as	A comparison of mean change scores between groups was nonsignificant ( $p = 0.20$ ).	Intervention/Control	Self-efficacy for Using Basic Cooking Techniques	5-point Likert-scale total score	Unpaired $t$ -tests

	compared to the control group, (pre- to -post-).					
3	RQ15- What is the impact of the College CHEF (pre- to -post-) with participants' self-efficacy for using fruits, vegetables, and seasonings?					
3	H15.1- Intervention group participants will have significant improvements with self-efficacy for using fruits, vegetables, and seasonings (pre- to -post-).	Pre- ( $M = 25.80$ ; $SD = 5.66$ ) to post-scores ( $M = 33.4$ ; $SD = 5.37$ ) among intervention were <b>significant</b> ( $p = .001$ ).	Intervention	Self-efficacy for Using Fruits, Vegetables, and Seasonings	5-point Likert-scale total score	Paired $t$ -tests
3	H15.2- Control group participants will not have a change with self-efficacy for fruits, vegetables, and seasonings (pre- to -post-).	Pre- ( $M = 27.47$ ; $SD = 8.57$ ) to post-scores ( $M = 27.59$ ; $SD = 7.83$ ) for control participants were not significant ( $p = 0.12$ ).	Control	Self-efficacy for Using Fruits, Vegetables, and Seasonings	5-point Likert-scale total score	Paired $t$ -tests
3	H15.3- Intervention participants will have significant improvements with self-efficacy for using fruits, vegetables, and seasonings, as compared to the control group, (pre- to -post-).	A comparison of mean change scores between groups was <b>significant</b> ( $p = 0.015$ ).	Intervention/Control	Self-efficacy for Using Fruits, Vegetables, and Seasonings	5-point Likert-scale total score	Unpaired $t$ -tests

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## VITA

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### **Place of birth**

Chicago, Illinois

### **Educational Institutions and Degrees Received**

*M.A. Teaching.* Frostburg State University: Frostburg, Maryland. Additional Endorsement: Secondary Biology. Degree conferred: May 2008. 4.0 GPA

*B.S. Liberal Studies, Biology, Philosophy (minor).* Frostburg State University: Frostburg, Maryland. Degree conferred: May 2007. Magna Cum Laude

### **Professional Positions Held**

*University of Kentucky:* Position: KHP Adjunct Instructor. (January 2016-present).

*University of Kentucky:* Position: Health Promotion Fellow for the Food Connection. (June 2015-August 2015).

*University of Kentucky:* Position: Research Assistant for Dr. Melinda Ickes. (May 2015- present).

*University of Kentucky:* Position: Group Fitness Instructor. (May 2014-present).

*University of Kentucky:* Position: Teaching Assistant. (August 2013- present).

*Nassau County School System, Florida:* Position: Science Teacher. (August 2009-July 2013).

### **Scholastic and Professional Honors:**

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Nominated for Hackensmith Award by Kinesiology and Health Promotion Department, April 2015.

### **Professional Publications:**

Ickes, M., McMullen, J. (2016 *in press*). Evaluation of a Health Coaching Experiential Learning Collaboration with Future Health Promotion

Professionals. *Pedagogy in Health Promotion*.

Ickes, M., **McMullen, J.**, Pflug, C., Hutchinson, P. (**Published February 2016**). Impact of a University-based Physical Activity Program on Obese College Students' Physical Activity and Overall Health. *American Journal of Health Education*, 47(1), 47-55.

Ickes, M., **McMullen, J.**, & Sharma, M. (**2015 in press**). Environmental changes as part of multi-component school-based obesity prevention interventions: A review. *Obesity Research*. Hong Kong: iConcept Press.

Ickes, M., **McMullen, J.**, Haider, T., & Sharma, M. (**Published August 2014**). Global school-based childhood obesity interventions: A review. *International Journal of Environmental Research and Public Health*, 11(9), 8940-8961, doi: [10.3390/ijerph110908940](https://doi.org/10.3390/ijerph110908940)

### **Manuscripts in Preparation:**

Manuscript: **McMullen, J.**, Ickes, M. Development of "College CHEF," a Campus-based, Culinary Nutrition Program.

Manuscript: **McMullen, J.**, Ickes, M. Impact Evaluation of "College CHEF," a Campus-based, Culinary Nutrition Education Program.

Manuscript: **McMullen, J.**, Ickes, M. The Effect of a Campus-based Culinary, Nutrition Education Program, "College CHEF," on College Students' Self-efficacy with Cooking Skills and Nutrition Behaviors.