PILOT STUDY OF A BUDGET-TAILORED CULINARY NUTRITION EDUCATION PROGRAM FOR UNDERGRADUATE FOOD SCIENCE STUDENTS

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ABSTRACT

The primary objective of this pilot study is to provide evidence that a budget-tailored culinary nutrition program is both appropriate and applicable to undergraduate food science students both in everyday life as well as their future health careers. Two validated programs were combined into one program in order to evaluate their combined effects: *Cooking With a Chef* and *Cooking Matters at the Store*. The secondary objective of this pilot study is to evaluate the components and reliability of a questionnaire created specifically for this pilot study. A review of past literature was written, which included culinary nutrition as a source of primary prevention, the importance of incorporating cost with culinary nutrition, and the importance of incorporating cost with culinary nutrition. Based on the literature review, it was determined that a budget-tailored culinary nutrition program was appropriate and applicable to undergraduate food science students interested in pursuing health-related careers.

The pilot study design was a semi-crossover study: all four groups received the program, however, two groups were first treated as the control groups. All fifty-four participants received 5 sessions of culinary nutrition information from *Cooking With a Chef*, collaboratively delivered by a nutrition educator and a chef, and one session of information about shopping healthy on a budget from *Cooking Matters at the Store* in the form of a grocery store tour led by the nutrition educator. Three questionnaires were administered to the participants that evaluated culinary nutrition and price knowledge, cooking attitudes, and opinions of the programs' relevance to participants' everyday lives and careers. Two of the questionnaires, including a questionnaire developed specifically

for the pilot study, were delivered as a pre- and post-test while the third questionnaire was delivered as a post-test. Eight random participants also partook in a focus group session led by the nutrition educator.

Based on statistical results, there were significant differences between the treatment group and control group in Cooking Self-Efficacy ($p=0.0024$), Self-Efficacy for Using Basic Cooking Techniques ($p=<0.0001$), Self-Efficacy for Using Fruits, Vegetables, and Seasonings ($p=<0.0001$), and the ability to use economical methods to purchase low-cost produce and identify different forms of produce ($p=<0.0001$). For the one-time post-program administered questionnaire, the participants received an average score of 89.44 percent. The reliability procedure performed on the pilot study questionnaire showed that 13 of the 15 items were statistically reliable ($p<0.05$). The factor analysis procedure performed showed that there were five factors within the pilot study questionnaire. Participant responses from the focus group included how the program was a positive change from other mandatory courses, reaffirmed or increased interest in their major(s) and applied both to their everyday life and future career.

This pilot study demonstrates preliminary results of the effects of combining culinary nutrition information with budget and price concepts to deliver to undergraduate food science students. The significance of understanding both culinary nutrition and price is important in order to effectively deliver nutrition counseling to patients of all different demographics. Additional testing and modification could be performed on the curriculum as well as the pilot study questionnaire in order to effectively relate the instrument to the program and increase the instrument's reliability.

DEDICATION

I would like to dedicate this thesis to my friends and family, especially my mother. I would not be where I am without your constant guidance and support. I love you.

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I would like to specifically thank Dr. Margaret Condrasky for her guidance, patience, and support throughout this project. You taught me so much these past couple of years and I know I will be very much prepared for my future career. I would also like to thank my committee members, Dr. McGregor and Dr. Sharp, for their guidance throughout this project. It was greatly appreciated. I would also like to thank Paul Leonard, the chef who helped teach this program. I could not have done it without you. I would also like to thank Dr. Griffin who helped with the qualitative analysis and the three graduate students, Mac, Zac, and Michele, who volunteered to analyze the focus group. Lastly, I would like to thank the food science undergraduate students who participated in the program. I could not have asked for a more enthusiastic and enjoyable group of students.

TABLE OF CONTENTS

Table of Contents (Continued)

Page

LIST OF TABLES

List of Tables (Continued)

Table Page

LIST OF FIGURES

CHAPTER ONE

REVIEW AND APPLICATION OF CURRENT LITERATURE RELATED TO THE NEED OF A BUDGET-TAILORED CUILNARY NUTRITION EDUCATION PROGRAM FOR UNDERGRADUATE FOOD SCIENCE STUDENTS

Abstract

This review provides evidence for the need of a budget-tailored culinary nutrition program for undergraduate food science students. Major issues that are addressed include the United States' current health crisis, culinary nutrition as a source of primary prevention, the significance of incorporating cost and budget with healthy eating, the role of nutrition among various health professionals, the significance of culinary knowledge for health professionals, current strives towards improving culinary nutrition knowledge for health professionals, a history of culinary nutrition programs, and a review of the social cognitive theory. Culinary nutrition programs are often examined using a social cognitive theory framework. Research shows that culinary nutrition knowledge as well as budget awareness is crucial for effective nutrition counseling for health professionals. Therefore, a budget-tailored culinary nutrition program for undergraduate food science students, who are pursuing health and health-related careers, is a preliminary effort to increase this knowledge in attempt for them to be effective nutrition counselors in their future careers.

Keywords: culinary nutrition, food budget, Cooking Matters at the Store, Cooking Matters, college student.

Introduction

This literature review examines the United States' current health and poverty crises and how culinary nutrition can serve as a means of primary prevention. One of the main causes for the health crisis is a change in the American lifestyle: consuming high amounts of convenience foods, foods eaten away from home, and SoFAS (solid fats and added sugars).[11,33] The United States currently spends only 3 percent of their Prevention and Public Health Funds on primary prevention methods.[44] Culinary nutrition, especially nutrition educators have been found to play a significant role in primary prevention.[18] Since 14.5 percent of American households claim to have some level of food insecurity, the need to incorporate budget with healthy eating is important.[8] Health professionals play a major role in promoting health and diet change. They must relay nutrition information to the general public in order to educate them as well as to "develop good practice and to act as role models."[5,18] Basic training in nutrition is essential for all health care professions in order to effectively assess dietary intake and provide appropriate guidance, counseling, and treatment to patients.[16] Evidence also indicates that patients are heavily interested in food price, foods that taste good, and foods that are healthy.[45] Therefore, the health professionals that these patients turn to must have a general understanding of all three of these concepts. This literature review elaborates on these topics and assesses the need of a budget-tailored culinary nutrition program for undergraduate food science students interested in pursuing health and health-related careers.

Defining Culinary Nutrition

Culinary nutrition is commonly defined as the combination of applying nutrition with the culinary arts in order to create both healthy and appealing meals to consumers. The purpose is to bridge the gap between culinary and nutrition fields in order to create a more cohesive curriculum as well as to stress the significance of how the knowledge of one is needed to fully understand and apply the other.[9]

The United States' Current Health Crisis

There has been a dramatic increase in the prevalence of diabetes among US adults. The belief that the life expectancy of the current child generation will be less than the adult generation is a plausible fear.[9] One of the greatest causes of this decreased life expectancy is the change in American lifestyle over the past forty years. For example, current Americans consume a high amount of convenience food and food eaten away from home compared to past generations, which is typically low in fiber and essential minerals as well as high in sodium and SoFAS (solid fats and added sugars).[11,33] Dietary guidelines recommend SoFAS should only represent a mere 5-15 percent of total daily calories. However, studies show that an average American consumes approximately 35 percent of their daily calories from SoFAS.[33] SoFAS consumption has heavily increased due to the increased amount of SoFAS products, prevalence of meals eaten away from home, as well as the amount of fast food restaurants. The increase in SoFAS consumption may be related to the increased obesity rates.[33] Obesity is a major driver of diabetes and other chronic diseases.

Health prevention methods have been considered a high priority for the United States government. The United States Department of Health and Human Services issued

a Prevention and Public Health Fund "for prevention, wellness, and public health activities including prevention research, health screenings, and initiative."[44] Covered by the Affordable Care Act, this fund aims "to provide for an expanded and sustained national investment in prevention and public health programs to improve health and help restrain the rate of growth in private and public health care costs." This funding will address various prevention methods, including obesity and tobacco use.[49] Approximately 2.25 billion dollars thus far have been used or allocated for prevention and public health activities.[1]

Culinary Nutrition and Primary Prevention Within the United States

The collaboration of chefs and physicians is a newer approach to the study of food and medicine. There has been growing evidence to support that food can prevent a myriad of diseases, such as obesity.[40] Statistics show that the United States spends only 3 percent of their allocated health care funds on primary prevention methods.[1] Primary prevention aims to prevent various diseases from occurring, reducing the incidence and prevalence of diseases.[22] Nutrition educators have been shown to play a significant role in primary prevention, especially within colleges and universities.[18] Culinary nutrition is typically taught by pairing nutrition educators with professional chefs.[43]

Chefs are currently becoming more involved in nutrition education in order to satisfy consumer demands as well as to fully understand the nutrition behind cooking.[36] Johnson and Wales University offers a bachelor's degree program in culinary nutrition to prepare entry-level culinarians for careers in the food industry and dietetic professions.[23] Johnson and Wales University has developed the new role of the Chef/Dietetic

Technician for the dietetic professional. This role is specific to those dieticians interested in entering the food service industry, such as chefs for professional sports teams, media communication specialists, roles in produce development and research test kitchens.[36]

Understanding culinary methods among health professionals has somewhat gone unseen, especially in recent years. Many health professionals, including dietitians, have focused on health and nutrition at the expense of pleasure and taste. Taste preference is an important component of individualizing nutrition advice. Taste has been labeled as one of the most satisfying and enduring bodily experiences.[21] According to the program, "Resetting the American Table," "In matters of taste, consider nutrition, and in matters of nutrition, consider taste. And in all cases, consider individual needs and preferences."[21]

The Importance of Incorporating Cost With Healthy Eating

A great deal of the United States' population faces poverty. In 2012, an estimated 14.5 percent of American households (17.6 million households) were found to experience food insecurity at some point during the year, including 5.7 percent of households with very high food insecurity.[8] In 2013, 59 percent of food insecure households reported to the World Hunger Education Service that they have participated in one or more of the following programs within the last month: Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), or the National School Lunch Program.[51] In 2013, approximately 47,636,000 families participated in SNAP, an amount that has doubled since 2003. In 2013, SNAP participants in South Carolina had an average monthly benefit of 131.47 dollars per person and 276.32 dollars per household. In 2013, approximately 8,633,000 families

participated in WIC and received a monthly benefit of 46.26 dollars per person.[35] A USDA report showed that the United States average weekly food cost per person is about 50 dollars or 200 dollars per month.[8]

Nutrition educators commonly face challenges teaching nutrition to low-income populations. However, it has been stressed that this population has a higher risk for obesity and other nutrition-related health problems due to lack of education and income.[46] Low-income children are shown to experience "at-risk" eating behaviors, increasing their likelihood for developing childhood obesity.[13] Thus, the need to effectively educate low-income children in proper nutrition is important. One study in particular used undergraduate nutrition students as nutrition educators for low-income children in a culinary nutrition camp. The camp focused on building confidence and motivation through acquiring cooking skills and nutrition knowledge. Results showed that the participants had positive improvements and reinforcements, indicating this age group can be affected by a culinary nutrition program.[13] Studies have shown that individuals within a low-income household, most commonly mothers, can experience nutritional deprivation.[30] Research shows that educating low-income populations about nutrition should be performed in a practical method, such as educating them how to use already bought produce in recipes and where to buy produce in their local area (i.e. farmers markets).[50]

Role of Nutrition Knowledge for Health Professionals and its Present Importance

Health professionals play a major role in promoting health and diet change. Health professionals must relay nutrition information to the general public in order to

educate patients as well as to "develop good practice and to act as role models."[5,14] Basic training in nutrition is essential for all health care professions in order to effectively assess dietary intake and provide appropriate guidance, counseling, and treatment to patients.[14] Nutrition and nutrition counseling have been established as key components for primary care physicians in the successful delivery of preventative services. However, there is a major gap between physicians' belief in nutrition significance and both their knowledge and counseling abilities.[5,27] Some physicians believe that advising patients about making positive lifestyle changes is daunting because they usually aren't trained to do it.[26] Research shows that the degree of nutrition training can depend both on the age and gender of the physician. One study showed that female physicians had significantly more positive attitudes towards nutrition therapy compared to male physicians.[37] Another study showed that 64 percent of physicians who were 45 years or younger claimed to have received nutrition training prior to practice whereas only 49 percent of physicians 45 years or older claimed to have the same level of training. More of the younger physicians claimed to have received their nutrition training during their residency while more of the older physicians claimed to have received more training during their actual practice (i.e. on the job training), which could be evidence to the increasing prevalence of nutrition education within pre-professional health schools.[27]

Another study was conducted to determine the level of nutrition knowledge among various health professionals, including dietitians, doctors, nurses, occupational therapists, psychologists, and speech therapists. The participants completed a questionnaire which asked them a myriad of nutrition-based questions, such as their

opinions about healthy food, their ability to give advice about healthy eating, the recommended alcohol intake for men and women, the recommended intake amounts of certain nutrients, and food rankings based on saturated fat content. In terms of knowledge of a balanced diet, the participants were asked whether it was better or worse to consume various nutrients (i.e. sugar, salt, fiber, starch, fat, and fruits and vegetables). These responses were then compared with those of non-health professional women from various social classes in order to evaluate the health professionals' knowledge levels compared to that of the general public. Results showed that there were similar knowledge levels between health professionals and the general public. However, health professionals proved to be less aware to increase starch in the diet, indicating they believe the general diet should be lower in fat, sugar, and starch. Results also showed that 34 percent of health professionals and 48 percent of the general public successfully ranked foods based on saturated fat intake, indicating nutrition education for health professionals on saturated fat may be inadequate.[5] In terms of healthy eating beliefs, 91 percent of health professionals agreed "healthy eating is enjoyable" and 27 percent agreed "the tastiest foods are the ones that are bad for you." Results also showed that 76 percent of health professionals agreed with the statement, "Giving advice about healthy eating is part of my job" and 72 percent agreed with the statement, "I would feel confident if I was giving advice about healthy eating."[5] Although these results show that health professionals have positive beliefs towards healthy eating, their level of nutrition knowledge is rather similar to that of the general public. Therefore, the results from this study pose the question that

nutrition education for physicians may not be sufficient enough to distinguish them from the general public or their patients.

There is a lack of evidence to support health care professionals' ability to effectively counsel and deliver nutrition knowledge to their patients. Nutrition counseling has been defined as helping individuals who have nutrition problems gain knowledge and/or motivation in order to make positive health changes.[14] One study showed that less than 50 percent of surveyed physicians routinely ask their patients about diet and exercise due to the physicians' overall lack of confidence with the subjects. 69 percent of the same physicians surveyed also stated that only 40 percent or less of their patients receive some form of nutrition counseling.[27] This leads one to consider that physicians may have certain barriers that prohibit them from relaying nutrition information to the general public. For example, research shows that those physicians who more frequently administer nutrition counseling have received larger amounts of nutrition education compared to those physicians who counsel less patients.[27]

In order to be an effective nutrition counselor, one must both instruct clients on the basic principles of nutrition and nutrition therapy as well as build a positive relationship with said patient in order to facilitate behavior change and enhance problem-solving skills.[14] One study showed that 68 percent of physicians spend roughly 5 minutes per session discussing diet with their patients while 2 percent of physicians don't bring up the subject at all.[27] Neither the public nor most health professionals understand the length of time required to bring about long-lasting changes in food habits and lifestyles.[14] However, 58 percent of these physicians who spend 5 minutes per session would like to

increase the amount of time with the subject.[27] Therefore, this shows there is evidence that physicians understand the importance of nutrition and have the desire to implement the subject material more in their counseling sessions. Another study evaluated sources of nutrition education from various health professionals. Results showed that participants stated the primary source of nutrition education for them was their physicians, while dietitians were ranked fifth.[45] Based on this evidence, nutrition knowledge and effective nutrition counseling is rather crucial for physicians.

Nurses also play a major role in educating the general public in terms of health promotion, disease prevention, and coordination of care. Since the nursing practice was established, nutrition has played a crucial nursing component in the proper service to patients. Before dietitians, nurses were responsible for serving food and liquid to patients. One study surveyed nurse educators and directors and found that 100 percent of undergraduate nursing programs and only 50 percent of graduate nursing programs believed their nutrition content to be sufficient. According to the National Council Licensure Examination for Registered Nurses (NCLEX-RN), student nurses are responsible for the knowledge of nutrition assessment and monitoring, diet therapy, and the methods of enteral and parenteral nutrition. Therefore, both basic and applied nutrition education is assumed of nurses as well as their ability to diagnose patients with imbalances or impaired abilities related to metabolism, ingestion, and hydration of fluid and electrolytes.[16]

Nutrition knowledge is essential in other health care professions, including pharmacy. The primary purpose of pharmacists is "to dispense medications to patients

and to offer advice of their safe use."[15] Pharmacists' direct role with nutrition therapy lies specifically with parenteral nutrition. Parenteral nutrition is a form of providing nutrients to patients via the veins in order to bypass the digestive system for various reasons (i.e. cancer, GI disorders, etc.). Pharmacists must ensure that the formula is stable, compatible, and sterile in order to be correctly and safely administered to the patient. According to the nutrition support pharmacist standards of practice provided by the American Society for Parenteral and Enteral Nutrition Support, pharmacists can provide nutrition assessments, patient care planning, initiation of therapy, monitoring, management of nutrition services, and advancement of nutrition care.[16] Pharmacists are also entitled to provide consultation services for nutrition management of diabetes, cardiovascular disease, obesity, etc. Therefore, pharmacists must understand nutrition principles as part of their profession. Present nutrition education for pharmacists in preparation for pharmacy school (i.e. undergraduate coursework) consists of nutrition, nutrition assessment, and parenteral nutrition. Nutrition education in pharmacy school may then be composed of enteral nutrition and formula intolerance. However, research shows that nutrition education in pharmacy schools may only be offered if there is available faculty, inferring that the subject is not a priority.[16]

Dentists also must have sufficient knowledge of a healthy diet since there is a strong correlation between diet and oral care.[16] For example, proper diet can enhance teeth mineralization, structure formation, salivary flow rate, and resistance to oral infections. Certain problems with the oral cavity (i.e. missing teeth) can also vastly affect the diet and nutrients consumed. Research shows that there is a wide gap between the

acknowledgement of nutrition and its effects on oral care and the implementation of said knowledge in effectively diagnosing and counseling patients based on their nutritional issues. One study showed that a majority of dentists were motivated to provide patient clinical care but felt they were not fully equipped with the knowledge to do so.[16] According to the Commission on Dental Accreditation and the American Dental Education Association (ADEA), there is currently not an established nutrition education requirement for dental students but rather is understood as necessary knowledge for "the application of biomedical science knowledge in the delivery of patient care" and "health promotion and disease prevention." Regardless, nutrition education is currently not mandatory for dental students. A 2011 study that surveyed 29 dental schools showed that there was an average of 15.9 curriculum hours of didactic nutrition and did not include applied nutrition.[16]

A registered dietitian (RD) is a professional food and nutrition expert who has met the minimum academic and professional requirements based on the Academy of Nutrition and Dietetics (AND).[42] Registered dietitians consistently have to translate nutrition science into food choices.[5] Academic requirements include a bachelor's degree with coursework approved by the Academy's Accreditation Council for Education in Nutrition and Dietetics (ACEND), such as food and nutrition sciences, foodservice systems management, business, economics, computer science, sociology, biochemistry, physiology, chemistry, and microbiology. Individuals also must complete an accredited, supervised, experiential practice program at a health-care facility, community agency, and foodservice corporation as well as pass a national examination administered by the

Commission of Dietetic Registration (CDR). The individual then must continue to complete professional education requirements to maintain licensure.[42] If desired, registered dietitians can obtain supplemental certifications through the CDR in specialty areas, such as pediatric, renal, or diabetes nutrition. Work settings for registered dietitians include hospitals, HMOs, private practice facilities, community and public health care facilities, food industry, journalism, business, sports nutrition, and corporate wellness programs.[42]

According to the 2012 Standards for Dietitian Education Programs established by the ACEND, there are a myriad of established core knowledge and competencies for the RD. This criteria falls within the scientific and evidence base of practice, professional practice expectations, clinical and customer services, practice management and use of resources, and support knowledge. A major competency for RD education is the ability to perform the Nutrition Care Process, which includes assessing the nutritional status of individuals in a variety of settings; diagnosing nutritional problems based on said assessments in order to create problem, etiology, signs and symptoms (PES) statements; plan and implement nutrition intervention programs by creating a nutrition prescription and goal(s) based on the nutrition diagnosis; monitor and evaluate problems, etiologies, signs and symptoms, and the impact of the interventions; complete documentation that follows the professional guidelines required by health care systems and the practice setting.[42] A recent study was conducted in order to determine the level of nutrition education taught within accredited curriculum for undergraduate dietetic students. The Commission on Accreditation typically certifies the dietetic curriculum for Dietetics

Education. The results from this study showed that 53 percent of programs surveyed offer specific courses in nutrition education, mostly in the freshman (31 percent) and sophomore (58 percent) years.[39] Other respondents stated that nutrition education is taught within the curriculum of multiple other required courses or within courses in different departments (rather than its own specific course). A majority of the respondents, however, stated they require their students to conduct nutrition education sessions (94 percent), write behavioral objectives (87 percent), develop educational materials (86 percent), and evaluate nutrition education sessions (81 percent). Only 34 percent of the accredited programs stated they were "very satisfied" with their student's nutrition education experiences while a majority (54 percent) stated "somewhat satisfied." Those who stated "somewhat satisfied" based their satisfaction on quality of experiences, inadequate time and resources, need for improvement of projects, need to reevaluate and update course content, and need for a course dedicated to nutrition education.[39] Therefore, nutrition education for undergraduate dietetic students has some room to grow.

Not only is it essential that all health care professionals understand and counsel basic nutrition to patients, but they all must be synchronized in a matter where the information is reinforced across all specialty areas.[16] For example, referrals from primary care providers to dietitians are crucial in order to elaborate and extend nutrition counseling. One study showed that 87 percent of the physicians who provided nutrition counseling stated they provide referrals post nutrition counseling, including dietitian outside the office referrals (51 percent), office nurse referrals (34 percent), or office dietitian referrals (27 percent).[27] This concept of "interprofessionality" is defined as a

process in which a myriad of professionals synthesize ways of practicing that provides "an integrated and cohesive answer to the needs of the client, family, and populations."[27]

The Importance of Culinary Knowledge for Health Professionals

It has been established that physicians, especially family doctors, must have an in-depth understanding of nutrition education. The van Dillen study evaluated common conversation topics of patients in social environments.[45] Results showed that the most common conversation topics (in decreasing order) were tasty food, healthy food, price of food, and balanced food.[45] This evidence indicates that patients are heavily interested in food price, foods that taste good, and foods that are healthy. Therefore, the health professionals that these patients turn to must have a general understanding of all three of these concepts.

Not only must dietitians have an in depth understanding of nutrition and its proper delivery to patients, but they also must have a foundational knowledge of food and food systems. They must possess a variety of skills in order to compete with culinary experts and hospital food professionals, such as food marketing, a basic understanding of the culinary arts, menu development, and foodservice management.[29] The understanding of culinary skills currently stands as a competency under "Support Knowledge." According to the standards, course content must include principles of food science and food systems, techniques of food preparation and application to the development, modification and evaluation of recipes, menus and food products acceptable to diverse groups.[42] Therefore, dietitians have both nutrition and culinary skill competencies they must fulfill in order to become licensed and practicing in the field. One of the American Dietetic Association's

dietetic practice groups is the Food and Culinary Professionals Group (FCP), which strives to increase food and culinary skills within the ADA and enhance their ability to make food choices that will impact the nutritional status of the public.[31] According to renowned chef Julia Child, "it is essential that every dietitian and nutritionist also be a reasonably good cook, and that the culinary arts be a fundamental part of their curriculum."[6] In 2007, a report from the Phase 2 Future Practice and Education Task Force identified practice roles for Registered Dietitians in 2017. The task force determined that future roles for RD's would require "expertise in food preparation, product development and research, and foodservice management opportunities."[6]

Past research has shown that food courses have played a less significant role in undergraduate dietetics education. Especially among clinical nutrition, priorities are set on understanding nutrients instead of food.[29] This distinction between foodservice and nutrition began in the 1930's, when more dietetic opportunities emerged outside the field of foodservice. By 1935, three precursor tracks of dietetics were established: a hospital course, an administrative course, and a community course; these eventually evolved into the three distinct areas today: clinical, community, and foodservice.[25] According to Ellie Krieger, MS, RDN, dietitians over time swapped their aprons for lab coats. Although this had many positive effects in terms of science advancements, dietitians lost their connection with food and cooking.[25] A study was done where directors of undergraduate dietetics program were asked to rank their believed level of importance for food courses and culinary training courses. Results showed that there was a higher average level of importance for food courses compared to culinary courses. The average rating of food

courses, on a Likert scale of 1-5 (1: no importance to 5: very high importance), was 4.3. The average rating of culinary courses was 3.3.[29] Increasing the level of food courses within the undergraduate dietetics curriculum is essential in order to properly develop food preparation and menu planning skills.[29] By increasing the amount of food courses and culinary courses, future dietitians can provide effective nutrition counseling.[29]

Current Strives toward Improving Culinary Nutrition Knowledge and Practice among Health Professionals

Many health professionals share the misconception with the general public that healthy food and cooking is difficult, time-consuming and lacks taste.[26] According to registered dietitian Barbara Olendzki, "When physicians are recommending a dietary change to a patient, often it is seen as something depriving…we want to get them excited and to see it as an opportunity."[26] Therefore, there have been some recent positive changes in increasing culinary nutrition knowledge and self-efficacy of practicing culinary nutrition among health professionals. For example, Harvard's Medical School has partnered with the Culinary Institute of America in an annual conference called "Healthy Kitchens, Healthy Lives." This gathering bridges nutrition science, healthcare, and the culinary arts in order to deliver the most recent advances in knowledge for all health professionals.[20] Every year for about four days, over 400 health professionals (physicians, registered dieticians, nutritionists, educators) attend to hear lectures taught by culinary professionals, such as restaurant chefs and cookbook authors.[28,40] These lectures include topics such as connecting the consumption of whole grains to lowering blood glucose levels, the use of legumes in cooking, vegetables and spices in healthy

menu planning, as well as selection, purchase, and preparation strategies and techniques for healthy foods and healthy cooking. Attendees have stated that the lectures are very hands-on, allowing them to cook as well as savor the meals under the guidance of "some of the most masterful chefs in America."[28] Dr. Robert Graham, an attendee of the conference, stated, "Many of us (clinicians) talk the talk when it comes to eating right, but we don't walk the walk."[26] David Eisenberg, co-founder of the conference as well as a professor of medicine at Harvard's School of Public Health states, "Most of these clinicians don't know cooking skills…they barely know how to hold a knife." Eisenberg is a strong believer of the use of food as a method of helping prevent illness or manage illness that has already occurred.[40] This program reaffirms that health professionals, specifically primary physicians, are leaders for behavioral change to their patients.[2] The topics taught at this conference serve the purpose to help train health professionals in changing the way they counsel their patients in order to change their patients' views of food and nutrition.[40]

Testimonials from health professionals who have attended the conference support that belief. According to attendee Dr. La Puma, "There's nothing like experiencing it (cooking healthy foods) before you can talk about it." She claimed the hands-on classes from the conference increased her counseling methods to help patients make positive lifestyle changes.[26]

History of Culinary Nutrition Programs

A myriad of culinary nutrition education programs have been implemented for adolescents and adults in order to increase the knowledge of both basic culinary nutrition

methods as well as the need to combine both in order to achieve healthier eating. For example, Pennsylvania State University offers a summer camp program called *Cook Like a Chef!,* which teaches healthy cooking and eating to male and female adolescents aged 11-13. The program focuses on fruit and vegetable preparation and consumption, basic food nutrition, use of seasonings for flavor, basic cooking techniques and creating recipes, as well as physical activities to improve fitness.[7]

Another program, *Cooking With a Chef* (CWC) is a hands-on nutrition education program collaboratively taught by a trained chef and nutrition educator. The program focuses on three main core goals: to increase vegetable and fruit consumption, to increase the occurrence of and confidence in at-home meal preparation, and to decrease the use of salt in cooking by the increase use of herbs and spices.[10] Research has shown the program to positively build cooking self-efficacy and increase accessibility of vegetables and fruit at home.[10] The program's unique use of a nutrition educator and trained chef allows for an enhanced delivery of healthy cooking.

The CWC program has been offered to parents, church cooks, food service operators, and college-aged students to promote healthy lifestyles. The curriculum was taught to college students because as a whole they tend to have low activity levels and poor eating habits. The program included the five CWC topics taught by both a trained chef and nutrition educator: "Make Menu Planning Easy," "Color the Plate with Vegetables and Fruits," "Vegetables and Fruits for a Week," "Flavor and Nutrition on the Menu," and "Get Savvy in the Supermarket." These topics were chosen in order to increase the students' knowledge about menu planning, food purchasing, food

preparation, and food consumption behaviors.[47] Within these sessions, the students had opportunities to practice knife skills, basic cooking methods, tips to incorporate whole grains into meals, flavor combinations to enhance taste but keep sodium intake at a minimum, and how to increase variety when menu planning. Under the guidance of the chef, the students prepared various recipes that exemplified the culinary skills and nutrition knowledge taught in the program.[47] There was a questionnaire to evaluate cooking and nutrition knowledge and included eight different scales: Availability and Accessibility of Fruits and Vegetables (AAFV), Cooking Attitudes (CA), Cooking Behaviors (CB), Self-Efficacy of Produce Consumption (SEPC), Cooking Self-Efficacy (SEC), Self-Efficacy for Using Basic Cooking Techniques (SECT), Self-Efficacy for Using Fruits, Vegetables, and Seasonings (SEFVS), and Knowledge of Cooking Terms and Techniques (SCORE). Subjects took the same questionnaire both before and after the program. Results show that those who underwent the program had significant increased post-test scores in the SEC, SECT, SEFVS, and SCORE scales, indicating the subjects showed an increase in self-efficacy of overall cooking, using basic cooking methods, and using fruits, vegetables, and seasonings in cooking.[48] These results indicate that CWC increased the beliefs among college-aged students that they understood and could cook meals using basic cooking techniques and healthier ingredients.

Knowledge of dietary guidelines has been proven to affect eating habits among college students. A study proved that those who had a greater knowledge of current dietary guidelines consumed more fruits and whole grain and less protein and dairy. Overall, college students who indicated to have greater food and nutrition knowledge

made healthier choices.[24] Studies have shown that maintaining a healthy diet by following specific dietary recommendations may also be related to cooking skills. For example, increasing culinary skills can increase kitchen self-efficacy, food preparation knowledge, nutrition knowledge, general cooking interest, as well as consumption of vegetables and fruits. The idea of combining nutrition with developing foods and recipes has begun to increase due to the high frequencies of eating out and of the consumption of energy dense foods and large portion sizes.[11]

Cooking Matters at the Store is another program founded by *Share Our Strength's No Kid Hungry* campaign with a purpose to end child hunger in America. Founded in 1984, the campaign has a network of partners, including private citizens, government officials, and business leaders that collaborate on methods to provide healthy foods to low-income families.[38] *Cooking Matters at the Store* (formerly *Shopping Matters*), a branch of *Cooking Matters*, has trained volunteers give 1.5 hour grocery store tours to low-income families that focus on four key food skills: reading food labels, comparing unit prices, finding whole grain foods, and identifying three ways to purchase produce. At the end of the tour, there is a 10 dollar Challenge activity, where participants use the skills they just learned to buy a healthy meal for a family of four, for under 10 dollars. These topics and activity help adults and WIC parents feel empowered to buy healthy food on a budget. The participants receive a handout that includes the discussed topics in greater detail, healthy recipes, and shopping tips, as well as a reusable grocery bag, and 10 dollars worth of healthy groceries.[38]

The volunteer leaders for the *Cooking Matters at the Store* program must complete an online training with various modules, self-assessments, and a final assessment, as well as order tour materials, recruit participants for the tour within the community, form a partnership with a local grocery store to host the tour, and report back to Share Our Strength after the tour by returning participant surveys and tour reporting forms. Once the leaders complete the initial online training, Share Our Strength provides on-going online training, participant booklets with tips and recipes, reusable grocery bags, tour leader flipbooks and planning guides to assist the leaders both before and during their tours, and template recruiting flyers and communication materials to serve as examples for the leaders.[38]

Cooking Matters at the Store has had a myriad of positive impacts. According to a 2013 evaluation of *Cooking Matters at the Store*, the number of participants comparing food labels doubled from pre- to post-assessment. Other results from the evaluation stated there was over a 30 percent increase in the number of participants who were comparing unit prices, shopping for whole grains, and reading nutrition facts labels from pre- to post-assessment. 89 percent of surveyed participants stated saving money on food purchases post program. The focus group from this evaluative study showed participants to indicate high degrees of satisfaction with the program and self-efficacy to change their shopping habits.[32] Other results include after attending the program, 75 perfect of tour facilitators agreed that "most" participants demonstrated proficiency in the skills discussed, 63 percent of participant graduates intend to read the ingredient lists to find whole grain products, 58 percent of participant graduates intend to compare unit prices in

order to find the best deal, 58 percent of participant graduates intend to compare food labels to make healthy choices, 88 percent of WIC participant graduates are very or completely confident in their ability to make the most of WIC fruit and vegetable vouchers, and 85 percent of WIC participant graduates are very or completely confident in their ability to identify WIC foods at the grocery store.[32,34]

Recent research has suggested that the consumer food environment may be heavily influenced by prices and marketing rather than health and nutrition.[18] A study was conducted to evaluate the potential relationships between food consumer environment and neighborhood environment, food prices, dietary patterns, and BMI. This study analyzed 47 pre-published papers that conducted food store audits in various countries and neighborhood settings. One previous study used found that lower priced fruits and vegetables lead to lower BMI rates in the area, indicating that price influences produce purchase rather than nutrition.[19] This could potentially support the belief that the general public potentially values food price over food nutrition. The overall study showed there is a need for interventions and education programs in which collaboratively address food purchasing habits and diet. An example of a female weight loss intervention discussed within the study proved this collaborative program to decrease both perceived and real barriers to purchasing fruits and vegetables, increasing their intake of fruits and vegetables regardless of their limited access to produce.[19] The success of this intervention supports the belief that consumer beliefs and self-efficacy towards produce consumption can be positively changed through nutrition and food purchasing education.

As of recently, Cooking Matters at the Store has been implemented in Sodexo's Dietetic Internship curriculum. Phyll Ribakoff, Internship Associate Director of Sodexo's Distance Education Dietetic Internship, is the main advocate of promoting *Cooking Matters at the Store* to the interns. According to Ribakoff, she has been involved with Cooking Matters from the beginning. She taught *Cooking Matters* and led tours on her own before coming to Sodexo, where she thought the dietetic interns would benefit from the *Cooking Matters at the Store* program. She believed the program would serve as a good method for dietetic interns to increase their community involvement as well as increase awareness of community hunger among the interns. She claims it is important to make future dieticians aware that hunger poses an issue (P. Ribakoff, personal communication, June 10, 2014).

Sodexo sponsors five dietetic internships, including the distance program, Mid-Atlantic program, Allentown, PA program, NY/Philadelphia program, and the Southcast, MA program.[41] According to Ribakoff, 81 percent of the total current Sodexo dietetic interns are completing the Cooking Matters at the Store program. This 81 percent includes 100 percent of the dietetic interns completing the distance internship. Ribakoff claims that due to her close involvement with the distance interns, the program is a requirement for the distance internship. However, the program remains optional for the four other programs. Due to the *Cooking Matters at the Store*'s success, it will return for a second year as well as serve as a requirement for the distance internship and a few of the other Sodexo internships (P. Ribakoff, personal communication, June 10, 2014).

Ribakoff believes Cooking Matters at the Store plays an important role in the internship curriculum. She believes being a tour guide is an essential tool for interns as well as any type of (nutrition) counseling (personal communication, June 10, 2014). The information covered in *Cooking Matters at the Store* is mirroring current trends. There is an increasing prevalence of registered dieticians in the supermarket setting due to their ability to reach the general public and affect their food decisions. According to highlights from the 2012 Food and Nutrition Conference and Exposition, produce is being promoted by stressing the mixing of fresh and local with canned and frozen. This method decreases the produce cost while still optimizing nutrition.[17] Thus, evaluating cost along with health is prevalent today.

Social Cognitive Theory

The Social Cognitive Theory (SCT) is a complex theoretical framework developed by Albert Bandura and states causation is a result from a combination of environmental events, personal factors, and behavior.[4] SCT highlights human thought and actions are heavily influenced by the interaction of these factors aka triadic reciprocal determinism.[4] SCT includes various constructs, such as environment, observational learning, enactive learning, social diffusion and innovation, incentive motivators, self-regulatory mechanisms, and self-efficacy.[3,4]

Demonstrations through observational learning provide resources for the subjects to use when applying and teaching the curriculum in the future (both for themselves and future patients). By observing the performance of others, subjects can acquire cognitive skills and new patterns of behavior.[4] Enactive learning can provide information on how

one's own behavior must be to produce a desired outcome, provide environmental predictors, and potentially strengthens automatic responses.[4] Promoting the importance of certain knowledge and its societal and self-applicability can heavily influence personal change. Incentive motivators provide outcome expectations, which increase the likelihood of certain courses of action. These expected outcomes also provide self-direction and self-motivation as well as increases self-involvement to produce the desired effect.[4]

Self-efficacy has been identified by Bandura as potentially the most influential self-knowledge aspect in peoples' everyday lives.[3,4] Self-efficacy can be developed from four main sources of influence: "mastery experiences," "vicarious experiences," "social persuasion," and "somatic and emotional states."[3,4]

Table 1.1: Social Cognitive Theory Constructs and Their Application to the Pilot Study Program

SCT Construct	Definition	Application in Program
Environment	External elements of one's surroundings.	1. Program uses common ingredients and cooking instruments for cooking demos. 2. Local grocery store is used for tour where most participants regularly visit. 3. Nutrition educator and chef promote regular discussions to learn about use of produce and whole grains, and knowledge of seasonings and cooking methods in participants' homes.
Observational Learning	New patterns of human behavior and cognitive skills learned by observation through modeling.	1. Participants observe the professional chef and peers demonstrate knife skills and various cooking techniques. 2. Participants observe nutrition educator demonstrate volumetrics, portion size vs. serving size, MyPlate meal planning, and methods to

		purchase healthy food on a budget.
Enactive Learning	Learning from the outcomes of one's own actions via the environment and informative feedback.	1. Participants prepare meals by chopping, measuring, and mixing ingredients. 2. Participants complete out-of-class assignments to construct their own meals using the MyPlate model and recommended amounts of fruits, vegetables, and whole grains. 3. Participants receive informative feedback from the nutrition educator, chef, and project advisor during nutrition discussions and the chef during cooking activities.
Social Diffusion and Innovation	The acquisition of knowledge (i.e. modeling) concerning the innovation and adoption of that innovation into practice.	1. The nutrition educator informs the participants of various health problems in the United States (i.e. the prevalence of obesity, diabetes, heart disease) and how they can be affected by proper dietary habits. 2. During the cooking and nutrition demonstrations, participants are constantly reminded of the applicability and prevalence of the knowledge taught to their future health or health-related professions (i.e. relayed to their future patients).
Outcome Expectations	A judgment of the likely consequence a certain behavior will produce.	1. Culinary nutrition and healthy shopping on a budget is presented as simple and enjoyable ways to improve optimal health while keeping costs at a minimum.
Incentive Motivators	A degree of worth placed on certain behavioral outcomes, providing motivation to promote said outcomes.	1. The program highlights self-evaluative incentives that reward personal efficacy, such as level of progress and feedback. 2. Participants are able to view their skill progress by continuing to perform

		cooking techniques and practice nutrition knowledge with assignments and on their own and receive constructive feedback both from the chef and nutrition educator.
Self-Regulatory Mechanisms	Self-regulation of behavior based on internal standards and self-incentives.	1. Participants are encouraged to prepare meals using the MyPlate model, recommended amounts of fruits, vegetables, and whole grains, seasonings other than salt, and methods for purchasing healthy food on a budget knowing these methods will help them to eat healthy and save money.
Self-Efficacy	Belief and confidence in one's own capabilities to produce a desired effect.	1. Participants prepare a component of the final meal for the group using information and skills learned during the program. 2. Participants complete at-home assignments about nutrition knowledge taught in class. 3. Participants complete various activities during the grocery store tour to highlight understood knowledge.

Conclusions and Benefits of a Budget-Tailored Culinary Nutrition Education Program for Undergraduate Students

Nutrition educators have been shown to play a significant role in primary prevention, especially within colleges and universities.[18] A budget-tailored culinary nutrition education program for undergraduate students would help these future health professionals by combining nutrition knowledge with culinary skills as well as address the issue of buying healthy food on a budget. Undergraduate students who desire to pursue health-related careers must have an especially strong knowledge of nutrition and its application. In order to be effective nutrition educators, undergraduate students must develop an advanced background in nutrition as well as strong communication skills.[15]

Both of these are prioritized in a budget-tailored culinary nutrition education program: the opportunity for future health professionals to learn nutrition in a culinary and cost-effective manner, thus providing tools to effectively tailor and educate future patients about nutrition.

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CHAPTER TWO

THE EFFECTIVENESS OF A PILOT STUDY BUDGET-TAILORED CULINARY NUTRITION EDUCATION PROGRAM ON UNDERGRADUATE FOOD SCIENCE STUDENTS

Abstract

Objective: This pilot study describes the effectiveness of implementing a combined budget-tailored culinary nutrition program on undergraduate food science students, in terms of knowledge, attitudes, and self-efficacy as well as applicability to everyday life and future health careers. This pilot study also analyzed the reliability and components of the questionnaire developed specifically for this pilot study.

Design: This pilot study followed a semi-crossover design. Two out of the four groups served as both the treatment and the control. Two groups completed the program during the first six weeks of the semester while the other two groups served as the control. The control groups then received the program during the second six weeks of the semester. The first five weeks of the program consisted of information from *Cooking With a Chef*, collaboratively taught by the nutrition educator and chef. The last week of the program consisted of information from *Cooking Matters at the Store*, where the nutrition educator led a grocery store tour for the participants. The participants completed three questionnaires. Two of the questionnaires were administered as a pre- and post-questionnaire: a validated *Cooking With a Chef* questionnaire and a questionnaire developed specifically for this pilot study. The *Cooking With a Chef* questionnaire evaluated availability and accessibility of produce, cooking attitude, cooking behavior,

produce consumption self-efficacy, cooking self-efficacy, self-efficacy of using basic cooking techniques, self-efficacy of using fruits, vegetables, and seasonings, and knowledge of cooking terms and techniques. The pilot study questionnaire evaluated the participants desire to participate in the program and belief of the program's applicability in the everyday life and future career settings. The third questionnaire was the Cooking Matters Tour Facilitator Online Training assessment and administered as a one-time post-questionnaire, which evaluated knowledge in purchasing healthy food on a budget. A focus group was administered at the end of the second six-weeks and consisted of eight randomly selected participants.

Setting: The first five weeks of the program was administered in the Clemson University Food Science, Nutrition, and Packaging Sciences demonstration kitchen. The last week of the program was administered in the local grocery store Publix, with permission from the store manager.

Participants: Participants were recruited from flyers displayed throughout Clemson University's Poole and Agriculture building, and two nutrition classes offered through Clemson University's Food Science, Nutrition, and Packaging Sciences Department. Participants were randomly divided into four groups of similar sizes (13 to 14 participants in each).

Analysis: Statistical analysis was performed on the data from all three questionnaires to determine differences within and between groups. Each scale in the *Cooking With a Chef* pre- and post-questionnaire was analyzed individually. Frequencies of responses were computed for the one-time post-questionnaire and compared to past score results from

Adult Grassroots Tour Leaders who completed the *Cooking Matters at the Store* online leader training. A reliability test was performed on the pilot study questionnaire. The pilot study questionnaire also underwent a factor analysis procedure. From there, the factors were analyzed from the pilot study pre- and post-questionnaire. The focus group was analyzed using a qualitative analysis procedure.

Results: There were significant differences between the treatment groups and control group in Cooking Self-Efficacy ($p=0.0024$), Self-Efficacy for Using Basic Cooking Techniques ($p=<0.0001$), Self-Efficacy for Using Fruits, Vegetables, and Seasonings ($p=<0.0001$), and the ability to use economical methods to purchase low-cost produce and identify different forms of produce ($p=<0.0001$). For the one-time administered questionnaire, the participants received an average score of 89.44 percent, which included information from the *Cooking Matters at the Store* portion. Based on the reliability procedure for the pilot study questionnaire, 13 of the 15 items were classified with moderate-high reliability. Based on the factor analysis for the pilot study questionnaire, five factors were established. Participant responses from the focus group included how the program was a positive change from other mandatory courses, reaffirmed or increased interest in their major(s), applied both to their everyday life and future career, as well as suggestions for the program's improvement.

Conclusions and Implications: This pilot study demonstrates preliminary results of the effects of combining culinary nutrition information with budget and price concepts to deliver to undergraduate food science students. The significance of understanding both is crucial in order to effectively deliver nutrition counseling to patients of all different

demographics. Additional testing and modification could be performed on the curriculum as well as the pilot study questionnaire in order to effectively relate the instrument to the program and improve the instrument's reliability.

Key Words: culinary nutrition, food budget, Cooking Matters at the Store, Cooking Matters, college student, nutrition.

Introduction

There has been a dramatic increase in the prevalence of diabetes among US adults. The belief that the life expectancy of the current child generation will be less than the adult generation is a plausible fear. One of the greatest causes of this decreased life expectancy is the change in American lifestyle over the past forty years. For example, current Americans consume a high amount of convenience food and food eaten away from home compared to past generations, which is typically low in fiber and essential minerals as well as high in sodium and SoFAS (solid fats and added sugars).[13,28] Dietary guidelines recommend SoFAS should only represent a mere 5-15 percent of total daily calories. However, studies show that an average American consumes approximately 35 percent of their daily calories from SoFAS.[28]

The collaboration of chefs and physicians is a newer approach to the study of food and medicine. There has been growing evidence to support that food may prevent certain diseases.[33] Statistics show that the United States currently spends only 3 percent of their allocated health care funds on primary prevention methods.[2] Primary prevention aims to prevent various diseases from occurring, reducing the incidence and prevalence of diseases.[23] Nutrition educators have been shown to play a significant role in primary

prevention, especially within colleges and universities.[21] Culinary nutrition is typically practiced by pairing nutrition educators with professional chefs.[35]

Understanding culinary methods among health professionals has somewhat gone unseen, especially in recent years. Many health professionals, including dietitians, have focused on health and nutrition at the expense of pleasure and taste. Taste preference is an important component of individualizing nutrition advice. Health professionals play a major role in promoting health and diet change. Health professionals must relay nutrition information to the general public in order to educate patients as well as to "develop good practice and to act as role models."[5] Basic training in nutrition is essential for all health care professions in order to effectively assess dietary intake and provide appropriate guidance, counseling, and treatment to patients.[19]

There is a lack of evidence to support health care professionals' ability to effectively counsel and deliver nutrition knowledge to their patients. One study showed that less than 50 percent of surveyed physicians routinely ask their patients about diet and exercise due to the physicians' overall lack of confidence with the subjects. 69 percent of the same physicians surveyed also stated that only 40 percent or less of their patients receive some form of nutrition counseling.[25] This leads one to consider that physicians may have certain barriers that prohibit them from relaying nutrition information to the general public. Another study evaluated common conversation topics of patients in social environments. Results showed that the most common conversation topics (in decreasing order) were tasty food, healthy food, recipes, diet, price of food and balanced food.[36] This evidence indicates that patients are heavily interested in food price, foods that taste good,

and foods that are healthy. Therefore, the health professionals that these patients turn to must have a general understanding of all three of these concepts.

A great deal of the United States' population faces poverty. In 2012, an estimated 14.5 percent of American households (17.6 million households) were found to experience food insecurity at some point during the year, including 5.7 percent of households with very high food insecurity.[11] In 2013, 59 percent of food insecure households reported to the World Hunger Education Service that they have participated in one or more of the following programs within the last month: Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), or the National School Lunch Program.[42] In 2013, approximately 47,636,000 families participated in SNAP, an amount that has doubled since 2003. In 2013, approximately 8,633,000 families participated in WIC.[29]

Nutrition educators commonly face challenges teaching nutrition to low-income populations. However, it has been stressed that this population has a higher risk for obesity and other nutrition-related health problems due to lack of education and income.[37] Thus, the need to effectively educate low-income children in proper nutrition is rather high. Research shows that educating low-income populations about nutrition should be performed in a practical method, such as educating them how to use already bought produce in recipes and where to buy produce in their local area (i.e. farmers markets).[40]

Cooking with a Chef (CWC) is a hands-on nutrition education program collaboratively taught by a trained chef and nutrition educator. The program focuses on three main core goals: to increase vegetable and fruit consumption, to increase the

occurrence of and confidence in at-home meal preparation, and to decrease the use of salt in cooking by the increase use of herbs and spices.[12] Research has shown *Cooking With a Chef* to positively build cooking self-efficacy and increase accessibility of vegetables and fruit at home.[12] The program's unique use of a nutrition educator and trained chef allows for an enhanced delivery of healthy cooking.

Cooking Matters at the Store is a program founded by Share Our Strength's No Kid Hungry campaign with a purpose to end child hunger in America. Founded in 1984, the campaign has a network of partners, including private citizens, government officials, and business leaders that collaborate on methods to provide healthy foods to low-income families.[32] *Cooking Matters at the Store* (formerly *Shopping Matters*), a branch of *Cooking Matters*, has trained volunteers give 1.5 hour grocery store tours to low-income families that focus on four key food skills: reading food labels, comparing unit prices, finding whole grain foods, and identifying three ways to purchase produce. At the end of the tour, there is a 10 dollar Challenge activity, where participants use the skills they just learned to buy a healthy meal for a family of four, for under 10 dollars. These topics and activity help adults and WIC parents feel empowered to buy healthy food on a budget. The participants receive a handout that includes the discussed topics in greater detail, healthy recipes, and shopping tips, a reusable grocery bag, and 10 dollars worth of healthy groceries.[32]

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SCT highlights that human thought and actions are heavily influenced by the interaction of these factors aka triadic reciprocal determinism.[4] SCT includes various constructs, such as environment, observational learning, enactive learning, social diffusion and innovation, incentive motivators, self-regulatory mechanisms, and self-efficacy. Self-efficacy has been identified by Bandura as potentially the most influential self-knowledge aspect in peoples' everyday lives.[3,4] Self-efficacy can be developed from four main sources of influence "mastery experiences," "vicarious experiences," "social persuasion," and "somatic and emotional states."[3,4]

Research Questions

The primary objective of this pilot study was to test the effects of combining two previously tested programs, *Cooking With a Chef* and *Cooking Matters at the Store*, in order to evaluate whether cooking attitude and behavior, produce use and consumption self-efficacy, cooking self-efficacy, knowledge of cooking terms and techniques, and knowledge of purchasing healthy foods on a budget are more positively affected compared to each program alone. The secondary objective was to determine the reliability of the questionnaire, "Readiness and Desire to Participate in Cooking with a Chef and Shopping Matters," which was created specifically for this pilot study. The tertiary objective was to conduct a factor analysis on the "Readiness and Desire to Participate in Cooking with a Chef and Shopping Matters" questionnaire. The quaternary objective of this research study was to determine the applicability of the program on the undergraduate food science students' future health-related careers. The following questions outline the objectives of this research study in research question format:

1. What are the effects of combining the *Cooking with a Chef* and *Cooking Matters at the Store* curriculums into one program on the following categories?

Cooking Attitude and Cooking Behavior scales

Produce Consumption, Cooking, Using Basic Cooking Techniques, and Using Fruits, Vegetables, and Seasonings Self-Efficacy scales

Availability and Accessibility of Fruits and Vegetables Index

Knowledge of Cooking Terms and Techniques Evaluation

Cooking Matters Tour Final Assessment

2. What is the reliability of the "Readiness and Desire to Participate in Cooking with a Chef and Shopping Matters" questionnaire via a test-retest reliability procedure?

3. What are the main factors within the "Readiness and Desire to Participate in Cooking with a Chef and Shopping Matters" questionnaire via a factor analysis procedure?

4. Is a combined culinary nutrition and healthy eating on a budget program beneficial for undergraduate food science students in preparation for their health-related careers?

Methodology

Introduction

This pilot study was approved by the Institutional Review Board in the Office of Research Compliance for Human Studies Research at Clemson University. The participants were recruited from the Food Science major, which consists of two concentrations: Nutrition and Food Technology. The participants for this study were recruited by posting flyers about the Spring 2014 Culinary Nutrition Creative Inquiry program throughout the Poole and Agriculture building as well as promoting the program

to undergraduate students in a nutrition class for Food Science and Nutrition majors (NUTR 4510) and in a nutrition class for non-majors (NUTR 2160), both of which were offered through the FNPS Department at Clemson University. Students were informed about the program via written and verbal communication. The students were informed that the program would have both a nutrition educator and a trained chef collaboratively teaching healthy menu options, creative ways to add vegetables and fruit, ways to develop healthy flavor, nutrition in the kitchen, and how to shop healthy on a budget. The students were also informed the program would include information from both *Cooking with a Chef* as well as *Cooking Matters at the Store* programs. Originally, the students were informed that the program was offered in two different sections: FD SC 4500 section 008 on Mondays from 12:20-1:10 PM and FD SC 4500 section 009 on Mondays from 1:25-2:15 PM. The students were instructed to sign up for either of the sections. Enrollment for the scheduled meeting time (12:20 PM or 1:25 PM) was chosen by the students' based on their schedule preferences. From there, the students (participants) were further randomly divided into four groups: Group A, Group B, Group C, and Group D. The participants were randomly divided into these four groups via Microsoft Excel SORT function. Therefore, four sessions of the creative inquiry were made available: two for the first six weeks of the semester (Groups A and B) and two for the last six weeks of the semester (Groups C and D). The first class met on Mondays from 12:20-1:10 PM and the second class met on Mondays from 1:25-2:15 PM. This was repeated for both six-week sessions. The first six-week session that met from 12:20-1:10 PM was designated as "Group A." The first six-week session that met from 1:25-2:15 PM was designated as

"Group B." The second six-week session that met from 12:20-1:10 PM was designated as "Group C." The second six-week session that met from 1:25-2:15 PM was designated as "Group D." "Group A" had 13 students throughout the semester. "Group B" had 14 students throughout the semester. "Group C" had 12 students at the beginning of the semester and 13 students once the session began (1 student signed up after the end of the first six week session). "Group D" had 14 students throughout the semester. Therefore, there were a total of 54 undergraduate students who completed the program.

Participant attendance was recorded at the beginning of each meeting. Each six week session was composed of one 50-minute meeting per week and was divided into five sessions that covered information from the *Cooking with a Chef* program and one session that covered information taught from *Cooking Matters at the Store*. The first five meetings occurred in the classroom/demo kitchen setting: students either sat around a large table listening to the nutrition educator or observed/participated in the demonstrating area with the chef. The final meeting occurred in a grocery store where the nutrition educator guided the participants through various sections of the store. Each participant was given his/her own copy of a *Cooking with a Chef* participant manual as well as a participant booklet for the *Cooking Matters at the Store* program.

There were a total of three questionnaires administered to the students throughout the semester. These questionnaires included a *Cooking With a Chef* (CWC) questionnaire (including indexes/scales such as "Availability and Accessibility of Fruits and Vegetables (AAFV) Index," "Cooking Attitude (CA) Scale," "Cooking Behavior (CB) Scale"), "Readiness and Desire to Participate in Cooking with a Chef and Shopping Matters"

(READ) questionnaire, and "Final Assessment- Cooking Matters Tour Facilitator Online Training" (SMFA), The participants in Groups A and B completed the CWC and READ questionnaires a total of two times: once prior to the first program session and once after the second program session. The participants in Groups C and D completed the CWC and READ questionnaires a total of three times: once prior to the first program session, once prior to the second program session, and once after the second program session. All participants in Groups A, B, C, and D filled out the SMFA questionnaire once, after the second program session.

Table 2.1: Overall Questionnaire Administration Frequencies Based on Group and Questionnaire

		CWC	READ	SMFA
Treatment 1	**Group A**	2	2	1
	Group B	2	2	1
Control/Treatment 2	**Group C**	3	3	1
	Group D	3	3	1

A random group of participants (n = 8) also participated in a focus group led by the nutrition educator, moderated by the project advisor, and verbally recorded and transcribed by a Clemson Food Science graduate student.

Theoretical Framework

The theoretical framework of this educational program is based on the Social Cognitive Theory (SCT). SCT was developed by Albert Bandura and states that learning occurs in a social context with the dynamic interaction between people, environment and behaviors.[3] A pivotal role in SCT is beliefs of personal efficacy or self-efficacy.[3] Self-efficacy is defined as the belief in one's own capabilities to produce a desired effect.[3,4]

Self-efficacy can be developed from four main sources of influence: "mastery experiences," "vicarious experiences," "social persuasion" and "somatic and emotional states."[3,4] This educational program attempts to develop self-efficacy using a combination of all four of these sources.

Research Design

This study followed a semi-crossover design. A crossover study is one where participants either receive different programs or both a program and a control in a set sequence.[16] Advantages to this design are reduction in subject variation, smaller, more efficient sample sizes, and comparability of a control and experimental treatment between the same subjects.[16] Disadvantages to this study are loss of subjects and the "carry-over effect", where the effects of one treatment (i.e. control) carries over into another treatment (i.e. experimental).[16] For this pilot study, one group of participants, "Control" or "Treatment 2," received both the control and experimental treatment, in said order. **Table 2.2** depicts the semi-crossover design.

The subjects were divided into four groups mainly for group size and managing purposes. Creative inquiry classes have smaller class sizes in order to increase interaction and hands-on experiences with the students. The semester was divided out into two six-week sessions. The first session met every Monday starting from January 27th, 2014 to February 3rd, 2014. The second session met every Monday starting from March 10th, 2014 to April 21st, 2014 (minus a meeting on Monday, March 17th due to the Spring Break holiday). There were two groups within each session, therefore, a total of four groups in the pilot study. The first group in each session met every Monday from 12:20

PM-1:10 PM (Groups A and C). The second group in each session met every Monday from 1:25 PM-2:15 PM (Groups B and D).

Table 2.2: Assigned Experimental and Control Treatments based on Group and Session

Group	**Session 1**	**Session 2**
Group A	Experimental treatment	----------
Group B	Experimental treatment	----------
Group C	Control treatment	Experimental treatment
Group D	Control treatment	Experimental treatment

During the first session, Groups A and B received the program and Groups C and D received no program. During the second session, Groups A and B received no program and Groups C and D received the program. Throughout both sessions, Groups A and B were collectively referred to as "Treatment 1." During the first session, Groups C and D were collectively referred to as "Control." During the second session, Groups C and D were collectively referred to as "Treatment 2." Therefore, the "Control" and "Treatment 2" groups contained the same group of participants.

Before the first session began, all four groups took a set of pre-test questionnaires, which included the CWC questionnaire and READ questionnaire. The students met with the creative inquiry staff on Monday, January 13th, 2014 at their scheduled times (12:20 or 1:25 PM). These two meetings allowed for the participants to meet the creative inquiry staff as well as to fill out the pre-test questionnaires prior to the first six-week session. Fifty-three individuals filled out each CWC and READ pre-test questionnaire, including

twenty-seven individuals in the treatment 1 group (Groups A and B) and twenty-six individuals in the control/treatment 2 group (Groups C and D). On Monday, March 10th, 2014 at their scheduled times (12:20-1:25 PM), twenty-seven individuals in the control/treatment 2 group filled out the CWC and READ questionnaires (one subject was added to the second session after the first session already began). The values from these questionnaires were treated as both the post-test questionnaires of the control group and pre-test questionnaires of the treatment 2 group. On April 28th, 2014 from 9:00-10:00 AM (the scheduled final time for the class), fifty-one individuals filled out each CWC, READ, and SMFA post-test questionnaire, including twenty-five individuals in the treatment 1 group and twenty-six individuals in the control/treatment 2 group. Two individuals from treatment 1 and one individual from treatment 2 did not arrive for the final CI meeting. They met the nutrition educator separately to fill out their post-test questionnaires within the week. See **Figure 2.1** below, which depicts the group and treatment assignments as well as data collection procedures.

Figure 2.1: Flow Chart For Group and Treatment Assignments and Data Collection

Staff Training

The chef and nutrition educator were trained with the information prior to teaching the lessons by the *Cooking With a Chef* Facilitator Training manual and project advisor. Training for the chef consisted of completion of a certified Culinary Arts Associate Degree curriculum. Preparation for the nutrition educator consisted of completion of an undergraduate degree in Food Science and Technology at Clemson University as well as an emphasis in Nutrition accomplished with a Masters Degree in Food Science, Nutrition, and Culinary Sciences at Clemson University. This team utilized the "Facilitator Guide," which contained all the information required for teaching the

Cooking With a Chef portion and was used for the first five sessions of the program.[15] The chef utilized a fully equipped demo kitchen to effectively provide cooking demonstrations. The nutrition educator utilized a dry erase board, food models and food ingredients to effectively demonstrate integrative nutrition segments.

The nutrition educator conducted the *Cooking Matters at the Store* curriculum and was a certified Grassroots Tour Leader prior to conducting tours for the study participants. The Grassroots Online Tour Leader Training is a program administered by Share Our Strength and included education topics essential for an individual to conduct an effective *Cooking Matters at the Store* grocery store tour.[32] The nutrition educator was given the "Tour Leader" booklet throughout the tour to refer to.

Cooking with a Chef Questionnaire

The *Cooking With a Chef* (CWC) questionnaire used for this study, which was previously validated by Patricia Michaud, consists of a demographic section, an index, six scales, and a test.[27]

The Availability and Accessibility of Fruits and Vegetables (AAFV) index consists of eight questions and is adapted from a food screener administered by Block and colleagues. This seven-item fruit and vegetable accessibility food screener was administered to assess fruit, vegetable, fiber, and micronutrient intakes.[7] The responses were compared to the "gold standard", a 100-item Food Frequency Questionnaire established by Block, and showed that the seven-item food screener was an accurate method of assessing nutrient intake compared to a more lengthy and intensive questionnaire.[7,8] The current AAFV index is also adapted from the Dave study and the

questions are in the "yes" or "no" format.[17] According to Michaud's research, this index was found to have a Cronbach Alpha value of 0.51.[27]

Cooking Attitudes (CA) scale consists of seven items and includes a five-point Likert scale, ranging from 1 ("Strongly disagree") to 5 ("Strongly agree") for positively-worded statements. For negatively worded statements, the scale was reversed. This scale is a condensed version from Michaud's eighteen-item Cooking Attitude scale, which was based on the "What's Cooking survey," "Physical Activity Enjoyment Scale" (PACES), and the "Body & Soul Peer Counselor Handbook."[10,24] According to Michaud's research, this scale was found to have a Cronbach Alpha value of 0.79.[27]

The Cooking Behaviors (CB) scale consists of eleven items and includes the following 5 response options: 1=Not at all, 2=1 to 2 times this month, 3=Once a week, 4=Several times each week, and 5=About everyday. Higher scores indicate more at-home cooking. This scale was expanded from Michaud's three-item Cooking Behavior scale based on items if the Food and Cooking Skills Questionnaire.[41]

The Produce Consumption Self-Efficacy (SEPC) scale consists of three items designed to evaluate one's confidence in consuming vegetables and fruit as well as obtaining the recommended intake of vegetables and fruit. A 5 choice Likert-type scale was also used here with responses ranging from "Not at all confident" to "Extremely confident." According to Michaud's research, this scale was determined to have a Cronbach Alpha value of 0.78.[27]

The Cooking Self-Efficacy (SEC) scale consists of six items that measure self-efficacy in performing various basic cooking methods. A five choice Likert-type scale

was used with responses ranging from "Not at all confident" to "Extremely confident." According to Michaud's research, this scale was determined to have a Cronbach Alpha value of 0.79.[27]

The Self-Efficacy for Using Basic Cooking Techniques (SECT) scale consists of twelve cooking technique items. Participants are asked to rate their confidence levels of performing various cooking methods on a five choice Likert-type scale from "Not at all confident" to "Extremely confident." According to Michaud's research, this scale was determined to have a Cronbach Alpha value of 0.87.[27]

The Self-Efficacy for Using Fruit, Vegetables, and Seasonings (SEFVS) scale consists of eight items. Participants are asked to rate their confidence of using fruits, vegetables, and seasonings in their cooking on a five choice Likert-type scale from "Not at all confident" to "Extremely confident."

The Knowledge of Cooking Terms and Techniques (CTT) test consists of eight questions that evaluate basic cooking knowledge. One question contains images of cooking tools as the answer choices (i.e. measuring spoon, liquid measuring cups, etc.). Since an image can not be analyzed with SAS®, their technical terms were used.[27]

Readiness and Desire to Participate in Cooking with a Chef and Shopping Matters Questionnaire

The "Readiness and Desire to Participate in Cooking with a Chef and Shopping Matters" (READ) questionnaire was created specifically for this pilot study. The questionnaire consists of seventeen items where the participants are asked to rate their level of agreement with each of the statements on a 6-point Likert scale, ranging from 0

("Strongly disagree") to 5 ("Strongly agree"). The statements include topics from the overall program curriculum, such as identifying different categories of produce, different forms of produce based on cost, unit prices, and whole grains. Other statements focus more on determining the participants' current self-efficacy to apply the class curriculum to their own lives as well as future careers. The questionnaire was administered to the participants both before and after the program in order to effectively evaluate the changes in agreement levels based on the program.

Cooking Matters at the Store Final Assessment Questionnaire

The pilot study program was given permission from Share Our Strength to use their official "Final Assessment- Cooking Matters Tour Facilitator Online Training" (K. Wong, personal communication, May 3, 2013). The questionnaire is administered as a final assessment to individuals completing the Cooking Matters Grassroots Tour Leaders via the Cooking Matters Learning Space online program. The questionnaire consists of ten questions: one question with true and false responses and nine questions with multiple-choice responses. The questions cover main topics from the Grassroots Tour Leaders modules that individuals should know for leading efficient and knowledgeable store tours, such as comparing unit prices, identifying whole grains, reading nutrition labels, and various tour leader scenarios. The questionnaire was administered to the participants at the end of the second six-week session in order to determine the knowledge gained from participating in a grocery store tour based on *Cooking Matters at the Store* curriculum.

Focus Group

After both program sessions were completed, eight participants were randomly selected to partake in a focus group session. The focus group consisted of eight participants, a facilitator, a recorder, and a project advisor. The facilitator was the nutrition educator from the program, the recorder was a Food Science, Nutrition, and Packaging Sciences graduate student, and the project advisor was the Food Science professor in charge of the program. The nutrition educator and project advisor were present to learn participants' beliefs first-hand and to tailor the line of questions throughout the focus group session. A focus group is a type of group interview that is either audio or video recorded and contains six to eight open-ended questions. A focus group also consists of a facilitator who stimulates the dialogue among the participants.[30] The purpose of the focus group was to further answer research questions one and four: "What are the effects of combining the *Cooking With a Chef* and *Cooking Matters at the Store* curriculums into one program?" and "Is a combined culinary nutrition and healthy eating on a budget program beneficial for undergraduate food science students in preparation for their health-related careers?" Goals of the focus group included identifying participants' beliefs of the program and suggestions for program improvement.

A focus group is one of the many types of methods of qualitative research. Qualitative research is reliable method of generating new ways of seeing existing data.[30] Qualitative data is important in various cases of research, such as when little information is known in the area and the results aren't certain.[30] This study is a pilot study, therefore,

a preliminary study that has not been conducted before. Little information was previously known about the combined effects of a culinary nutrition and budget emphasized education program. Qualitative data is also important when researchers are interested in learning from the participants in a setting or a process the way they experience it, the meanings they put on it, and how they interpret their experiences.[30] A research question for this pilot study was to determine if the combined program was beneficial in preparing participants for their future health-related careers. Therefore, a focus group is a method of determining the participants' perceptions of the program and their interpretations of the program information relating to their future careers. Lastly, qualitative data helps researchers understand a certain phenomena deeply and in detail.[30] Results from this pilot study needed to be analyzed in various methods, both qualitatively and quantitatively, in order to properly generate assumptions and effects of the program.

Sodexo Dietetic Interns Questionnaire

With permission from Phyll Ribakoff, Sodexo Distance Dietetic Internship Coordinator, a questionnaire was administered to the Sodexo interns through SurveyMonkey and included all the items from the CWC and READ questionnaires (84 items total) (personal communication, June 10, 2013). These dietetic interns completed the *Cooking Matters at the Store* Adult Grassroots Training as part of their internship curriculum. The purpose of having these current dietetic interns respond to CWC and READ questionnaire items was to determine similarities and differences in responses compared to Food Science undergraduate participants, many of who are interested in pursuing dietetic careers.

Cooking With a Chef (CWC) Results and Discussion

CWC Data Analysis

Two subjects were removed from the CWC analysis, one from treatment 1 and one from treatment 2. This was done because the subject in treatment 1 did not complete the post-CWC questionnaire and the subject in treatment 2 joined the program after the first session, therefore, was not in the control group. Thus, they were both removed from analysis to improve and increase the accuracy and validity of the results.

The CWC statistical analysis was performed using SAS® version 9.2 using a frequency procedure and a mixed procedure. A frequency procedure computes response frequencies. A mixed procedure analyzes statistical differences within groups (pre to post-program) and between groups (treatments and control).

Demographics

Table 2.3: Age, Grade, Gender, Ethnicity, and Food Service Experience Characteristics of Participants at Time of Program

		Treatment 1 (n=26)		Treatment 2/Control (n=26)	
		n	%	n	%
Age	**18-19 years old**	11	42.31	9	34.62
	20-24 years old	14	53.85	17	65.38
	35-39 years old	1	3.85	-------	-------
Grade	**Freshman**	4	15.38	4	15.38
	Sophomore	10	38.46	10	38.46
	Junior	5	19.23	4	15.38
	Senior	7	26.92	8	30.77
Gender	**Female**	24	92.31	20	76.92
	Male	2	7.69	6	23.08
Ethnicity	**Black, not of Hispanic origin**	1	3.85	1	3.85
	White, not of Hispanic origin	25	96.15	23	88.46

	Asian or Pacific Islander	------	------	2	7.69
Food Service Experience	**Yes**	12	46.15	12	46.15
	No	14	53.85	14	53.85

As seen in **Table 2.3**, in treatment 1, a majority of the participants were within the ages of 20-24 (53.85 percent) while the rest of the participants were within the ages of 18-19 (42.31 percent) or 35-39 (3.85 percent) at the time of their program. In treatment 2/control, a majority of the participants were within the ages of 20-24 years (65.38 percent) while the rest of the participants were within the ages 18-19 years (34.62 percent) at the time of their program.

For treatment 1, the largest fraction of participants was classified as sophomores (38.46 percent), followed by seniors (26.92 percent), juniors (19.23 percent), and freshman (15.38 percent). For treatment 2, the largest fraction of participants was classified as sophomores (38.46 percent), followed by seniors (30.77 percent), and an equal amount classified as seniors and freshman (15.38 percent).

For treatment 1, a vast majority of the participants were female (92.31 percent) while the rest were male (7.69 percent). In treatment 2, a majority of participants were also female (76.92 percent) while the rest were male (23.08 percent). In terms of demographics, 96.15 percent of participants in treatment 1 and 88.46 percent of participants in treatment 2/control classified themselves as "White, not of Hispanic origin," 3.85 percent of participants in both treatment 1 and treatment 2/control classified themselves as "Black, not of Hispanic origin," and 7.69 percent of participants in treatment 2/control classified themselves as "Asian or Pacific Islander." In treatment 1,

only “White, not of Hispanic origin” and “Black, not of Hispanic origin” were present whereas in treatment 2/control, “White, not of Hispanic origin,” “Black, not of Hispanic origin,” and “Asian or Pacific Islander” were present. In terms of food service experience, 46.15 percent of participants in both treatment 1 and treatment 2/control stated they had experience while 53.85 percent of participants in both treatment 1 and treatment 2/control stated they did not have experience.

Table 2.4: P-Values from Testing Difference between Treatments and Control Based on Cooking With a Chef (CWC) Questionnaire Scales

Scale	p value
Availability and Accessibility of Fruits and Vegetables (AAFV)	0.4518
Cooking Attitude (CA)	0.2939
Cooking Behavior (CB)	0.1748
Produce Consumption Self-Efficacy (SEPC)	0.1364
Cooking Self-Efficacy (SEC)	0.0024*
Self-Efficacy for Using Basic Cooking Techniques (SECT)	<0.0001*
Self-Efficacy for Using Fruits, Vegetables, and Seasonings (SEFVS)	<0.0001*
Knowledge of Cooking Terms and Techniques Evaluation (CTT)	0.9101

*Significant difference between treatments and control group ($p<0.05$)

Three of the eight CWC indexes/scales showed significant differences between the treatment and control groups (**Table 2.4**): Cooking Self-Efficacy (SEC), Self-Efficacy for Using Basic Cooking Techniques (SECT), and Self-Efficacy for Using Fruits, Vegetables, and Seasonings (SEFVS). The Availability and Accessibility of Fruits and Vegetables (AAFV), Cooking Attitude (CA), Cooking Behavior (CB), Produce Consumption Self-Efficacy (SEPC), and Knowledge of Cooking Terms and Techniques

Evaluation (CTT) indexes/scales did not show significant differences between the treatment and control groups.

Table 2.5: Cooking With a Chef (CWC) Descriptive Statistics (Mean, Standard Error of the Mean (SEM), Range) for Pre-Test and Post-Test of Treatment 1, Treatment 2, and Control Groups

		Pre-Test			Post-Test		
Group	**Scale**	**Mean**	**SEM**	**Range**	**Mean**	**SEM**	**Range**
T1	**AAFV**	5.81	0.35	2.00-8.00	5.35	0.35	1.00-8.00
	CA	29.73	0.87	20.00-35.00	29.23	0.87	18.00-35.00
	CB	16.69	0.61	9.00-25.00	18.31*	0.61	13.00-23.00
	SEPC	3.04	0.22	1.00-5.00	3.19	0.22	1.00-4.00
	SEC	25.46	0.73	12.00-30.00	26.19	0.73	18.00-30.00
	SECT	27.62	0.81	17.00-35.00	30.38*	0.81	20.00-35.00
	SEFVS	30.50	1.19	16.00-39.00	32.46*	1.19	18.00-39.00
	CTT	14.77	0.36	11.00-20.00	14.00	0.36	11.00-17.00
T2	**AAFV**	5.65	0.35	0-8.00	5.81	0.35	2.00-8.00
	CA	28.81	0.87	15.00-35.00	29.65	0.87	16.00-35.00
	CB	16.73	0.61	9.00-24.00	17.35	0.61	11.00-24.00
	SEPC	3.31	0.22	2.00-5.00	3.54	0.22	2.00-5.00
	SEC	23.38	0.73	10.00-30.00	26.00*	0.73	20.00-30.00
	SECT	24.77	0.81	13.00-30.00	29.15*	0.81	20.00-35.00
	SEFVS	27.23	1.19	14.00-38.00	31.77*	1.19	20.00-40.00
	CTT	13.96	0.36	11.00-18.00	13.77	0.36	12.00-17.00
C	**AAFV**	6.08	0.35	0-8.00	5.65	0.35	0-8.00
	CA	29.23	0.87	14.00-35.00	28.81	0.87	15.00-35.00
	CB	16.73	0.61	12.00-22.00	16.73	0.61	9.00-24.00
	SEPC	3.50	0.22	2.00-5.00	3.31	0.22	2.00-5.00
	SEC	23.96	0.73	14.00-29.00	23.38	0.73	10.00-30.00
	SECT	25.62	0.81	18.00-32.00	24.77	0.81	13.00-30.00
	SEFVS	28.69	1.19	18.00-37.00	27.23	1.19	14.00-38.00
	CTT	14.38	0.36	10.00-20.00	13.96	0.36	11.00-18.00

Abbreviations: T1 – Treatment 1; T2 – Treatment 2; C – Control; AAFV – Availability and Accessibility of Fruits and Vegetables; CA – Cooking Attitudes; CB – Cooking Behaviors; SEPC – Produce Consumption Self-Efficacy; SEC – Cooking Self-Efficacy; SECT – Self-Efficacy for Using Basic Cooking Techniques; SEFVS – Self-Efficacy for Using Fruit, Vegetables, and Seasonings; score – Knowledge of Cooking Terms and Techniques; SD – Standard Deviation
* Significant difference within group ($p<0.05$)

In terms of Availability and Accessibility of Fruits and Vegetables (AAFV) index, both treatment 1 and control had slight decreases in their mean scores from pre-test to

post-test (-0.46 and -0.43) and treatment 2 had a slight increase in the mean score from pre-test to post-test (0.16). The AAFV index had a minimum score of 0.00 and a maximum score of 8.00. There were no significant differences within each group from pre-test to post-test (**Table 2.5**).

In terms of Cooking Attitude (CA) scale, both treatment 1 and control had slight decreases in their mean scores from pre-test to post-test (-0.5 and -0.42) and treatment 2 had a slight increase in the mean score from pre-test to post-test (0.84). The CA scale had a minimum score of 7.00 and a maximum score of 35.00. There were no significant differences within each group from pre-test to post-test (**Table 2.5**).

In terms of Cooking Behavior (CB) scale, both treatment 1 and treatment 2 had increases in their mean scores from pre-test to post-test (1.62 and 0.62) and control had the same mean score in pre-test and post-test. The CB scale had a minimum score of 6.00 and a maximum score of 30.00. Only treatment 1 had a significant difference from pre-test and post-test (**Table 2.5**).

In terms of the Produce Consumption Self-Efficacy (SEPC) scale, both treatment 1 and treatment 2 had slight increases in their mean scores from pre-test to post-test (0.15 and 0.23) and control had a slight decrease in mean score from pre-test to post-test (-0.19). The SEPC scale had a minimum score of 1.00 and a maximum score of 5.00. There were no significant differences within each group from pre-test to post-test (**Table 2.5**).

In terms of the Cooking Self-Efficacy (SEC) scale, both treatment 1 and treatment 2 had increases in their mean scores from pre-test to post-test (0.73 and 2.62) and control had a slight decrease in the mean score from pre-test to post-test (-0.58). The SEC scale

had a minimum score of 6.00 and a maximum score of 30.00. Only treatment 2 had a significant difference from pre-test to post-test (**Table 2.5**).

In terms of Self-Efficacy for Using Basic Cooking Techniques (SECT) scale, both treatment 1 and treatment 2 had increases in their mean scores from pre-test to post-test (2.76 and 4.38) and the control had a slight decrease in the mean score from pre-test to post-test (-0.85). The SECT scale had a minimum score of 7.00 and a maximum score of 35.00. Both treatment 1 and treatment 2 had significant differences from pre-test and post-test (**Table 2.5**).

In terms of Self-Efficacy for Using Fruits, Vegetables, and Seasonings (SEFVS) scale, both treatment 1 and treatment 2 had increases in their mean scores from pre-test to post-test (1.96 and 4.54) and the control had a decrease in the mean score from pre-test to post-test (-1.46). The SEFVS scale had a minimum score of 8.00 and a maximum score of 40.00. Both treatment 1 and treatment 2 had significant differences from pre-test and post-test (**Table 2.5**).

In terms of Knowledge of Cooking Terms and Techniques Evaluation (CTT) index, the index had a perfect score of 14.00 (all questions answered correctly). Therefore, the treatment 1 post-test mean score reached the perfect score of 14.00 while the treatment 1 pre-test mean score was 14.77. The treatment 2 pre-test mean score (13.96) was closer to the perfect score compared to treatment 2 post-test mean score (13.77). The control post-test mean score (13.96) was closer to the perfect score compared to the control pre-test mean score (14.38). The CTT index had a minimum

score of 8.00, a maximum score of 32.00, and a perfect score of 14.00. There were no significant differences within each group from pre-test and post-test (**Table 2.5**).

CWC Discussion

Every participant completed the entire education program. Availability and Accessibility of Fruits and Vegetables (AAFV) did not show significant differences between the treatment groups and control group (**Table 2.4**). All items within this scale were included in the analysis. Treatment 1, treatment 2, and control had fairly similar mean scores in their pre-tests (5.81, 5.65, and 6.08) (**Table 2.5**). With an AAFV index maximum score of 8.00, the mean scores indicate that participants entered the program already with a fair amount of produce availability and accessibility. The post-test scores in treatment 1 slightly decreased compared to their pre-test scores while the post-test scores in treatment 2 slightly increased compared to their pre-test scores. Regardless, the treatment 1 and treatment 2 mean scores were still above the median score of 4 and somewhat close to the maximum scale score of 8 (5.35 and 5.81). Therefore, this indicates that the information covered in the program could have been that which participants were already aware of. For example, the nutrition educator covered produce availability through CWC information, one produce presentation and engaged discussions with the participants. The CWC information covered in this scale discussed the basis of menu planning, including balance, variety, contrast, color, and eye-appeal as well as coloring a plate with vegetables and fruit, where variety of produce colors were discussed and tips to serve more vegetables and fruits. The produce presentation related the amount of produce for an adult for one week. The undergraduate food science students could

have already been familiar with these basic concepts based on previous nutrition classes. The nutrition educator also discussed tips to purchasing and storing fresh produce in the grocery store tour, a concept covered in this scale. The chef and participants also prepared various salad recipes during the program, such as a green bean salad and a pasta salad over greens. Therefore, they had a general familiarity preparing salads and vegetables, concepts covered in this scale. Based on a previous study using the CWC questionnaire on college students (**Appendix B**), the treatment participants (Group A) did not show an increase mean score from pre-test to post-test (0.70 to 0.68) nor significant differences from pre-test to post-test.[38] These results support those found from this pilot study.

The Cooking Attitude (CA) scale did not show significant differences between the treatment groups and control group (**Table 2.4**) nor within the groups from pre-test to post-test (**Table 2.5**). All items within this scale were included in the data analysis. A potential reason for no differences in cooking attitude is because the group of participants already enjoyed "trying new recipes," believed "making meals at home helps me to eat more healthfully" and disagreed that "cooking is frustrating" prior to the program. Treatment 1, treatment 2, and control had fairly similar CA pre-test scores (29.73, 28.81, and 29.23) (**Table 2.5**). With a maximum score of 35.00, the participants had fairly positive cooking attitude beliefs entering the program. Therefore, the program did not have a strong effect on their cooking attitudes. The CA scale in a previous study with CWC on college students did not show significant differences from pre-test to post-test (**Appendix B**). The treatment group's mean scores in pre-test and post-test increased

slightly from pre-test to post-test (3.47 to 3.53).[38] These past results somewhat support the results from the pilot study that cooking attitudes were not significantly affected from the program.

The Cooking Behavior (CB) scale did not show significant differences between the treatment groups and control group (**Table 2.4**) but did not a significant difference in treatment 1 from pre-test to post-test (**Table 2.5**). The same information was covered within each treatment group and an equal amount (46.15 percent) in each group stated they had previous foodservice experience (**Table 2.3**), therefore, a significant difference in only one is surprising. Thus, differences within each treatment group in terms of participants' opinions and views on cooking behavior may have existed. Only the items, "Prepare meals from basic ingredients," "Prepare meals using convenience items," "Reheat or use leftovers in another meal," "Eat breakfast away from home," "Eat lunch away from home," and "Eat dinner away from home" were included in the scale analysis because the remaining items were extraneous to this pilot study. Treatment 1, treatment 2, and control also had fairly similar CB pre-test scores (16.69, 16.73, and 16.73). With a maximum score of 24.00, the participants had fairly high degrees of cooking behavior practices (**Table 2.5**). As previously stated, a majority of these participants had nutrition knowledge and practiced healthy cooking methods at home entering the program. In terms of cooking behavior, the participants could have already prepared "meals from basic ingredients" or "meals using convenience items." Treatment 1 had a significant difference from pre-test to post-test but treatment 2 did not (**Table 2.5**). Therefore, the program was only semi-successful in altering cooking behaviors. The CB scale on

college students previously did not have a significant effect from pre-test to post-test within the treatment group, supporting these pilot study results (**Appendix B**).[38]

The Self-Efficacy of Produce Consumption (SEPC) scale did not show significant differences between the treatment groups and control group (**Table 2.4**) nor within the groups from pre-test to post-test (**Table 2.5**). The only item tested in this scale was "Eat recommended 9 half cup serving fruits and vegetables daily." Therefore, slight score changes in this question strongly affected the statistics from this scale. This concept was demonstrated in the "Produce for a Week" where the nutrition educator presented all the produce for one person for one week using the recommended fruit and vegetable servings per day. However, from participant reactions during the program, this recommended amount seemed somewhat difficult to reach. Both the treatment 1 and treatment 2 had slight increases in the mean score from pre-test to post-test while the control did not (**Table 2.5**). The SEPC scale on college students previously did not have a significant effect from pre-test to post-test within the treatment group, supporting these pilot study results (**Appendix B**).[38]

The Cooking Self-Efficacy (SEC) scale showed significant differences between the treatment groups and control group (**Table 2.4**) but only within treatment 2 from pre-test to post-test (**Table 2.5**). As previously discussed, the same information was covered for each treatment and the same amount of participants in each group (46.15 percent) stated to have previous foodservice experience (**Table 2.3**), therefore, a significant difference in only one group is surprising. Thus, differences within each treatment group in terms of participants' opinions and views may have existed. All items in this scale

were included in the data analysis. This scale included the statements, "Cook from basic ingredients," "Follow a written recipe," "Prepare dinner from items you currently have in your pantry and refrigerator," "Use knife skills in the kitchen," "Plan nutritious meals," and "Use basic cooking techniques." These results show that the program effectively increased participants' self-efficacy or self-confidence to cook. Concepts in this scale were specifically covered from CWC discussions and demonstrations. The participants were given the opportunity to prepare nutritious meals by following recipes and using knife skills, basic ingredients and cooking techniques. The chef devoted an entire lecture to knife skills where he demonstrated proper techniques as well as allowed the participants to practice the techniques on yellow potatoes. All of this information was also provided in the *Cooking With a Chef* notebook provided to each participant.[15] For example, the participants prepared a vegetable pasta salad (under the supervision of the chef) where they had follow the recipe provided, use basic ingredients such as vegetables, oil, vinegar, seasonings, and pasta, use knives to chop the vegetables, measure the seasonings, vinegars, and oil, and mix the ingredients together. Thus, the participants were given plenty of opportunities to increase their cooking self-confidence.

The Self-Efficacy for Using Basic Cooking Techniques (SECT) scale showed significant differences between the treatment groups and control group (**Table 2.4**). This scale also showed significant differences within treatment 1 and treatment 2 from pre-test to post-test (**Table 2.5**). This scale included statements asking participants' self-efficacy in boiling, simmering, steaming, sautéing, poaching, baking, and roasting, all of which were covered in the hands-on culinary activities. Only these seven items were included in

the data analysis because these were the only items specifically covered during the program. For example, the chef demonstrated how to boil and simmer ingredients when making the vegetable-barley soup, demonstrated steaming when making the peach salsa, demonstrated sautéing, poaching, and baking techniques on three different chickens, and demonstrated roasting when making the sweet potato and chickpea salad.[15] The participants also had to complete a culinary terms definition sheets that included defining the terms, "roast," "bake," "sauté," "poach," "dice," etc. These results indicate that the program effectively demonstrated and increased self-efficacy of the tested cooking techniques.

The Self-Efficacy for Using Fruits, Vegetables, and Seasonings (SEFVS) scale showed significant differences between the treatment groups and control group (**Table 2.4**). This scale also showed significant differences within treatment 1 and treatment 2 from pre-test to post-test (**Table 2.5**). All items in this scale were included in the data analysis except the item "Hot sauces." This item was removed because it was not specifically covered in the program. This scale included statements asking participants' self-efficacy in using fresh and frozen produce, root vegetables, fruit, herbs, spices, vinegars, citrus juice, and citrus zest. All of these forms of produce and seasonings were covered during hands-on culinary activities as well as casual discussions between the nutrition educator, chef, advisor, and participants. For example, a myriad of the recipes that were prepared during class included herbs, spices, vinegars, citrus juice, and citrus zest, such as the chicken salad recipe, the black-eyed pea hummus recipe, and the peach salsa recipe. The peach salsa recipe, kidney bean pasta salad, and green bean salad

included fresh and/or frozen vegetables. The roasted sweet potato and chickpea recipe included roasting sweet potatoes (root vegetable). The chef also prepared sample spice blends that included various dried herbs for the participants to take home and use in their own cooking.[15] The program also included a flavor building ingredient activity using various balsamic vinegars and olive oils. Results indicate that the program effectively demonstrated and increased self-efficacy of produce and seasoning use.

The Culinary Terms and Knowledge (CTT) test did not show significant differences between the treatment groups and control group (**Table 2.4**) nor within the groups from pre-test to post-test (**Table 2.5**). All items in this scale were included in the data analysis. A plausible reason is that the participants already had previous culinary knowledge from school courses and/or at-home cooking. Treatment 1, treatment 2, and control pre-test mean scores were fairly high (14.77, 13.96, and 14.38) (**Table 2.5**). However, the treatment 1 and treatment 2 mean test scores slightly decreased in the post-test. Thus, these results indicate that the information within this scale was not effectively covered in the program. For example, one question asks, "What is the term for preparing all ingredients, gathering equipment, and organizing your work area before beginning to cook?" This was not directly covered in the program. Another plausible explanation is that the multiple-choice questions asked in this scale were very basic culinary definitions (i.e. "water is simmering when" and "a diced potato should be cut into:") that participants would know if they practiced simple at-home cooking as well as took a basic cooking class at Clemson University. This group of participants was rather biased towards understanding culinary skills and nutrition knowledge. The purpose of the program was

to further increase these skills.

The CTT index in a previous study on college students showed significant differences from pre-test to post-test within the treatment group (Group A). Therefore, there must have been discrepancies in information covered in this program compared to the previous program (**Appendix B**).[38]

Final Assessment – Cooking Matters Tour Facilitator Online Training (SMFA)

Results and Discussion

SMFA Data Analysis

The SMFA questionnaire statistical analysis was performed using SAS® version 9.2. A frequency procedure was used. This method was used to determine the response frequency of each answer. The average participant SMFA score was compared with the average SMFA score of Cooking Matters at the Store Adults, provided by Share our Strength.[16] These Cooking Matters at the Store Adults were those who were not affiliated with larger partner organizations and had completed the Grassroots Tour Leader online training and the same final assessment. The online training covered similar information as the grocery store tour. Each question was worth 1 point or 10 percent. Therefore, the questionnaire had a minimum score of 0.00 or 0 percent and a maximum score of 10.00 or 100 percent.

Table 2.6: Final Assessment – Cooking Matters Tour Facilitator Online Training (SMFA) Program Participant Frequency Results

Question. ***Correct answer shown in italics***	**Correct**	**Incorrect**
	n (%)	**n (%)**

1. As participants gather before the tour, you notice everyone has brought a shopping cart. What should you do? *Tell participants that to be respectful of other customers who may need to get by in the aisles, you'll need to ask that only participants who have small children with them should bring a cart along on the tour.*	54 (100)	0 (0)
2. As the tour leader, you are the expert and can tell participants what choices they should make about food. *False*	28 (51.85)	26 (48.15)
3. While discussing healthy cereal options, a participant says she thinks low-sugar cereals taste nasty. A good response would be: *Both A and C (Suggest ways to improve taste like adding fruit to low-sugar cereal and Ask other participants to share ways they have successfully transitioned to low-sugar cereals).*	53 (98.15)	1 (1.85)
4. Much to your surprise, the community partner you are working with has been able to recruit 20 participants for your tour. A good course of action would be: *Both B and C (Stay calm. Remember that not all participants who sign up will probably be able to show up- 10-16 participants is a more likely number and Find 1-2 additional tour leaders or assistants so that you can break into smaller groups or have help answering questions and facilitating hands-one activities as needed).*	45 (83.33)	9 (16.67)
5. Which of the following common misunderstanding about how you can tell if a bread is a whole grain should you come prepared to discuss with participants? *All of the above (Brown bread, names or words like "multigrain," "seven grain," or "wheat" and front of package labels like "made with whole grains")*	50 (92.59)	4 (7.41)
6. You are helping participants figure out how to use a food label. A participant picks up a package with the Nutrition Facts Panel (shown). You ask her to locate the serving size then determine how many servings of the food she would normally eat in a sitting. She says she would eat 2 servings. The number of grams of sugar she would normally eat in a sitting would be: *12 grams of sugar*.	50 (92.59)	4 (7.41)
7. Participants are in the canned vegetable aisle, getting hands-on practice reading food labels. As they compare different types of canned vegetables, what one key piece of information on the Nutrition Facts Panel would be good to draw their attention to? *Sodium.*	52 (96.30)	2 (3.70)

8. Which food has the lower unit price? *15 oz canned green beans, $1.09*	45 (83.33)	9 (16.67)
9. You are sharing a tip with participants that "convenience" produce (like baby carrots or bagged salad) often costs more than whole forms of produce (like whole carrots or a head of lettuce). A participant tells you that she doesn't think that little bit of savings would matter compared to the time it would take for her to chop the carrots or lettuce. A good response would be: *All of the above (Acknowledge the trade-offs between time and cost and encourage participants to find cost-saving strategies that work best for their lives, have participants compare unit prices between the "convenient" form and the whole form to determine the savings could be, and ask other participants to share tips on saving time when chopping vegetables).*	52 (96.30)	2 (3.70)
10. Participants are considering whether it would make sense to buy a 2 pound bag of sweet potatoes or loose (individual) sweet potatoes. The 2 pound bag is priced at $2.99. The loose sweet potatoes are priced at $0.50 each. You determined that about 8 sweet potatoes would be the same as 2 pounds. Which food has the lowest unit price? *The two pound bag.*	50 (92.59)	4 (7.41)

According to **Table 2.6**, 100 percent of the program participants correctly answered how to handle tour participants who unnecessarily bring shopping carts on the tour. This question highlights a plausible scenario that participants may face as a Grassroots Tour Leader. 51.85 percent of the participants correctly answered that tour leaders are not experts on food. This question overall encompasses the standing of a Grassroots Tour Leader. 98.15 percent of participants correctly answered how to respond to a tour participant who dislikes low-sugar cereals. 83.33 percent correctly answered how to handle a tour that has too many recruited participants. 92.59 percent of participants correctly identified examples of whole grain breads. 92.59 percent of participants correctly answered the amount of sugar in a food product based on the nutrition label and number of servings. 96.30 percent of participants correctly answered

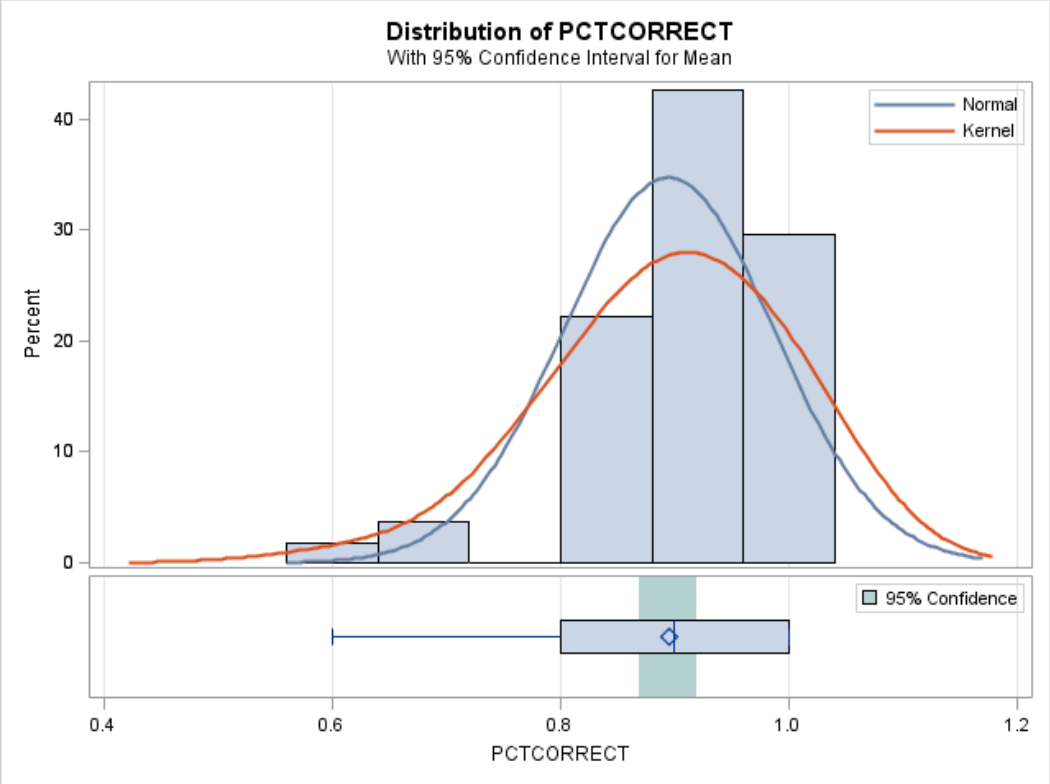
the nutritional component to be mindful of in canned products. 83.33 percent of participants correctly answered the food with the lowest unit price based on a unit price calculation. 96.30 percent of participants correctly answered how to respond to a tour participant who doesn't believe in the unit price principle. 92.59 percent of participants correctly answered the food with the lowest unit price based on a unit price calculation.

Table 2.7: Final Assessment – Cooking Matters Tour Facilitator Online Training (SMFA) Descriptive Statistics for Program Participants (Mean, Standard Deviation (SD), Minimum and Maximum Scores)

N	Mean (%)	SD (%)	Minimum (%)	Maximum (%)
54	89.44	0.092	60.00	100.00

The overall mean of the SMFA questionnaire was 89.44 percent. The standard deviation was about 0.092 percent, indicating there was very little variation about the mean. The minimum score was 60 percent and the maximum score was 100 percent (**Table 2.7**).

Figure 2.2: Final Assessment – Cooking Matters Tour Facilitator Online Training (SMFA) Program Participant Percent Correct Score Distribution



The SMFA participant scores did not follow either a normal distribution or Kernel distribution. For example, the scores were normally distributed about the mean, but instead, a majority of the participants scored at or above the mean percentage of 89.44 (**Figure 2.2**).

SMFA Discussion

Overall, a vast majority of the program participants correctly answered the final assessment. Correct responses ranged from 51.85-100 percent. Other than 51.85 percent, correct responses ranged from 83.33-100 percent, indicating the participants were fairly

prepared for the *Cooking Matters at the Store* final assessment solely based attending the grocery store tour.

Provided by Karen Wong, Manager of Program Measurement and Evaluation at Share Our Strength, the mean score of the Adult Grassroots Leaders who completed the same questionnaire was 94.3 percent (personal communication, May 3, 2013). The mean score of the participants was only 4.86 percent lower than the mean score of the Adult Grassroots Leaders. The Adult Grassroots Leaders completed the entire *Cooking Matters at the Store* training, including the required online modules, quizzes, and the final assessment. The program participants only attended a shortened tour led by a certified Grassroots Leader. Therefore, it is possible information covered in the tour was not as thorough as that from the online training, especially since the program tour was approximately 30 minutes while the typical *Cooking Matters at the Store* tour is normally 1 hour. The program tour was shortened both based on the 50-minute scheduled time as well as to allot travel time for the participants to and from Clemson University's campus.

Readiness and Desire to Participate in Cooking With a Chef and Shopping Matters (READ) Results and Discussion

READ Test-Retest Analysis

A test-retest reliability procedure was performed on the READ questionnaire after the program. Since this questionnaire was created specifically for this pilot study and had not been used on a group of participants before, a test-retest procedure was deemed necessary and appropriate. Reliability is defined as the extent to which related items measure the same concept.[20] Test-retest reliability is a type of reliability procedure that

evaluates reliability based on temporal stability.[18,38] This procedure involves the same participants completing the same questionnaire at two points in time in order to evaluate the reliability of the responses and questions among the same group of participants.[18]

Twenty-two undergraduate students who did not complete the pilot study program were used for this procedure. These participants were recruited from two Food Science courses, FDSC 3070 and FDSC 4500. The participants were asked to complete the hard copy, 17-statement READ questionnaire by rating their levels of agreement with the statements on a 6-point Likert scale. The participants were again given the same READ questionnaire two weeks later by rating their levels of agreement with the same statements on a 6-point Likert scale. Upon data entry, the 6-point Likert scale was again changed to a 5-point Likert scale (combining scores 2 and 3 as 3), just as in the program data analysis. The same two statements that were removed from the data analysis were removed from the test-retest analysis, "I will learn from this semester tutorial" and "I plan on working in the health care industry. If so, what in specific (i.e. clinical setting, public health, etc.)?" A correlation procedure was performed on the data using SAS® version 9.2.

The correlation between the test and retest variables was evaluated using the Pearson's Correlation Coefficient values. Pearson's Correlation Coefficients measure the strength of linear association between two variables.[31] Pearson's Correlation Coefficient assumes the a continuous relationship and has a value range from $-1 \leq r \leq 1$, where -1 represents a perfect negative correlation and 1 represents a perfect positive correlation.

Based on Sprinthall's interpretation of the Pearson coefficient, the following scale was used to interpret each of the READ statements:[34,38]

Table 2.8: Spinthall Interpretation of Pearson Correlation Coefficient (R) Value

R value	Interpretation
Less than 0.20	Slight; almost negligible relationship
0.20-0.40	Low correlation; definite but small relationship
0.40-0.70	Moderate correlation; substantial relationship
0.70-0.90	High correlation; marked relationship
0.90-1.00	Very high correlation; very dependable relationship

The correlation coefficients of particular interest were those comparing each variable (test) to their post-variable (retest). The values are depicted in the table below.

Table 2.9: Readiness and Desire to Participate in Cooking With a Chef and Shopping Matters (READ) Questionnaire Test-Retest Pearson's Correlation Coefficient (R) Values and Corresponding P-Values

Variable	R value	P value
Read_NutCook (Nutrition and cooking should be collaboratively approached)	0.02	0.9149
Read_HealthLC (Healthy food can be low-cost)	0.63	0.0015*
Read_WGExam (Lists examples of suggested whole grain products)**	0.66	0.0008*
Read_RetP (Retail price is the best indication of a low-cost item)**	0.79	<0.0001*
Read_CulNut (Culinary nutrition can be applied to future career)	0.82	<0.0001*
Read_WG (Identifying whole grains can be applied to future career)	0.81	<0.0001*
Read_EconFruVeg (Identifying methods to buy low-cost food can be applied to future career)	0.82	<0.0001*
Read_FoodLab (Comparing food labels can be applied to future career)	0.64	0.0014*
Read_UnitPri (Comparing unit prices can be applied to future career)	0.72	0.0001*
Read_GStore (Ability to identify most cost-effective source of produce)	0.52	0.0141*

Read_BasCook (Use basic cooking skills to create nutritious meals)	0.86	<0.0001*
Read_DiffVeg (Ability to identify different types of vegetables)	0.54	0.0097*
Read_SkillCN (Culinary nutrition skills will be/have been positively affected from tutorial)	0.39	0.0758
Read_Apply (Applying tutorial to everyday life)	0.45	0.0470*
Read_Teach (Teaching tutorial in future career)	0.50	0.0190*

* Significant correlation ($p<0.05$)

READ Test-Retest Discussion

The following statements had Pearson coefficients ≥ 0.7 and p-values equal to or less than 0.0001, indicating a high linear correlation and marked relationship between the test and retest data in the absence of a program.[34] These statements include, "Comparing retail prices is the best method to determine the lowest-cost product" (r=0.79), "Culinary nutrition can be implemented into my future career" (r=0.82), "The ability to identify whole grains can be applied to my future career" (r=0.81), "The ability to identify economical methods to purchase vegetables and fruits can be applied to my future career" (r=0.82), "The ability to compare product unit prices can be applied to my future career" (0.72), and "I can currently use basic cooking techniques to plan and prepare nutritious meals" (r=0.86). Therefore, these statements are suitable for this population and this method of delivery.

The following statements had Pearson coefficients 0.40-0.70, indicating moderate correlation and a substantial relationship between test and retest data in the absence of a program.[34] These statements include, "Healthy food options can be low-cost" (r=0.63), "Whole grain products include rice flour, unbleached enriched flour, and foods containing whole grains" (r=0.66), "The ability to compare product food labels can be

applied to my future career" (r=0.64), "In a grocery store, given various unit prices, amounts per product, and storage methods, I would be able to identify the most cost-effective source of peas (i.e. fresh, frozen, canned)" (r=0.52), "I feel confident identifying different categories of vegetables (i.e. identify leafy greens, root vegetables, legumes, etc.)" (r=0.54), "I will be able to apply this semester tutorial to my everyday life" (r=0.45), and "I will be able to teach this semester tutorial to other individuals in my future career" (r=0.50). Based on the significant p-values, these statements still follow a substantial linear relationship in the absence of a program.

The following statements did not have significant linear correlations between the test and retest data.[34] These statements include, "Nutrition and cooking should be collaboratively approached" (r=0.02) and "My skill level in culinary nutrition will be positively affected from this semester tutorial" (r=0.39). Based on the insignificant p-values, these statements did not follow a significant linear relationship. A plausible reason why the statement, "My skill level in culinary nutrition will be positively affected from this semester tutorial" did not have a strong linear correlation from test to retest is because the participants used for this procedure did not actually complete the "semester tutorial," therefore, this statement may have caused confusion.

READ Factor Analysis

Upon data entry, the 6-point Likert scale assigned to the READ questionnaire was changed to a 5-point Likert scale, ranging from 1 (Strongly disagree) to 5 (Strongly agree). The values 2 and 3 from the original scale were both counted as the value of 3 in the revised scale. The values were combined in order for both the READ and CWC

questionnaires to have the same 5-point Likert scale and to provide response consistency between the two questionnaires. Two participants were removed from the READ analysis, both from the treatment 2 group. Participant removal from analysis was done because one of the participants did not complete the post-READ questionnaire and the other participant in treatment 2 joined the program after the first session, therefore, was not in the control group. Thus, they both were removed from the READ analysis completely in order to increase the accuracy and validity of the results.

The READ statistical analysis was performed using SAS® version 9.2. A factor analysis was performed on the READ questionnaire to establish which of the 17 items loaded onto particular factors given this was the first time the questionnaire was administered to a group of participants and there had been no previous analyses performed on either the questionnaire as a whole or its individual statements. The factor analysis was conducted using a factor procedure on SAS® version 9.2. A varimax rotation method was used to extract uncorrelated or orthogonal components.[22]

Table 2.10: Readiness and Desire to Participate in Cooking With a Chef and Shopping Matters (READ) Questionnaire Eigenvalues of Correlation Matrix from Factor Analysis

Component	Eigenvalue	Component (cont.)	Eigenvalue (cont.)
1	4.697	9	0.563
2	2.057	10	0.477
3	1.446	11	0.360
4	1.290	12	0.320
5	1.014	13	0.247
6	0.915	14	0.183
7	0.670	15	0.134
8	0.630		

Table 2.11: Readiness and Desire to Participate in Cooking With a Chef and Shopping Matters (READ) Questionnaire Rotated Factor Pattern from Factor Analysis

Variable (Overall Theme)	Factor 1 CAREER	Factor 2 CURRKNOW	Factor 3 APPSELF	Factor 4 TERMS	Factor 5
Read_NutCook (Nutrition and cooking should be collaboratively approached)	16	6	9	-9	**90***
Read_HealthLC (Healthy food can be low-cost)	5	32	-11	32	30
Read_WGExam (Lists examples of suggested whole grain products)**	5	12	-3	**79***	-17
Read_RetP (Retail price is the best indication of a low-cost item)**	9	-20	10	**78***	9
Read_CulNut (Culinary nutrition can be applied to future career)	**81***	13	0	0	-4
Read_WG (Identifying whole grains can be applied to future career)	**87***	14	3	12	12
Read_EconFruVeg (Identifying methods to buy low-cost food can be applied to future career)	**85***	2	3	18	19
Read_FoodLab (Comparing food labels can be applied to future career)	**89***	7	14	9	19
Read_UnitPri (Comparing unit prices can be applied to future career)	**84***	1	12	2	2
Read_GStore (Ability to identify most cost-effective source of produce)	8	**78***	-3	-9	8

Read_BasCook (Use basic cooking skills to create nutritious meals)	24	**78***	10	1	0
Read_DiffVeg (Ability to identify different types of vegetables)	2	**87***	-1	3	1
Read_SkillCN (Culinary nutrition skills will be/have been positively affected from tutorial)	19	-11	**80***	-1	0
Read_Apply (Applying tutorial to everyday life)	6	12	**85***	5	7
Read_Teach (Teaching tutorial in future career)	**68***	17	27	-19	-21
Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.4 are flagged by an '*'. **Statements are false.					

According to the eigenvalue results (**Table 2.10**) and rotated factor pattern (**Table 2.11**), a total of five factors were retained. The factor analysis used the eigenvalue-one criterion or the Kaiser criterion, which states to retain components with an eigenvalue greater than 1.00.[22] Due to the eigenvalue results in **Table 2.10**, five factors had eigenvalues greater than 1.00. A varimax rotation method was used due to its ability to maximize the variance of a column of the factor pattern matrix. This rotation method is also the most commonly used orthogonal rotation method.[22] Although five factors were identified based on the eigenvalue-one criterion, only the first three factors were considered due to the major themes and number of items retained within each factor. Six of the variables were grouped into factor 1: culinary nutrition can be applied to my future career, identifying whole grains can be applied to my future career, identifying methods

to buy low-cost food can be applied to my future career, reading nutrition labels can be applied to my future career, comparing unit prices can be applied to my future career, and teaching the program in my future career. Factor 1 consisted of variables that referenced the program's applicability to participants' careers, therefore, was labeled CAREER. Three of the variables were grouped into factor 2: the ability to identify the lowest cost form of peas, the ability to use basic cooking skills to plan and prepare nutritious meals, and the ability to identify different types of vegetables. Factor 2 consisted of variables that referenced the participants' current abilities, therefore, was labeled CURRKNOW. Two of the variables were grouped into factor 3: culinary nutrition skills have been positively affected from the program and applying the program to everyday life. Factor 3 consisted of variables that referenced the program's applicability to the participants, therefore, was labeled APPSELF. The remaining four variables were not considered as part of these three factors but were still analyzed: identifying whole grain products, understanding retail price vs. unit price, the collaboration of nutrition and cooking, and healthy food can be low-cost. Identifying whole grain products and understanding retail price vs. unit price were analyzed together since they were grouped together by the factor analysis (factor TERMS). The collaboration of nutrition and cooking and healthy food can be low-cost were individually analyzed since they were not grouped in the first four factors (**Table 2.11**).

READ Data Analysis

A mixed procedure was used for the READ analysis. A mixed procedure analyzes statistical differences within groups (pre to post-program) and between groups (treatments and control).

Table 2.12: P-Values from Testing Differences Between Treatments and Control Based on Readiness and Desire to Participate in Cooking With a Chef and Shopping Matters (READ) Questionnaire Factor and Variables

Factor/Variable	p value
CAREER: Applicability of Program to Career	0.9106
CURRKNOW: Current Knowledge and Abilities with Identifying Low Cost Produce, Identifying Vegetables, and Preparing Nutritious Meals	<0.0001*
APPSELF: Applicability of Program to Everyday Life	0.2483
TERMS: Definitions of Whole Grains and Unit Price	0.0779
Read_NutCook: Collaboration of Nutrition and Cooking	0.4929
Read_HealthLC: Healthy Food Can Be Low Cost	0.8770

*Significant difference between treatments and control group ($p<0.05$)

Only the CURRKNOW factor showed significant differences between the treatment and control groups (**Table 2.12**). The CAREER, APPSELF, and TERMS factors as well as the collaboration of nutrition and cooking and healthy food can be low-cost variables did not show significant differences between the treatment and control groups.

Table 2.13: Readiness and Desire to Participate in Cooking With a Chef and Shopping Matters (READ) Questionnaire Descriptive Statistics (Mean, Standard Error of the Mean (SEM), Range) for Pre-Test and Post-Test of Treatment 1, Treatment 2, and Control Groups

		Pre-test			Post-test		
Group	**Scale**	**Mean**	**SEM**	**Range**	**Mean**	**SEM**	**Range**
T1	**CAREER**	25.81	0.90	14.00-30.00	26.19	0.90	15.00-30.00
	CURRKNOW	12.22	0.36	8.00-15.00	13.81*	0.36	10.00-15.00
	APPSELF	9.48	0.15	7.00-10.00	9.26	0.15	7.00-10.00
	TERMS	5.11	0.39	3.00-8.00	5.41	0.39	2.00-10.00
	Read_NutCook	4.44	0.13	3.00-5.00	4.63	0.13	3.00-5.00
	Read_HealthLC	3.85	0.14	3.00-5.00	4.11	0.14	3.00-5.00
T2	**CAREER**	26.00	0.93	12.00-30.00	26.28	0.93	6.00-30.00

	CURRKNOW	11.36	0.38	6.00-15.00	13.64*	0.38	11.00-15.00
	APPSELF	9.76	0.16	8.00-10.00	9.52	0.16	6.00-10.00
	TERMS	5.28	0.41	2.00-10.00	6.16*	0.41	2.00-10.00
	Read_NutCook	4.76	0.14	4.00-5.00	4.44	0.14	1.00-5.00
	Read_HealthLC	4.16	0.14	3.00-5.00	4.44	0.14	3.00-5.00
C	**CAREER**	25.76	0.93	12.00-30.00	26.00	0.93	12.00-30.00
	CURRKNOW	11.92	0.38	9.00-14.00	11.36	0.38	6.00-15.00
	APPSELF	9.72	0.16	8.00-10.00	9.76	0.16	8.00-10.00
	TERMS	5.64	0.41	2.00-10.00	5.28	0.41	2.00-10.00
	Read_NutCook	4.68	0.14	3.00-5.00	4.76	0.14	4.00-5.00
	Read_HealthLC	3.92	0.14	3.00-5.00	4.16	0.14	3.00-5.00

Abbreviations: T1 – Treatment 1; T2 – Treatment 2; C – Control; CAREER – Applicability of Program and Program Components to Career; CURRKNOW – Current Knowledge and Abilities With Identifying Low Cost Produce, Identifying Vegetables, and Preparing Nutritious Meals; APPSELF – Applicability of Program and Program Components to Everyday Life; TERMS – Definitions of Whole Grain and Unit Price; Read_NutCook – Collaboration of Nutrition and Cooking; Read_HealthLC – Healthy Food Can Be Low Cost; SEM – Standard Error of the Mean
* Significant difference within group ($p<0.05$)

The CAREER factor, treatment 1, treatment 2, and control had slight increases in their mean scores from pre-test to post-test (0.38, 0.28, and 0.24). The CAREER factor had a minimum score of 6.00 and a maximum score of 30.00. There were no significant differences within the groups from pre-test to post-test (**Table 2.13**)

In terms of the CURRKNOW factor, both treatment 1 and treatment 2 had increases in their mean scores from pre-test to post-test (1.59 and 2.28) and the control had a slight decrease in the mean score from pre-test to post-test (-0.56). The CURRKNOW factor had a minimum score of 3.00 and a maximum score of 15.00. Both treatment 1 and treatment 2 had significant differences from pre-test to post-test (**Table 2.13**).

In terms of the APPSELF factor, both treatment 1 and treatment 2 had slight decreases in their mean scores from pre-test to post-test (-0.22 and -0.24) and the control

had a slight increase in the mean score from pre-test to post-test (0.04). The APPSELF factor had a minimum score of 2.00 and a maximum score of 10.00. There were no significant differences within the groups from pre-test to post-test (**Table 2.13**).

In terms of the TERMS factor, both treatment 1 and treatment 2 had slight increases in their mean scores from pre-test to post-test (0.3 and 0.88) and the control had a slight decrease in the mean score from pre-test to post-test (-0.36). The TERMS factor had a minimum score of 2.00 and a maximum score of 10.00. Only treatment 2 had a significant difference from pre-test to post-test (**Table 2.13**).

In terms of the collaboration of nutrition and cooking, both treatment 1 and control had slight increases in their mean scores from pre-test to post-test (0.19 and 0.08, respectively) and treatment 2 had a slight decrease in the mean score from pre-test to post-test (-0.32). The collaboration of nutrition and cooking statement had a minimum score of 1.00 and a maximum score of 5.00. There were no significant differences within the groups from pre-test to post-test (**Table 2.13**).

In terms of healthy food can be low-cost, treatment 1, treatment 2, and control all had slight increases in their mean scores from pre-test to post-test (0.26, 0.28, and 0.24). The healthy food can be low-cost statement variable had a minimum score of 1.00 and a maximum score of 5.00. There were no significant differences within the groups from pre-test to post-test (**Table 2.13**).

READ Discussion

The factor CAREER was neither statistically significant between the treatment groups and control group (**Table 2.12**) nor within the groups from pre-test to post-test

(**Table 2.13**). According to **Table 2.13**, both treatments and the control had increases in the mean scores from pre-test to post-test, indicating the program overall did not have a distinguished effect in increasing participants' beliefs of the program's applicability to their careers. However, there were some positive points discovered in terms of the CAREER factor. A majority of participants in treatment 1, treatment 2, and control strongly agreed with all the statements that referenced their future career, including culinary nutrition, identifying whole grains, comparing food labels, comparing unit prices, and knowledge of price and budget (**Appendix C**). Therefore, the overall participants in this pilot study recognized that culinary nutrition as well as price and budget play roles when it comes to health-related careers, which is very promising. Careers of interest to this group of participants included registered dietitians, physicians, dentists, and physical therapists.

For this particular pilot study, 2014 Sodexo dietetic interns, who completed the *Cooking Matters at the Store* training as part of their curriculum, were asked to complete the same READ questionnaire via SurveyMonkey in order to compare their response frequencies to those of the program participants. A majority of the seventeen interns surveyed also strongly agreed that culinary nutrition, price and budget, identifying whole grains, comparing food labels, and comparing unit prices applied to their future careers as registered dietitians (**Appendix D**). Therefore, the interns' beliefs of culinary nutrition and food budget applicability concur with those of the program participants. Thus, food science undergraduate students and current dietetic interns value culinary nutrition and purchasing healthy food on a budget applicable for their future careers.

The factor CURRKNOW was statistically significant between the treatment groups and control group (**Table 2.12**) as well as within treatment 1 and treatment 2 groups from pre-test to post-test (**Table 2.13**). This factor included present abilities to identify low-cost sources of produce, create nutritious meals, and identify different types of vegetables. These results indicate that the program positively affected participant's present abilities and confidence in using culinary nutrition skills and purchasing healthy food on a budget, concepts covered in *Cooking with a Chef* and *Cooking Matters at the Store*. A majority of participants in both treatment 1 and treatment 2 strongly agreed with the statements within this factor. A majority of the Sodexo interns also strongly agreed with these statements, indicating that Sodexo interns also have received sufficient *Cooking Matters at the Store* and culinary nutrition education. These results indicate that the *Cooking Matters at the Store* information taught to the program participants was sufficient enough to affect their knowledge about the subject. The Sodexo dietetic interns had to complete the Grassroots Adult Training program, recruit participants for a grocery store tour, as well as lead a certified *Cooking Matters at the Store* tour. The program participants simply participated in a shortened *Cooking Matters at the Store* tour led by the Grassroots-certified nutrition educator. Due to these results, the shortened program tour provided the participants with sufficient information to affect their abilities in shopping healthy on a budget.

The factor APPSELF was neither statistically significant between treatment and control groups (**Table 2.12**) nor within the groups from pre-test to post-test (**Table 2.13**). Both treatments had decreased mean scores from pre-test to post-test while the control

group had an increased mean score from pre-test to post-test, indicating the program did not positively affect participants' culinary skills nor was deemed useful in their everyday lives. Regardless, a majority of participants post- program in both treatment groups as well as the control group strongly agreed that their culinary nutrition skills were positively affected from the program as well as their belief in the program's applicability to their everyday lives (**Appendix C**). Thus, a majority of participants valued culinary nutrition and its applicability to their own lives post-program. A majority of the Sodexo interns believed both their culinary nutrition skills were positively affected from their internship as well as their internship's applicability to their lives, indicating current dietetic internship provide potential culinary nutrition education (**Appendix D**).

The factor TERMS was not statistically significant between treatment and control groups (**Table 2.12**) though there were significant differences in the treatment 2 group from pre-test to post-test (**Table 2.13**). Thus, differences within each treatment group in terms of participants' opinions and views may have existed. Responses from the treatment groups in both the pre-test and post-test were fairly dispersed among the five-item Likert scale (**Appendix C**). The Sodexo dietetic intern responses were also rather dispersed. One of the statements lists a number of grain products, where some are whole grains and some are not. Although the correct response was "false," participants and surveyed interns may have been confused since the statement contained both true and false answers. The second statement stated retail price is the best method to determine low-cost food. Although the correct answer was "false," some participants or surveyed interns may have found the statement to be too absolute. Although *Cooking Matters at*

the Store firmly states unit price to be the best method to compare food costs, shoppers often choose products based on retail price.

The variable indicating that nutrition and cooking should be collaboratively approached was neither statistically significant between treatment groups and control group (**Table 2.12**) nor within the groups from pre-test to post-test (**Table 2.13)**. In both the pre-test and post-test frequency responses for all groups, a majority of the participants strongly agreed with this statement (**Appendix C**). The frequency responses indicate that the participants believed in the concept of culinary nutrition entering the program, leading to insignificant differences based on the program. A majority of the Sodexo interns also strongly agreed with this statement (**Appendix D**). Overall, these results support that current food science undergraduate students and dietetic interns believe in the cohesive nature of culinary nutrition, which is promising.

The variable indicating that healthy food can be low cost was neither statistically significant between treatment groups and control group (**Table 2.12**) nor within the groups from pre-test to post-test (**Table 2.13**). There were increases in the mean scores in both treatments and control from pre-test to post-test, which is surprising. A potential reason for the overall increase in mean scores is the fact that the program was advertised as being a budget-tailored culinary nutrition class (**Table 2.13**). Therefore, the control group may have answered higher levels of agreement in their post-test in anticipation for the program.

Focus Group Results and Discussion

Focus Group Results

The focus group of eight anonymous and random participants was analyzed using a qualitative analysis method. The focus group was audio recorded and then transcribed verbatim. Three trained graduate students in the Food Science, Nutrition, and Packaging Sciences Department were recruited to provide an unbiased analysis of the transcript. The three graduate students met with the nutrition educator a total of three times. During the first meeting, Dr. Sarah Griffin, Qualitative Analysis expert, along with the three graduate students and nutrition educator reviewed qualitative analysis methods.[30] The nutrition educator and graduate students then thoroughly analyzed the transcript for major themes and began to create a codebook. At the second meeting, the nutrition educator and graduate students completed the transcript codebook. Two graduate students coded each response within the transcript. At the third meeting, the codes were compared in order to identify potential discrepancies within the code. Below are the major themes and their frequencies within the focus group transcript.

Table 2.14: Focus Group Key Themes Based on Information Covered

Information Covered		
Key Theme	**n_p**	**Participant Comment**
Change from Typical Curriculum in Other Mandatory Courses	14	"It was a breath of fresh air after all my hard science classes." "It taught me that a class doesn't have to be incredibly challenging for you to learn a lot because I feel like I gained more from this class which was very easy and approachable versus other really challenging classes." "Since I'm not a nutrition major all my classes are focused on the science aspect (of food science) but it really brought in a lot of MyPlate and (nutrition) things we learned in class."

		"This is without a doubt the most beneficial CI I've ever been in and I would say that I learned way more practical things from this class versus other more technical classes." "It was a more practical class as compared to other information I've learned in other classes…its things that I'm actually going to use."
Influenced Major Field of Study	11	"It just brings things into focus for me like this is why I'm in this major, this is what I want to do." "Before I took this class I've been considering switching majors so I'm glad that I took it because I actually got to learn what you actually should be learning in the major." "It's definitely an application-based class but that's what I was looking for especially freshman year because you get all your gen ed's so this kind of showed me what I'm going to be doing the next three years and it got me excited about this major."
Culinary Skills	11	"I thought some of the techniques that Paul showed us I hadn't learned before and that's what I had hoped to learn." "All the activities we did with the chef were useful and practical." "The basic knife skills or how to blanch something (are) useful skill(s) to all people." "It was really nice to be hands-on and create the products."
Culinary Nutrition	10	"I just like the fact that from now on when I am in the kitchen cooking, these nutrition ideas are going to be in the back of my brain." "I think (the class) was bringing the science of nutrition together with the art of cooking and bringing it down to a level for people who want to know more about cooking that don't necessarily know a lot about nutrition or the science behind it." "Specifically for this CI, (culinary nutrition) was incorporating as many nutrients, vitamins, and minerals into one dish."
General	3	"I thought for the amount of time we had which wasn't a lot there was a lot of stuff covered. We packed everything we could into the class."
Change of Perspective	3	"The 'Fruits and Vegetables for a Week' really put things into perspective when grocery shopping for the week because you don't actually think that huge

		amount would be just for a week." "Something I really liked was when we had to plan the menu for a day and incorporate all the food groups we needed. I feel like that really helped my put things into perspective of how much you need of each (food group) and how to combine (them)." "Paul one day was explaining different spices and using white wine vinegar…it was interesting that he was saying using white wine vinegar (because) I wouldn't have normally thought about using that." "Usually when I cook, I basically just do whatever I was taught at my house (so) its nice to learn different approaches to cooking."
Cooking Matters at the Store	2	"I thought the concepts were just really useful especially the Shopping Matters information at the grocery store."
Increased Level of Knowledge (i.e. Nutrition)	1	"I took (the class) as learning cooking techniques and skills that amplify the nutrition in food or going to buy foods and having knowledge of what is more nutritious."

Table 2.15: Focus Group Key Themes Based on Applying Program

Applying Semester Tutorial		
Key Theme	**n_p**	**Participant Comment**
Everyday Life	10	"I can (see myself) on a more personal level teach (children, family friends) the basics." "I would say (culinary nutrition) is the combination of health ideals that you can practice everyday and everyday cooking that people can do by themselves." "I thought the concepts were really useful and especially the Shopping Matters information at the grocery store. I thought that a lot of people could really use that even if they're not really interested in cooking fancy dishes. Everyone has to go to the store so its really useful." "I feel like you made (the class) really relevant to us because we're college students and don't have a lot of money and try to make affordable ways to eat healthy."
Future Career	5	"I think I learned more information that is practical for my future career because I'm going to hopefully be educating people with nutrition and using culinary skills to do that."

		"When (the nutrition educator) was talking about all the different (recipes) for hummus and for product development that's really beneficial because you could extend a line or a brand." "I feel like I could teach the Shopping Matters class to somebody. I could go to a grocery store and teach the information that you relayed to us."
General	5	"(In the future) this is (information) I'll think about later in my life and use."
Hands-On Activities	3	"The vegetable and fruit activity really helped because when I go to the grocery store now I am constantly thinking about the 9-10 servings of fruits and vegetables." "I definitely got experience that I feel like I wouldn't just get at home or just watching someone do it. It was really nice to just be hands-on and create the products."
Major Field of Study	2	"Since I'm going to do culinology (the class is) a really good intro to the class I'm taking in the kitchen."
General Public	1	"It showed us what we can actually tell other people (and) what people could understand later in the future."

Table 2.16: Focus Group Key Themes Based on Participant Career Choices

Careers		
Key Theme	**n_p**	**Participant Comment**
Registered Dietitian	4	"I would really love to be an RD at a hospital or clinic but I am also really interested in being a dietitian for a grocery store." "I want to be an RD in an outpatient facility and I want to be able to do counseling and teach classes and do grocery store tours." "I definitely want to do something with culinary nutrition and I want to get my RD certification."
Education	3	"I would rather do education when I leave…teach lower level classes in this major or maybe even lead a CI."
Product Development	2	"I really want to do product development for some sort of food company like Stonyfield Yogurt and come up with new food items." "I want to do product development."

Chef	1	"Best case scenario I'll go to culinary school and be a chef or have a bakery."

Table 2.17: Focus Group Key Themes Based on Suggestions for Program Improvement

Suggestions for Overall Improvement		
Key Theme	**n_p**	**Participant Comment**
More Application-Based Nutrition Knowledge	3	"If we go through each ingredient…and commenting on every aspect and that way we're getting the whole picture and understanding the nutrition behind it a little bit more." "If we had a cooking (class) with Paul and Adair walk around and (comment). I feel like putting them together at the same time is beneficial because it's happening right there."
Change in Class Structure	3	"The first half of the semester you do all the cooking and the second half of the semester you do nutrition or vice-versa."
Longer Time-Slot	2	"I really think it could be beneficial if it was 2 hours." "I think if it was back to back for two hours."
Increase in Course Credit Hours	2	"Making (the class) two credits. One could be cooking with Paul and the other credit could be sitting down with Adair."
Increase in Culinary Skills	2	"I wanted it to be almost a basic cooking class but showing how nutrition is involved in (cooking)." "Increase the recipes we do and increase the kinds of cooking because baking is very much unhealthy so if you had an aspect like that…and teaching (how) those methods (can) be more nutritious."
Increase in Learning Ingredient Properties	2	"We could talk about what gives foods its different characteristics because I feel for other classes that ties into those."
Increase in Resources and Space	1	"The kitchen is kind of small…it's hard to get hands-on and one-on-one interaction."

Focus Group Discussion

There were 14 different responses that addressed the program was a change from other mandatory courses. Participant comments include that the course was not only a

"breath of fresh air" but also taught them practical information that they will use. There were 11 different responses that addressed the program either reaffirmed or increased interest in their major field of study. This key theme suggests that the program contains many of the core competencies that Food Science undergraduate students value within their majors. There were 11 different responses that addressed the culinary skills to be particularly useful, beneficial, and enjoyable. The high frequency of this key theme indicates that food science undergraduate students strongly believe in the importance and practicality of cooking. There were 10 different responses that addressed the program in terms of culinary nutrition, indicating participants recognized and supported the concept of culinary nutrition. There were 3 different responses that addressed the general information covered in the course and its usefulness in the future. There were also 3 different responses that addressed the program provided a change of perspective, either when grocery shopping, planning a menu, or using ingredients in the kitchen. These comments indicate that the program enabled Food Science students to broaden their horizons in terms of food purchasing, healthy eating, and cooking in the kitchen. There were 2 different responses that addressed the enjoyment and benefits of the Cooking Matters at the Store program, indicating the grocery store tour made an impact on the participants. Lastly, there was 1 response that addressed the program information to increase their level of nutrition knowledge (**Table 2.14**).

There were several key themes addressed in the focus group that related applying the program. There were 10 different responses that addressed the program could apply to everyday life, either the culinary nutrition concepts or the Cooking Matters at the Store

information. One participant commented that they could teach the information taught from the program to friends or family. One participant highlighted that the program was rather relevant to college students, based on the program addressing eating healthy on a budget. These responses suggest that the program was successful in both relating concepts to everyday life as well as to college students. There were 5 different responses that addressed the program applying to future careers, in terms of educating future patients on culinary nutrition or shopping healthy on a budget as well as applying the information to food product development. There were 5 responses that addressed the theme of applying general program information. There were 3 different responses that addressed applying to class' hands-on activities, including the homework assignments of the culinary demonstrations. There were 2 different responses that addressed applying the program to the major field of study, such as Culinology, indicating information from the program relates and applies to other majors within the department. Lastly, there was 1 response that addressed applying the program to the general public. Due to these key themes, the program seemed to have a high degree of applicability (**Table 2.15**).

Program participants were interested in pursuing a variety of careers. There were 4 responses (3 participants) that addressed becoming a registered dietitian, 3 responses (2 participants) that addressed pursuing education, 2 responses (2 participants) that addressed entering product development, and 1 response (1 participant) that addressed becoming a chef. Based on previous key themes and this list of careers, participants in this program are interested in pursuing a variety of career paths (**Table 2.16**).

There were a few suggestions stated for program improvement. There were 3 responses that addressed the program should have more application-based nutrition knowledge, where nutrition is implemented more within food preparation. For example, one participant suggested thoroughly identifying the nutrition aspect of each ingredient used. There were 3 responses that addressed changing the class structure, such as separating cooking and nutrition. There were 2 responses that addressed increasing the program time-slot to two hours. There were 2 responses that addressed increasing the amount of culinary skills performed during the class, such as increasing the amount of recipes and including more cooking methods, such as baking. There were 2 responses that addressed the program should include discussing ingredient properties. Lastly, there was one response that addressed the program should be taught in an environment with more kitchen resources and space. Although suggestions for improvement were stated, they were minor and those that can be easily implemented (**Table 2.17**).

Conclusions

Based on results from this pilot study, a culinary nutrition program implementing healthy eating on a budget is a successful method to increase self-efficacy in cooking, using various cooking techniques, and using produce and seasonings as well as increasing culinary nutrition and healthy eating on a budget practices among food science undergraduate students. Participants overall recognized the importance of incorporating budget into healthy eating and its applicability both in their everyday lives and future careers. Results from current surveyed dietetic interns indicates that current Food Science undergraduates value culinary nutrition, healthy eating on a budget, and their

applicability similarly to post-graduate individuals about to enter similar careers of interest.

This pilot study was an effective method of teaching *Cooking Matters at the Store* information to undergraduate students. Based on their high levels of understanding and positive beliefs towards the program, these participants could serve as the next generation of volunteer tour leaders, further publicizing the importance of the *Cooking Matters at the Store* program.

Future Implications

In the future, the program could possibly address certain concepts covered in the CWC questionnaire more directly. For example, the program could devote an entire class period to methods of incorporating fruits and vegetables into meals and snacks. The chef could demonstrate how to properly cut and store various types of produce while the nutrition educator identifies current barriers of produce availability as well as leads an active discussion on the nutritional significance of incorporating fruits and vegetables into the diet. The nutrition educator could assess whether participants already cook meals at home and if not, identify and minimize barriers. The chef could demonstrate recipes and state which meal of the day they could be used for. The program could also address this subject in more depth. For example, the chef could create a recipe that specifically includes approximately half of the daily-recommended servings and the nutrition educator could discuss with the participants each of the servings in the meal. In the future, when using this program on undergraduate food science students, the CWC curriculum and questionnaire could contain more advanced culinary nutrition concepts

that semi-experienced nutrition cooks would not know prior to the program. By aiming the curriculum and questions/statements towards a more culinary nutrition experienced group, possible differences and effects could be seen as a result from the program.

A study could also include a follow-up evaluation of the participants post-program, such as 6 months after the program. This evaluation could determine the level of knowledge, beliefs, and attitudes still present after the program.

Based on factor analysis and test-retest reliability results, the READ questionnaire could be further modified. For example, removing or modifying the variables that do not belong to the major three factors as well as those that did not have a Pearson's coefficient $\geq$0.7 from pre-test to post-test.

Based on responses from the focus group, the program could contain more application-based nutrition knowledge as well as be offered as a 2-credit, 2-hour long class. The nutrition educator could include more nutrition information specific to each recipe. Also, it may be optimal that the class contains fewer students, since it was suggested the environment did not have enough space or resources.

Limitations

This group of participants represented a rather homogenous group of students. Participants for this pilot-study were undergraduate food science students, either emphasizing in nutrition or food technology. Therefore, these results were for a group of undergraduate students with a general background in food science and nutrition. Also, a significant amount of the participants had previous foodservice experience.

The program was administered in a short time frame. Each group met weekly for 50 minutes, which included nutrition demonstrations and discussions, hands-on cooking activities, and a mealtime for the participants to taste the recipes they assisted to prepare. At times, the curriculum seemed rather rushed. Both the *Cooking With a Chef* and *Cooking Matters at the Store* curriculums had to be shortened for time purposes.

The CWC results from this pilot study couldn't properly be compared to the previous CWC results from Andrew Warmin's study on college students because different statements within the scale were tested in each study.[38,39] For example, some statements in the pilot study were removed for analysis due to lack of information covered in the program.

The SMFA results from this pilot study couldn't properly be compared to those from the Adult Grassroots Leaders since the participants did not complete the same online training.

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APPENDICES

Appendix A

Readiness and Desire to Participate in Cooking With a Chef and Shopping Matters (READ) Questionnaire Items and Corresponding Statements

Read_NutCook	'Nutrition and cooking should be collaboratively approached.'
Read_HealthLC	'Healthy food options can be low-cost.'
Read_WGExam	'Whole grain products include rice flour, unbleached enriched flour, and foods containing whole grains.'
Read_RetP	'Comparing retail prices is the best method to determine the lowest-cost product.'
Read_CulNut	'Culinary nutrition can be implemented into my future career.'
Read_WG	'The ability to identify whole grains can be applied to my future career.'
Read_EconFruVeg	'The ability to identify economical methods to purchase vegetables and fruits can be applied to my future career.'
Read_FoodLab	'The ability to compare product food labels can be applied to my future career.'
Read_UnitPri	'The ability to compare product unit prices can be applied to my future career.'
Read_GStore	'In a grocery store, given various unit prices, amounts per product, and storage methods, I would be able to identify the most cost-effective source of peas (i.e. fresh, frozen, canned).'
Read_BasCook	'I can currently use basic cooking techniques to plan and prepare nutritious meals.'
Read_DiffVeg	'I feel confident identifying different categories of vegetables (i.e. identify leafy greens, root vegetables, legumes, etc.).'

Read_SkillCN	'My skill level in culinary nutrition will be positively affected from this semester tutorial.'
Read_Apply	'I will be able to apply this semester tutorial to my everyday life.'
Read_Teach	'I will be able to teach this semester tutorial to other individuals in my future career.'

Appendix B

Previous Cooking With a Chef (CWC) Questionnaire Data Collected on College Students[38]

		Pre-test			Post-test		
Group A	**Scale**	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**
	AAFV	0.70	0.23	0.13-1.0	0.68	0.25	0.0-1.0
	CA	3.47	0.33	2.57-4.14	3.53	0.27	2.57-4.00
	CB	2.58	0.52	1.67-3.56	2.61	0.63	1.33-4.11
	SEPC	3.32	0.86	1.0-5.0	3.47	0.82	1.0-5.0
	SEC	3.66	0.70	2.0-5.0	3.98*	0.69	1.5-5.0
	SECT	3.49	0.85	1.67-4.83	3.81*	0.74	1.25-1.50
	SEFVS	3.31	0.90	1.38-4.62	3.89*	0.65	2.13-5.0
	score	3.75	1.61	1.0-7.0	5.25*	1.13	2.0-7.0
Control	AAFV	0.71	0.23	0.13-0.88	0.61	0.35	0.0-1.0
	CA	3.47	0.28	3.0-4.0	3.45	0.34	2.71-4.0
	CB	2.68	0.46	1.78-3.22	2.72	0.48	1.78-3.67
	SEPC	3.13	0.92	1.0-5.0	3.21	1.10	1.0-5.0
	SEC	3.65	0.73	2.33-4.83	3.65	0.61	2.33-5.0
	SECT	3.58	0.76	2.08-5.0	3.60	0.60	2.17-5.0
	SEFVS	3.58	0.83	2.0-5.0	3.58	0.78	2.25-5.0
	score	3.95	1.81	1.0-7.0	4.46	1.84	1.0-7.0

Abbreviations: AAFV – Availability and Accessibility of Fruits and Vegetables; CA – Cooking Attitudes; CB – Cooking Behaviors; SEPC – Produce Consumption Self-Efficacy; SEC – Cooking Self-Efficacy; SECT – Self-Efficacy for Using Basic Cooking Techniques; SEFVS – Self-Efficacy for Using Fruit, Vegetables, and Seasonings; score – Knowledge of Cooking Terms and Techniques; SD – Standard Deviation

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

Appendix C

Program Participants' Readiness and Desire to Participate in Cooking With a Chef and Shopping Matters (READ) Questionnaire Frequency Results

Variable (Overall Theme)		SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)
Treatment 1						
Read_NutCook (Nutrition and cooking should be collaboratively approached)	Pre	0 (0)	0 (0)	6 (22.22)	3 (11.11)	18 (66.67)
	Post	0 (0)	0 (0)	3 (11.11)	4 (14.81)	20 (74.07)
Read_HealthLC (Healthy food can be low-cost)	Pre	0 (0)	0 (0)	9 (33.33)	13 (48.15)	5 (18.52)
	Post	0 (0)	0 (0)	6 (22.22)	12 (44.44)	9 (33.33)
Read_WGExam (Lists examples of suggested whole grain products)*	Pre	3 (11.11)	4 (14.81)	6 (22.22)	10 (37.04)	4 (14.81)
	Post	8 (29.63)	0 (0)	5 (18.52)	6 (22.22)	8 (29.63)
Read_RetP (Retail prices is the best indication of a low-cost item)*	Pre	1 (3.70)	0 (0)	12 (44.44)	10 (37.04)	4 (14.81)
	Post	6 (22.22)	0 (0)	6 (22.22)	8 (29.63)	7 (25.93)
Read_CulNut (Culinary nutrition can be applied to future career)	Pre	0 (0)	1 (3.70)	3 (11.11)	9 (33.33)	14 (51.85)
	Post	1 (3.70)	0 (0)	2 (7.41)	5 (18.52)	10 (70.37)
Read_WG (Identifying whole grains can be applied to future career)	Pre	1 (3.70)	3 (11.11)	1 (3.70)	7 (25.93)	15 (55.56)
	Post	1 (3.70)	0 (0)	3 (11.11)	8 (29.63)	15 (55.56)
Read_EconFruVeg (Identifying methods to buy low-cost food can be applied to future career)	Pre	0 (0)	2 (7.41)	2 (7.41)	8 (29.63)	15 (55.56)
	Post	0 (0)	1 (3.70)	3 (11.11)	7 (25.93)	16 (59.26)
Read_FoodLab	Pre	1 (3.70)	1 (3.70)	3 (11.11)	5 (18.52)	17 (62.96)

(Comparing food labels can be applied to future career)	Post	0 (0)	1 (3.70)	4 (14.81)	5 (18.52)	17 (62.96)
Read_UnitPri (Comparing unit prices can be applied to future career)	Pre	0 (0)	1 (3.70)	5 (18.52)	9 (33.33)	12 (44.44)
	Post	0 (0)	1 (3.70)	5 (18.52)	7 (25.93)	14 (51.85)
Read_GStore (Ability to identify the most cost-effective source of produce)	Pre	0 (0)	0 (0)	8 (29.63)	13 (48.15)	6 (22.22)
	Post	0 (0)	0 (0)	3 (11.11)	5 (18.52)	19 (70.37)
Read_BasCook (Use basic cooking skills to create nutritious meals)	Pre	0 (0)	1 (3.70)	2 (7.41)	11 (40.74)	13 (48.15)
	Post	0 (0)	0 (0)	2 (7.41)	5 (18.52)	20 (74.07)
Read_DiffVeg (Ability to identify different types of vegetables)	Pre	0 (0)	1 (3.70)	7 (25.93)	11 (40.74)	8 (29.63)
	Post	0 (0)	0 (0)	1 (3.70)	10 (37.04)	16 (59.26)
Read_SkillCN (Culinary nutrition skills will be/have been positively affected from tutorial)	Pre	0 (0)	0 (0)	0 (0)	5 (18.52)	22 (81.48)
	Post	0 (0)	0 (0)	0 (0)	12 (44.44)	15 (55.56)
Read_Apply (Ability to apply tutorial to my everyday life)	Pre	0 (0)	0 (0)	2 (7.41)	5 (18.52)	20 (74.07)
	Post	0 (0)	0 (0)	1 (3.70)	6 (22.22)	20 (74.07)
Read_Teach (Ability to teach this tutorial to others in future career)	Pre	0 (0)	0 (0)	3 (11.11)	9 (33.33)	15 (55.56)
	Post	0 (0)	0 (0)	5 (18.52)	10 (37.04)	12 (44.44)
Treatment 2						
Read_NutCook	Pre	0 (0)	0 (0)	0 (0)	6 (24.00)	19 (76.00)

(Nutrition and cooking should be collaboratively approached)	Post	1 (4.00)	0 (0)	1 (4.00)	8 (32.00)	15 (60.00)
Read_HealthLC (Healthy food can be low-cost)	Pre	0 (0)	0 (0)	5 (20.00)	11 (44.00)	9 (36.00)
	Post	0 (0)	0 (0)	1 (4.00)	12 (48.00)	12 (48.00)
Read_WGExam (Lists examples of suggested whole grain products)*	Pre	1 (4.00)	1 (4.00)	12 (48.00)	6 (24.00)	5 (20.00)
	Post	8 (32.00)	3 (12.00)	4 (16.00)	1 (4.00)	9 (36.00)
Read_RetP (Retail prices is the best indication of a low-cost item)*	Pre	2 (8.00)	1 (4.00)	14 (56.00)	6 (24.00)	2 (8.00)
	Post	6 (24.00)	2 (8.00)	12 (48.00)	0 (0)	5 (20.00)
Read_CulNut (Culinary nutrition can be applied to future career)	Pre	0 (0)	0 (0)	5 (20.00)	11 (44.00)	9 (36.00)
	Post	1 (4.00)	0 (0)	3 (12.00)	5 (20.00)	16 (64.00)
Read_WG (Identifying whole grains can be applied to future career)	Pre	1 (4.00)	0 (0)	4 (16.00)	7 (28.00)	13 (52.00)
	Post	2 (8.00)	0 (0)	0 (0)	5 (20.00)	18 (72.00)
Read_EconFruVeg (Identifying methods to buy low-cost food can be applied to future career)	Pre	0 (0)	0 (0)	3 (12.00)	5 (20.00)	17 (68.00)
	Post	2 (8.00)	0 (0)	0 (0)	4 (16.00)	19 (76.00)
Read_FoodLab (Comparing food labels can be applied to future career)	Pre	0 (0)	1 (4.00)	3 (12.00)	5 (20.00)	16 (64.00)
	Post	1 (4.00)	1 (4.00)	2 (8.00)	4 (16.00)	17 (68.00)
Read_UnitPri (Comparing unit prices can be applied to future career)	Pre	0 (0)	1 (4.00)	3 (12.00)	6 (24.00)	15 (60.00)
	Post	1 (4.00)	1 (4.00)	2 (8.00)	3 (12.00)	18 (72.00)
Read_GStore	Pre	2 (8.00)	2 (8.00)	7 (28.00)	9 (36.00)	5 (20.00)

(Ability to identify the most cost-effective source of produce)	Post	0 (0)	0 (0)	1 (4.00)	7 (28.00)	17 (68.00)
Read_BasCook (Use basic cooking skills to create nutritious meals)	Pre	0 (0)	1 (4.00)	4 (16.00)	12 (48.00)	8 (32.00)
	Post	0 (0)	0 (0)	2 (8.00)	7 (28.00)	16 (64.00)
Read_DiffVeg (Ability to identify different types of vegetables)	Pre	0 (0)	2 (8.00)	8 (32.00)	9 (36.00)	6 (24.00)
	Post	0 (0)	0 (0)	3 (12.00)	8 (32.00)	14 (56.00)
Read_SkillCN (Culinary nutrition skills will be/have been positively affected from tutorial)	Pre	0 (0)	0 (0)	0 (0)	2 (8.00)	23 (92.00)
	Post	0 (0)	0 (0)	1 (4.00)	6 (24.00)	18 (72.00)
Read_Apply (Ability to apply tutorial to my everyday life)	Pre	0 (0)	0 (0)	1 (4.00)	2 (8.00)	22 (88.00)
	Post	0 (0)	0 (0)	1 (4.00)	2 (8.00)	22 (88.00)
Read_Teach (Ability to teach this tutorial to others in future career)	Pre	1 (4.00)	0 (0)	4 (16.00)	8 (32.00)	12 (48.00)
	Post	1 (4.00)	0 (0)	6 (24.00)	8 (32.00)	10 (40.00)
Control						
Read_NutCook (Nutrition and cooking should be collaboratively approached)	Pre	0 (0)	0 (0)	2 (8.00)	4 (16.00)	19 (76.00)
	Post	0 (0)	0 (0)	0 (0)	6 (24.00)	19 (76.00)
Read_HealthLC (Healthy food can be low-cost)	Pre	0 (0)	0 (0)	7 (28.00)	13 (52.00)	5 (20.00)
	Post	0 (0)	0 (0)	5 (20.00)	11 (44.00)	9 (36.00)
Read_WGExam (Lists examples of suggested whole grain products)*	Pre	3 (12.00)	1 (4.00)	5 (20.00)	11 (44.00)	5 (20.00)
	Post	1 (4.00)	1 (4.00)	12 (48.00)	6 (24.00)	5 (20.00)
Read_RetP	Pre	5 (20.00)	1 (4.00)	14 (56.00)	4 (16.00)	1 (4.00)

(Retail prices is the best indication of a low-cost item)*	Post	2 (8.00)	1 (4.00)	14 (56.00)	6 (24.00)	2 (8.00)
Read_CulNut (Culinary nutrition can be applied to future career)	Pre	1 (4.00)	1 (4.00)	4 (16.00)	7 (28.00)	12 (48.00)
	Post	0 (0)	0 (0)	5 (20.00)	11 (44.00)	9 (36.00)
Read_WG (Identifying whole grains can be applied to future career)	Pre	1 (4.00)	1 (4.00)	2 (8.00)	6 (24.00)	15 (60.00)
	Post	1 (4.00)	0 (0)	4 (16.00)	7 (28.00)	13 (52.00)
Read_EconFruVeg (Identifying methods to buy low-cost food can be applied to future career)	Pre	1 (4.00)	0 (0)	4 (16.00)	5 (20.00)	15 (60.00)
	Post	0 (0)	0 (0)	3 (12.00)	5 (20.00)	17 (68.00)
Read_FoodLab (Comparing food labels can be applied to future career)	Pre	1 (4.00)	0 (0)	4 (16.00)	5 (20.00)	15 (60.00)
	Post	0 (0)	1 (4.00)	3 (12.00)	5 (20.00)	16 (64.00)
Read_UnitPri (Comparing unit prices can be applied to future career)	Pre	0 (0)	1 (4.00)	5 (20.00)	6 (24.00)	13 (52.00)
	Post	0 (0)	1 (4.00)	3 (12.00)	6 (24.00)	15 (60.00)
Read_GStore (Ability to identify the most cost-effective source of produce)	Pre	0 (0)	0 (0)	11 (44.00)	11 (44.00)	3 (12.00)
	Post	2 (8.00)	2 (8.00)	7 (28.00)	9 (36.00)	5 (20.00)
Read_BasCook (Use basic cooking skills to create nutritious meals)	Pre	0 (0)	0 (0)	4 (16.00)	9 (36.00)	12 (48.00)
	Post	0 (0)	1 (4.00)	4 (16.00)	12 (48.00)	8 (32.00)
Read_DiffVeg (Ability to identify different types of vegetables)	Pre	0 (0)	0 (0)	7 (28.00)	13 (52.00)	5 (20.00)
	Post	0 (0)	2 (8.00)	8 (32.00)	9 (36.00)	6 (24.00)

Read_SkillCN (Culinary nutrition skills will be/have been positively affected from tutorial)	Pre	0 (0)	0 (0)	1 (4.00)	3 (12.00)	21 (84.00)
	Post	0 (0)	0 (0)	0 (0)	2 (8.00)	23 (92.00)
Read_Apply (Ability to apply tutorial to my everyday life)	Pre	0 (0)	0 (0)	0 (0)	2 (8.00)	23 (92.00)
	Post	0 (0)	0 (0)	1 (4.00)	2 (8.00)	22 (88.00)
Read_Teach (Ability to teach this tutorial to others in future career)	Pre	0 (0)	0 (0)	4 (16.00)	6 (24.00)	15 (60.00)
	Post	1 (4.00)	0 (0)	4 (16.00)	8 (32.00)	12 (48.00)

SD – Strongly agree; D – Disagree; N – Neither agree nor disagree; A – Agree; SA- Strongly agree.
See Appendix A for variables and their exact corresponding statements.
*These statements are false.

Appendix D

Sodexo Dietetic Interns' Readiness and Desire to Participate in Cooking With a Chef and Shopping Matters (READ) Questionnaire Frequency Results

Variable (Overall Theme)	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)
Read_NutCook (Nutrition and cooking should be collaboratively approached)	0 (0)	0 (0)	1 (5.88)	5 (29.41)	11 (64.71)
Read_HealthLC (Healthy food can be low-cost)	0 (0)	0 (0)	0 (0)	7 (41.18)	10 (58.82)
Read_WGExam (Lists examples of suggested whole grain products)*	2 (11.76)	5 (29.41)	3 (17.65)	5 (29.41)	2 (11.76)
Read_RetP (Retail price is the best indication of a low-cost item)*	3 (17.65)	3 (17.65)	2 (11.76)	5 (29.41)	4 (23.53)
Read_CulNut (Culinary nutrition can be applied to future career)	0 (0)	0 (0)	1 (5.88)	4 (23.53)	12 (70.59)
Read_WG (Identifying whole grains can be applied to future career)	0 (0)	0 (0)	1 (5.88)	4 (23.53)	12 (70.59)
Read_EconFruVeg (Identifying methods to buy low-cost food can be applied to future career)	0 (0)	0 (0)	2 (11.76)	5 (29.41)	10 (58.82)

Read_FoodLab (Comparing food labels can be applied to future career)	0 (0)	0 (0)	1 (5.88)	3 (17.65)	13 (76.47)
Read_UnitPri (Comparing unit prices can be applied to future career)	0 (0)	0 (0)	2 (11.76)	4 (23.53)	11 (64.71)
Read_GStore (Ability to identify most cost-effective source of produce)	0 (0)	0 (0)	0 (0)	4 (23.53)	13 (76.47)
Read_BasCook (Use basic cooking skills to create nutritious meals)	0 (0)	0 (0)	0 (0)	1 (5.88)	16 (94.12)
Read_DiffVeg (Ability to identify different types of vegetables)	0 (0)	0 (0)	0 (0)	1 (5.88)	16 (94.12)
Read_SkillCN (Culinary nutrition skills will be/have been positively affected from internship)	0 (0)	1 (5.88)	2 (11.76)	3 (17.65)	11 (64.71)
Read_Apply (Applying internship to everyday life)	0 (0)	0 (0)	0 (0)	1 (5.88)	16 (94.12)
Read_Teach (Teaching info from internship in future career)	0 (0)	0 (0)	0 (0)	1 (5.88)	16 (94.12)

SD – Strongly agree; D – Disagree; N – Neither agree nor disagree; A – Agree; SA- Strongly agree.
See Appendix A for variables and their exact corresponding statements. For the Sodexo interns, Read_Skill CN, Read_Apply, and Read_Teach were modified to state "from dietetic internship" instead of "semester tutorial"
*These statements are false.

Appendix E

Cooking With a Chef (CWC) Questionnaire

Availability and Accessibility of Fruits and Vegetables (AAFV) Index			
DIRECTIONS: This section is about the presence of fruits and vegetables in your house during the past week. Please circle YES or NO for EACH question.			
1.	Did you have pure (100%) fruit juice in your home last week?	Yes	No
2.	Did you have fresh fruit in your home last week?	Yes	No
3.	Did you have raw or cooked vegetables in your home last week?	Yes	No
4.	Did you have salad in your home last week?	Yes	No
5.	In the last week, were fruit and vegetables on the kitchen counter or somewhere in the open?	Yes	No
6.	In the last week, was 100% fruit juice or cut up fresh fruit on the front shelf of the refrigerator as a snack?	Yes	No
7.	In the last week, were cut up fresh vegetables on the front shelf of the refrigerator as a snack?	Yes	No
8.	In the last week, were vegetables in the refrigerator prepared so they readily could be used in a meal?	Yes	No

Cooking Attitude (CA) Scale

DIRECTIONS: For each item below, indicate the extent to which you agree or disagree with the statement about cooking.

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
9.	I do NOT like to cook because it takes too much time.	☐	☐	☐	☐	☐
10.	Meals made at home are affordable	☐	☐	☐	☐	☐
11.	Cooking is frustrating.	☐	☐	☐	☐	☐
12.	I like trying new recipes.	☐	☐	☐	☐	☐
13.	It is too much work to cook.	☐	☐	☐	☐	☐
14.	Making meals at home helps me to eat more healthfully.	☐	☐	☐	☐	☐
15.	I find cooking tiring.	☐	☐	☐	☐	☐

Cooking Behavior (CB) Scale

DIRECTIONS: For the 3 items below, think about your usual cooking habits. Select ONE box for EACH question.

	How often did you do the following?	Not at all	1 to 2 times this week	Once a week	Several times each week	About every day
16.	Prepare meals from basic ingredients (such as whole fresh produce, raw chicken, etc).	☐	☐	☐	☐	☐
17.	Prepare meals using convenience items (such as bagged salad, prepared mashed potatoes, pre-shredded carrots, deli rotisserie chicken).	☐	☐	☐	☐	☐
18.	Reheat or use leftovers in another meal.	☐	☐	☐	☐	☐
18a.	Eat breakfast away from home	☐	☐	☐	☐	☐
18b.	Reheating leftovers from a home cooked lunch or dinner meal	☐	☐	☐	☐	☐
18c.	Reheating leftovers from a meal from away from home for lunch or dinner meal	☐	☐	☐	☐	☐
18d.	Using leftovers from a home cooked meal in a new dish	☐	☐	☐	☐	☐
18e.	Using leftovers from a meal away from home in a new dish	☐	☐	☐	☐	☐
18f.	Using fresh and convenience items in combination for home meal preparation (i.e. a bag salad with cooked meat or pasta dish)	☐	☐	☐	☐	☐
18g.	Eat lunch away from home	☐	☐	☐	☐	☐
18h.	Eat dinner away from home	☐	☐	☐	☐	☐

Produce Consumption Self-Efficacy (SEPC) Scale						
DIRECTIONS: For each item below, indicate the extent to which you feel confident about performing the particular activity. Select ONE box for EACH question.						
		NOT at all confident	**NOT very confident**	**Neither confident nor unconfident**	**Confident**	**Extremely confident**
19.	Eat fruits and vegetables at every meal, every day	☐	☐	☐	☐	☐
20.	Eat fruits or vegetables as a snack, even if everybody else were eating other snacks	☐	☐	☐	☐	☐
21.	Eat the recommended 9 half cup servings of fruits and vegetables each day	☐	☐	☐	☐	☐

Cooking Self-Efficacy (SEC) Scale

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

		NOT at all confident	NOT very confident	Neither confident nor unconfident	Confident	Extremely confident
22.	Cook from basic ingredients (ex: whole lettuce heads, fresh tomatoes, raw chicken)	☐	☐	☐	☐	☐
23.	Follow a written recipe (ex: preparing fresh salsa from tomatoes, onion, garlic, jalapeno peppers)	☐	☐	☐	☐	☐
24.	Prepare dinner from items you currently have in your pantry and refrigerator	☐	☐	☐	☐	☐
25.	Use knife skills in the kitchen.	☐	☐	☐	☐	☐
26.	Plan nutritious meals.	☐	☐	☐	☐	☐
27.	Use basic cooking techniques.	☐	☐	☐	☐	☐

Self-Efficacy for Using Basic Cooking Techniques (SECT) Scale

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

		NOT at all confident	NOT very confident	Neither confident nor unconfident	Confident	Extremely confident
28.	Boiling	☐	☐	☐	☐	☐
29.	Simmering	☐	☐	☐	☐	☐
30.	Steaming	☐	☐	☐	☐	☐
31.	Deep frying	☐	☐	☐	☐	☐
32.	Sautéing	☐	☐	☐	☐	☐
33.	Stir-frying	☐	☐	☐	☐	☐
34.	Grilling	☐	☐	☐	☐	☐
35.	Poaching	☐	☐	☐	☐	☐
36.	Baking	☐	☐	☐	☐	☐
37.	Roasting	☐	☐	☐	☐	☐
38.	Stewing	☐	☐	☐	☐	☐
39.	Microwaving	☐	☐	☐	☐	☐

Self-Efficacy for Using Fruits, Vegetables, and Seasonings (SEFVS) Scale

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.

		NOT at all confident	NOT very confident	Neither confident nor unconfident	Confident	Extremely confident
40.	Fresh or frozen green vegetables (ex: broccoli, spinach)	☐	☐	☐	☐	☐
41.	Root vegetables (ex: potatoes, beets, sweet potatoes)	☐	☐	☐	☐	☐
42.	Fruit (ex: peaches, watermelon)	☐	☐	☐	☐	☐
43.	Herbs (ex: basil, thyme)	☐	☐	☐	☐	☐
43a.	Spices (ex: cayenne pepper, cinnamon)	☐	☐	☐	☐	☐
43b.	Vinegars	☐	☐	☐	☐	☐
43c.	Citrus juice	☐	☐	☐	☐	☐
43d.	Citrus zest	☐	☐	☐	☐	☐
43e.	Hot sauces	☐	☐	☐	☐	☐

Knowledge of Cooking Terms and Techniques Evaluation

DIRECTIONS: **For questions 56-61 below, indicate what you believe is the best answer by checking the box next to your response. Select ONE answer for EACH question.**

44. **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

45. 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.

46. A diced potato should be cut into :

* Long, thin matchstick size pieces.
* Very small and uneven pieces.
* Cubes usually ¼ to ¾ inch in size.
* Don't know.

47. 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.

48. 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.

Knowledge of Cooking Terms and Techniques Evaluation (Continued)

49. 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: For questions 62-63 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.

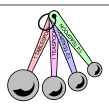
Orange Smoothie
1 cup fat free vanilla yogurt
½ cup sweet potatoes, cooked, cooled and mashed
1 cup orange juice
½ tsp vanilla extract
1 cup ice

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

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

51. 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

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
* Mixed/Other _____

What college education level are you currently in?

* Freshman
* Sophomore
* Junior
* Senior

Have you worked in foodservice before?

* Yes
* No

Appendix F

Final Assessment – Cooking Matters Tour Facilitator Online Training

(SMFA) Questionnaire

Question 1 (1 point)

As participants gather before the tour, you notice that everyone has brought a shopping cart along with them. What should you do?

Question 1 options:

- Ignore it and let participants each bring a cart.
- Tell participants that bringing carts on the tour is rude and they should put the carts back.
- Tell participants that to be respectful of other customers who may need to get by in the aisles, you'll need to ask that only participants who have small children with them should bring the cart along on the tour.

Question 2 (1 point)

As the tour leader, you are the expert and can tell participants what choices they should make about food.

Question 2 options:

- True
- False

Question 3 (1 point)

While discussing healthy cereal options, a participant says that she thinks low-sugar cereals taste nasty. A good response would be:

Question 3 options:

- A) Suggest ways to improve taste like adding fruit to low-sugar cereal.
- B) Tell her that she's wrong and that low-sugar cereals are delicious.
- C) Ask other participants to share ways that they have successfully transitioned their families to low-sugar cereals.
- D) Both A and C.
- E) None of the above.

Question 4 (1 point)

Much to your surprise, the community partner you are working with has been able to recruit 20 participants for your tour. A good course of action would be:

Question 4 options:

- A) Tell the partner that's too many participants for you to handle on one tour. Ask the partner to call some of the recruited participants and tell them they won't be able to join after all.
- B) Stay calm. Remember that not all participants who sign up will probably be able to show up - 10-16 participants is a more likely number.
- C) Find one to two additional tour leaders or assistants so that you can break into smaller groups or have help answering questions and facilitating hands-on activities as needed.
- D) Both B and C.
- E) None of the above.

Question 5 (1 point)

Which of the following common misunderstandings about how you can tell if a bread is a whole grain should you come prepared to discuss with participants:

Question 5 options:

- Brown bread
- Names or words like "multigrain," "seven grain" or "wheat"
- Front of package labels like "made with whole grains"
- All of the above

Question 6 (1 point)

Nutrition Facts

Serving Size 1 cup (137g)
Servings per Package 2

Amount Per Serving	
Calories 290	Calories from Fat 50
	% Daily Value
Total Fat 6g	**9%**
Saturated Fat 0g	**3%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 250mg	**10%**
Total Carbohydrate 50g	**17%**
Dietary Fiber 7g	**28%**
Sugars 6g	
Protein 10g	
Vitamin A 0% •	Vitamin C 30%
Calcium 4% •	Iron 10%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

You are helping participants figure out how to use a food label. A participant picks up a package with the Nutrition Facts Panel shown above.

You ask her to locate the serving size then determine how many servings of the food she would normally eat in a sitting. She says she would eat 2 servings. The number of grams of sugar she would normally eat in a sitting would be:

Question 6 options:

- 6 grams of sugar
- 9 grams of sugar
- 12 grams of sugar
- This number cannot be determined.

Question 7 (1 point)

Participants are in the canned vegetables aisle, getting hands-on practice reading food labels. As they compare different types of canned vegetables, what one key piece of information on the Nutrition Facts Panel would be good to draw their attention to?

Question 7 options:

- Vitamin A
- Sodium
- Protein
- Cholesterol

Question 8 (1 point)

Which food has the lower unit price?

Question 8 options:

- 15 oz canned green beans, $1.09
- 12 oz frozen green beans, $0.99

Question 9 (1 point)

You are sharing a tip with participants that "convenience" produce (like baby carrots or bagged salad) often costs more than whole forms of produce (like whole carrots or a head of lettuce). A participant tells you that she doesn't think that little bit of savings would matter compared to the time it would take her to chop the carrots or lettuce. A good response would be:

Question 9 options:

- Acknowledge the real trade-offs between time and cost and encourage participants to find the cost-saving strategies that work best for their lives.
- Have participants compare unit prices between the "convenient" food and the whole food to determine just how large the savings could be.
- Ask other participants to share tips on saving time when chopping up vegetables.
- All of the above.

Question 10 (1 point)

Participants are considering whether it would make sense to buy a 2 pound bag of sweet potatoes or loose (individual) sweet potatoes. The 2 pound bag is priced at $2.99. The loose sweet potatoes are priced at $0.50 each. You determine that about 8 sweet potatoes would be the same as 2 pounds. Which food has the lower unit price?

Question 10 options:

- The two pound bag.
- The loose sweet potatoes.
- They have the same unit price.
- It cannot be determined.

Appendix G

Readiness and Desire to Participate in Cooking With a Chef and

Shopping Matters (READ) Questionnaire

Questionnaire: Readiness and Desire to Participate in Cooking with a Chef and Shopping Matters

Name: _____

On a scale from 0-5 (0: strongly disagree, 5: strongly agree), answer the following statements:

☐ 1. Nutrition and cooking should be collaboratively approached.

☐ 2. Healthy food options can be low-cost.

☐ 3. Whole grain products include rice flour, unbleached enriched flour, and foods containing whole grains.

☐ 4. Comparing retail prices is the best method to determine the lowest-cost product.

☐ 5. Culinary nutrition can be implemented into my future career.

☐ 6. The ability to identify whole grains can be applied to my future career.

☐ 7. The ability to identify economical methods to purchase vegetables and fruits can be applied to my future career.

☐ 8. The ability to compare product food labels can be applied to my future career.

☐ 9. The ability to compare product unit prices can be applied to my future career.

☐ 10. In a grocery store, given various unit prices, amounts per product, and storage methods, I would be able to identify the most cost-effective source of peas (i.e. fresh, frozen, canned).

☐ 11. I can currently use basic cooking techniques to plan and prepare nutritious meals.

☐ 12. I feel confident identifying different categories of vegetables (i.e. identify leafy greens, root vegetables, legumes, etc.).

☐ 13. My skill level in culinary nutrition will be positively affected from this semester tutorial.

☐ 14. I will learn from this semester tutorial.

☐ 15. I will be able to apply this semester tutorial to my everyday life.

☐ 16. I will be able to teach this semester tutorials to other individuals in my future career.

☐ 17. I plan on working in the health care industry. If so, what in specific (i.e. clinical setting, public health, etc.)?