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Developing a Culinary and Nutrition Curriculum to Improve Diet Quality and Self-efficacy of College Students: the College Connection

Caitlyn Winn
University of Maine, caitlyn.winn@maine.edu

DEVELOPING A CULINARY AND NUTRITION CURRICULUM TO IMPROVE DIET QUALITY AND SELF-EFFICACY OF COLLEGE STUDENTS: THE COLLEGE CONNECTION

By

Caitlyn Winn

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Advisory Committee:

Dr. Jade McNamara, Assistant Professor, University of Maine, Advisor

Dr. Mona Therrien-Genest, Principal Lecturer and Dietetic Internship Director, University of Maine

Dr. Yanyan Li, Assistant Professor, University of Maine

DEVELOPING A CULINARY AND NUTRITION CURRICULUM TO IMPROVE DIET QUALITY AND SELF-EFFICACY OF COLLEGE STUDENTS: THE COLLEGE COOKING CONNECTION

By

Caitlyn Winn

Thesis Advisor: Dr. McNamara

An Abstract of the Thesis Presented
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Objective:
The objective of this study was to develop and assess the feasibility, the acceptability, and the program outcomes of a culinary nutrition education pilot program that was created using community-based participatory research.

Methods:
Curriculum development was guided by community based participatory research (CBPR) and influenced by both the social cognitive theory (SCT) and experiential learning theory (ELT) and adapted based on two evidenced based programs: *Cooking Matters* and *Culinary Bootcamp.* Feasibility of the program was assessed using an expert review developed in Qualtrics. Experts in the fields of nutrition, college student health, and curriculum development were contacted to participate in an online expert review. The goal of this expert review was to gain feedback regarding the feasibility and clarity of lesson objectives. Program feasibility and skill improvement capability was assessed using a Likert scale between 0-10, with lower scores indicating low feasibility and skill improvement capability. Perceived skill change of participants

was measured using a four-point scale (1= did not improve, 2= improved very little, 3= somewhat improved, 4= improved a lot). Participants completed post-class evaluations to determine whether lesson learning objectives were met, in addition to gaining curriculum feedback.

Results:

Experts were asked a series of questions about the program with answers on a Likert scale of zero to 10. Experts (N = 7) unanimously agreed that lesson objectives were clear and adequately addressed in all four lessons, with the majority of experts supporting the feasibility of the curriculum (8.96+/- 0.87). When asked about the ability of the program to improve diet quality of college students, the average score was 8.37 +/- 2.08. Experts felt that the program could improve cooking skills of college students (9.34 +/- 0.73) and could improve self-efficacy of college students (9.48 +/- 0.85). In addition, experts scored the ability of the program to improve the cooking self-efficacy of college students at a mean score of 8.43 +/- 1.52. On average, experts scored their confidence in teaching the program as 8.5+/- 1.57. From the students' perspective, 68.8% reported that their basic cooking skills improved, 79.3% reported that their budgeting skills improved, 84.8% reported that their knowledge related to nutrition and mental health improved, and 75.8% stated that their meal preparation skills improved. Ninety percent or more of participants met the lesson learning objectives.

Discussion:

Overall, experts found the College Cooking Connection curriculum to be valuable, organized, and clear. The majority of experts found the curriculum to be feasible and program objectives to be well-defined. Participant data also supported lesson clarity with 90% or more of participants

meeting the learning objectives, and majority of participants reporting a perceived increase in skills and knowledge. The clarity of the program and success in meeting lesson objectives of participants could be attributed to the adaptation of evidenced-based programming, use of theory, and incorporation of CBPR methodologies.

Conclusion:

Health programs have targeted college students' diet quality and cooking self-efficacy, but no existing programs have utilized adapted evidenced-based curricula, CBPR, behavioral theories, and expert content revision. Existing programs also neglect to evaluate lesson learning objectives and perceived skill change of participants. It was hypothesized that developing a culinary and nutrition program using CBPR, behavioral theories, and adapted evidenced-based curricula would result in a feasible and acceptable program, and an increase in nutrition and cooking knowledge and self-efficacy in college undergraduates. This hypothesis was supported, with the majority of experts reporting favorable feedback and participants meeting the learning objectives and reporting a perceived increase in skills and knowledge.

DEDICATION

This paper is dedicated to my friends and family, who have supported me both personally and professionally throughout my postgraduate studies. I would not be here without your unrequited support.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

1.1 Problem

College students are a uniquely vulnerable population in the domains of mental health, diet quality, and unhealthy weight outcomes due to challenges such as high academic stress, limited resources, low food security, and inadequate cooking and nutrition knowledge and self-efficacy.[1] Habits that are formed during this period of young adulthood lay the foundation for the rest of adulthood, making this a critical time to implement health interventions. Health programming in this population must address nutrition knowledge and self-efficacy as a means to support the physical and mental health of college students. Rates of adult obesity in the United States continue to rise. Obesity increases the risk for various noncommunicable diseases, including cancer, heart disease, stroke, and diabetes.[2,3]

Regular consumption of fruits and vegetables is inversely associated with obesity due to the high nutritional and low caloric content of these foods.[4] Cooking self-efficacy impacts fruit and vegetable intake through its influence on at home meal preparation.[5] Meals prepared at home tend to be lower in saturated fat, sodium, and added sugars, and higher in fruits and vegetables.[5] Nutrition and culinary interventions in the college setting are a necessary measure to reduce the burden of obesity on an already oversaturated healthcare system.

Coupled with obesity, young adults have the worst mental health out of any other age group, yet often go untreated.[6] Additionally, food insecurity is exacerbated in the college setting by a lack of resources, scarcity of grocery stores on campuses, inadequate cooking self-efficacy, and inadequate cooking facilities.[1] Despite the relevance of these topics, existing culinary and nutrition interventions neglect budgeting and the connection between nutrition and mental health.

Utilizing community based participatory research (CBPR) is one way to avoid missing relevant topics by imploring community members as equal partners in program development.[7] Few culinary and nutrition programs utilize community voices. College Cooking Connection aimed to address these gaps by creating a community-tailored health intervention to improve the diet quality and self-efficacy of college students.

CHAPTER TWO

REVIEW OF THE LITERATURE

2.1. Health Behaviors of College Students

In the United States, 20 million young adults are enrolled in secondary education.[8] The college environment is notoriously unhealthy due to high incidences of stress, poor dietary habits, and excessive alcohol consumption.[9,10,11] For many young adults, this period brings drastic lifestyle changes. The amalgamation of new found independence, demanding academic schedules, easily accessible convenience foods, and pressure from peers to engage in unhealthy behaviors all play a role in the development of unhealthy habits during this period.[10,12]

In the U.S., 13.9% of college students are classified as obese, with young adults having the highest incidence of poor dietary habits.[10,13] The average college student gains 1.6-8.8 lbs. in their first year at university, with this weight gain often continuing throughout college.[12,14] Unhealthy weight gain during young adulthood drastically increases the risk for unhealthy weight outcomes later in adulthood.[12,14] The impact of this weight gain is exacerbated in college students of low socioeconomic status who already have a higher risk of adverse health outcomes.[14] Young adults who are considered mildly or moderately overweight are more likely to become obese later in adulthood, with women being four times as likely to develop obesity by the fourth decade of their life.[10]

Young adulthood is a period where lifelong habits are formed, making this an essential time to encourage healthful behaviors. Inspiring healthful behaviors in the college student population will reduce the incidence of obesity and chronic illness in future generations. This is important because roughly 70% of adults in the United States are considered overweight and obese.[10] It is estimated that by 2030, 50% of adults in the United States will be classified as

obese with 25% classifying as severely obese.[15] For women, non-Hispanic black adults, and low-income adults, severe obesity is projected to be the most common body mass index (BMI) category.[8] This is a national concern, as obesity greatly increases the risk of various chronic diseases such as cancer, heart disease, stroke, and diabetes.[2,3]

In the United States, chronic diseases are the leading cause of disability and death.[3] Roughly 50% of adults have been diagnosed with at least one chronic disease, accounting for 75% of aggregate healthcare costs in the United States (1 trillion dollars annually).[16] Chronic diseases are responsible for the deaths of approximately 1.7 million Americans annually.[16] Globally, noncommunicable diseases such as cardiovascular disease, cancer, and diabetes account for roughly 70% of all deaths.[4] Positive health behaviors such as regular physical activity, abstinence from tobacco use, and healthful dietary habits have been shown to reduce the risk of developing chronic diseases by up to 80%.[3] The reduction of unhealthful habits could prevent the onset of up to 40 million cases of chronic disease in the United States.[16] The importance of healthy habit formation in young adulthood is widely documented yet has proven to be a complex and multifaceted endeavor.

2.2. Diet Quality

College students face many barriers when it comes to consuming a healthful diet, including lack of resources to purchase groceries, scarcity of grocery stores on campuses, lack of transportation, inadequate cooking facilities, and inadequate cooking skills.[1] Additionally, demanding academic schedules leave little time for meal preparation, with college students often choosing ready-made convenience meals.[3,17] Ready-made meals are high in sodium, fat, and added sugars, and low in essential nutrients.[3] Convenience meals are also frequently absent in

fruits, vegetables, lean proteins, and whole grains.[3] Fast food consumption, unhealthy weight loss methods, and skipping meals are common behaviors in this population.[18]

In a study conducted in 2018 by Hutchins et. al., registered dietitians collaborated with campus dining halls at the University of Indiana to offer nutritious meal options. These nutritious meals were labeled with a sycamore leaf to indicate selection by a dietitian.[13] Overall, students did not comprehend the meaning of the leaf symbol, indicating the need for improved marketing strategies.[13] The few students (n=6) who did report consistently selecting meals with the leaf symbol were more likely to consume fruits and vegetables.[13] Participants were primarily underclassmen (65%), and female (69%).[13] Of participating students, only 5.6% met the national dietary guidelines for fruit and vegetable intake.[13] This study highlights that even with environmental changes more needs to be done to get college students to consume a diet high in fruits and vegetables.

Fruits and vegetables contain essential compounds like fiber, antioxidants, and micronutrients, which support function and protect against disease.[4] In a study conducted in 2019 by Hee Lee and colleagues, only 12.3% of American adults met the United States Department of Agriculture (USDA) Dietary Guidelines for Americans 2020-2025 for fruit, with only 10% meeting vegetable recommendations.[19] Inadequate intake of fruits and vegetables is a risk factor for various noncommunicable diseases, such as cardiovascular disease.[4] In a study conducted by Zhan et. al., the risk of cardiovascular disease was inversely associated with vegetable intake.[20] Participants in this study who consumed the highest intake of fruits and vegetables experienced a 17% reduction in cardiovascular disease risk.[20] A 17% reduction is noteworthy, considering that the World Health Organization estimates that by the year 2030, 23.3 million people will die annually from cardiovascular disease.[20] In order to address the global cardiovascular disease

epidemic, it is critical to focus on the underlying conditions that exacerbate the risk of developing this disease, such as obesity.[2,3] Behavioral modifications such as increasing cooking self-efficacy reduce the risk of obesity by increasing the frequency of at home meal preparation.

2.3. Cooking Skills/ Self-Efficacy

Self-efficacy directly impacts the behavior of college students by influencing motivation to achieve difficult tasks.[21,22] Cooking self-efficacy refers to one's perceived confidence in cooking-related knowledge and skills, which significantly influence diet quality.[21] In a study conducted by Kourajian et. al., undergraduates (n=968) at Midwest University completed an online survey assessing cooking self-efficacy.[23] Cooking self-efficacy was assessed using a thirteen-item survey which asked students how strongly they agreed or disagreed with statements related to cooking confidence and skills.[23] The study showed that higher cooking skills scores were significantly correlated with increased vegetable consumption. [23] Comparatively, low cooking self-efficacy was associated with increased consumption of ready-made convenience meals and decreased home meal preparation.[5]

Ready-made foods tend to be higher in calories, sodium, saturated fat, and added sugars,[3] versus home-cooked meals, which tend to be higher in fruits, vegetables, and fiber.[3] In a study conducted by Wolfson et. al., cooking dinner at home two or more times per week was associated with decreased consumption of fat, sugar, and carbohydrates.[24] Adults living in households with higher cooking frequency have healthier diets than those who live in households with low cooking frequency.[24]

Cooking frequency, self-efficacy, and a positive attitude toward cooking are also related to better diet quality in young adults,[3,14,25] but students often lack these skills.[10] Minkow and colleagues assessed cooking skills using a survey adapted from Cooking with a Chef, a subset of

Clemson University Cooking and Healthy Eating Food Specialist program.[3] Findings indicated that 18.3% of women and 23.3% of men between the ages of 18-24 reported having inadequate cooking skills.[3] In a similar study conducted by Wilson et al. cooking skills and meal preparation patterns were assessed using a 67-item original survey.[25] In this study, only 56% of students reported feeling confident planning meals for the week ahead,[25] and 31.5% of college students only felt comfortable preparing a meal using ready-made ingredients.[25] Literature suggests an inverse relationship between the frequency of ready-made meal consumption and diet quality in the college student population.[3] Young adults who prepare meals at home are more likely to meet the dietary guidelines for fruits, vegetables, and whole grains.[3]

In a study conducted by Laska et. al., home meal preparation and regularity of meals were most strongly correlated with healthful dietary patterns.[10] In this study, students were recruited from three community colleges in the Twin Cities of Minnesota to participate in the 24-month intervention: CHOICES. Those randomized to the intervention group were enrolled in a one-credit course covering nutrition, sleep, stress, and physical activity.[10] Following completion of the intervention, 91.5% of students reported feeling somewhat to very satisfied with the course, with 94.1% reporting they would recommend the intervention to others.[10] These results showcase that students are interested and motivated in learning how to better their health. In addition to one's confidence in cooking, mental health has been established as a protective factor for healthful dietary behaviors.

2.4. Mental health

The vulnerability of the young adult population does not end with physical health, with rates of mental health disorders amongst college students nearly doubling in the last decade.[26,27] In the United States, young adults experience the highest rates of mental health disorders

compared to other age groups.[6] In a study conducted by the American College Health Association, 15.4% of college students reported having a diagnosis of depression, with 28.4% of students describing difficulty functioning due to depression.[26] In a similar study conducted by Duffy et. al., 18.5% of college students met the diagnostic criteria for major depressive disorder and 16.7% of students met the diagnostic criteria for generalized anxiety disorder.[28] Despite efforts by college campuses to provide adequate mental health support for students, individuals struggling with mental disorders continue to go untreated.[29] Without treatment, mental health disorders in young adults can have detrimental short-and long-term consequences, such as increased risk of drop out, lower academic achievement, substance use, unemployment, and suicidal actions and ideations. [28,29] Mental health status is also a significant determinant of physical health.[30]

The relationship between mental and physical health is bidirectional.[30] On one hand, mental health disorders like major depressive disorder (MDD) can lead to poor lifestyle and dietary behaviors.[31] This is related to the motivational diminishment associated with MDD, which hinders the ability of these individuals to maintain healthy habits such as exercising and consuming a healthful diet.[30] This diminished motivation impacts dietary intake and physical activity, also increasing chronic disease risk, including cardiovascular disease.[32,33,34]

On the other hand, oxidative stress and inflammation have been associated with the onset of depression.[35] Fruits and vegetables are abundant in antioxidants, which neutralize free radicals and reduce inflammation and oxidative stress.[35] Emerging evidence suggests that individuals who consume more fruits and vegetables have better mental health in terms of lower levels of depression and higher life satisfaction and happiness.[14,35,36,37]

In a study conducted by Blanchflower and colleagues, individuals between the ages of 16-75, who reported the highest life satisfaction and happiness levels, were those who consumed between seven and eight servings of fruits and vegetables daily.[38] In a related study conducted by Smith et. al., who assessed mental health status using the Profile of Fatigue Related Symptoms (PFRS) and the Hospital Anxiety and Depression Scale (HADS),[39] researchers found that college undergraduates who consumed a piece of fruit as a snack in the afternoon reported overall better mental health compared to those who snacked on chips or chocolate.[39] Similarly, Carr et. al. found that adult males between the ages of 18-35 who consumed two kiwi fruit daily for six weeks showed a significant decrease in depression and overall mood imbalances.[40]

One explanation for the relationship between fruit and vegetable intake and mental well-being could be the high presence of essential nutrients like Vitamins B and C, which play critical roles in major chemical neural pathways that dictate mood and emotions.[37] Vitamin C acts as a cofactor during the synthesis of dopamine and serotonin, hormones known to support mental well-being.[37] The Mediterranean Diet, which emphasizes fruits, vegetables, fish, and whole grains, has demonstrated protective effects against these mental disorders.[33] In a study conducted by Parletta and colleagues, adults between the ages of 18-65 with self-reported depression participated in a three-month nutrition intervention consisting of daily fish oil supplementation and bi-weekly nutrition education emphasizing the Mediterranean diet.[34] Following this intervention, participating adults showed significant improvements in depression and overall mental health status.[34] By understanding the connection between diet quality and mental health status, nutrition and culinary interventions can serve as a protective factor for the mental health status of participants through their positive impacts on diet quality.[41]

2.5. Culinary Interventions

Cooking intervention participants have shown promising changes in their overall health status, dietary intake, motivation, and self-efficacy.[41] In a study conducted by Davis and colleagues, diet quality and blood pressure of Latino elementary students (grades 3-5) improved following a 12-week cooking and gardening intervention including a nutrition education component.[42] In a 6-week study conducted by Caspi et. al., adults of low socioeconomic status were recruited to participate in a combined nutrition education and cooking intervention. Following this intervention, cooking skills and diet quality improved.[43] These studies highlight that cooking interventions serve as a bridge between nutrition education and healthful dietary habits, by providing participants with the skills necessary to implement healthy eating behaviors independently. [42,43,44] While many cooking interventions have been implemented in adult and youth populations, few interventions have targeted college students.

In a study conducted by Ellis et. al., collegiate athletes were recruited to participate in a nutrition and culinary intervention rooted in the Social Cognitive Theory (SCT).[45] Self-efficacy for food preparation and selection significantly increased post intervention.[45] Participants had positive feedback related to the intervention, reporting they felt more comfortable cooking and experimenting with new recipes, and would recommend the course to a friend.[45] In another study conducted by McMullen et. al., college students were recruited to participate in the College CHEF (e.g., Cooking Healthfully, Educating for Life-Long Change) culinary and nutrition program.[46] Participants in this intervention experienced significant increases in self-efficacy related to fruit and vegetable consumption, basic cooking skills, and cooking with produce and seasonings.[46] These positive outcomes are likely due to the fact that both programs were developed using theory-driven methods.

2.6. Social Cognitive and Experiential Learning Theories

Behavioral theories have been widely implemented to guide the development of interventions aiming at improving health behaviors. Existing literature widely demonstrates the amelioration of health interventions incorporating behavioral theories.[47] The SCT focuses on the various intrinsic and extrinsic factors that influence human behavior including reciprocal determinism, self-efficacy, behavioral capability, observational learning, and reinforcements.[48]

The central concept of the SCT is reciprocal determinism, which encompasses the ongoing interaction between a person, their environment, and their behavior.[48] Self-efficacy refers to one's belief that they can complete a certain behavior successfully, resulting in a desired outcome.[22] Self-efficacy directly impacts behaviors through its influence on motivation.[22] When a person believes they are capable of completing a behavior successfully, they are more likely to perform this behavior.[22] Behavioral capability is the ability of a person to perform a task using their set of knowledge and skills.[48] Observational learning is another construct of the SCT, and refers to the modeling, observation, and replication of a desired behavior.[48] Reinforcements refer to positive and negative responses to behavior that influence the longevity of a given behavior.[48]

These behavioral constructs facilitate reciprocal determinism, thus influencing behavior. In a study conducted by Szczepanski et. al., the SCT was used to develop a 4-week college culinary and nutrition intervention called: Culinary Boot Camp.[49] Lessons within this curriculum focused on food groups, seasonal produce, food allergies, mindful eating, knife safety/skills, and strategies for grocery shopping/meal planning.[49] The final lesson of this program was a 60-minute guided grocery tour at a local grocery store.[49]At the end of each lesson students participated in a group mindful mealtime led by a registered dietitian.[49] Following this intervention, dietary intake of fruits, vegetables, fiber, potassium, vitamin C, and magnesium significantly increased.[49]

The experiential learning theory (ELT) takes a more hands-on approach, with the understanding that learning is an ongoing process shaped by experience. Existing literature demonstrates increased efficacy of nutrition and cooking interventions that incorporate experiential learning.[43] In a study conducted by Bohn et. al., college undergraduates, enrolled in an introductory food science and nutrition course, were recruited to participate in an experiential learning activity related to meal choices.[50] Students were first given a worksheet containing a variety of menu selections and asked to choose the meals that most closely emulated the meals they typically eat.[50] Students then received a brief lesson on nutrition labels and were asked to complete a dietary assessment of their selected meals. Following this experiential learning experience, 97% of students felt that the activity was helpful in learning at least one aspect of the course material.[50]

Behavioral theories like the SCT and ELT serve as powerful tools in interventions aiming to create lasting behavior change.[47]However, despite improving health behaviors of college students using these methods, there is limited research regarding the development of cooking programing for college students using frameworks, such as CBPR, to tailor the content to meet the needs of specific audiences.

2.7. Community Based Participatory Research

Community based participatory research (CBPR) is a community guided approach, involving members of a target population as stakeholders in the development of locally driven interventions.[7] As defined by the W.K. Kellogg Foundation's Community Health Scholars Program, CBPR is "a collaborative approach to research that equitably involves all partners in the research process and recognizes the unique strengths that each brings."[7] Existing literature demonstrates overall positive program outcomes and increased community involvement in

programs utilizing CBPR.[7] Employing community voices in the program development process encourages health equity and empowers community leaders.[7] The collaborative, multidisciplinary nature of CBPR fosters a mutually beneficial partnership between trained professionals and community members. The primary mechanism for cultivating this collaboration is the creation of a Community Advisory Board (CAB). Through participation in a CAB, community stakeholders advocate for their community as equal partners of the research team and provide unique and beneficial perspectives. Insights provided by community members guide the research team in the application of evidenced-based knowledge. Utilizing the opinions, experiences, and concerns of community members ameliorates the feasibility and efficacy of community health interventions.[32]

Of the limited existing cooking interventions targeting college students, the educational content mainly focuses on general nutrition information and basic cooking skills. Important topics like mental health and budgeting are overlooked in existing curricula, despite being influences of college students' dietary health. In a culinary and nutrition intervention developed by Szczepenski et. al., lessons focused on the five food groups and strategies for grocery shopping.[49] Bernardo and colleagues developed a similar study called Nutrition and Culinary in the Kitchen,[51] in which lessons focused on basic cooking skills, the importance of eating fruits and vegetables, and how to prepare healthy meals using pantry items. Additionally, the majority of existing culinary and nutrition interventions targeting college students do not utilize CBPR in program development, and therefore are likely missing essential topic areas that college students find to be helpful or motivational for healthful behavior change.

2.8. Hypothesis and Objectives

Therefore, it is hypothesized that a culinary and nutrition curriculum informed by a CAB and developed using behavioral theory and two evidenced based curricula, will meet the requirements of experts in the fields of nutrition, college student health, and curriculum development, and result in college student participants' meeting lesson learning objectives. To test this hypothesis, the following objectives were created:

1. Develop a culinary and nutrition education curriculum using social cognitive and experiential learning theories and two evidenced based curricula.
2. Gain feedback from experts in the fields of nutrition, college student health, and curriculum development.
3. Determine the efficacy and feasibility of the curriculum through post-lesson evaluations.

CHAPTER THREE

METHODOLOGY

Study Design

The aim of this study was to (1) develop an evidenced-based culinary nutrition education pilot program as a result of a CBPR program, (2) assess the feasibility of the program, and (3) determine the acceptability and program outcomes. College Cooking Connection (CCC) was created to address health discrepancies such as high stress, poor dietary habits, and low food security in college students. Curriculum development was guided by CBPR and influenced by both the SCT and ELT and adapted based on two evidenced based programs: *Cooking Matters*[52] and *Culinary Bootcamp.*[49] Feasibility of the program was assessed using an expert review. Experts in the fields of nutrition, college student health, and curriculum development were contacted to participate in an online expert review. The goal of this expert review was to gain feedback regarding the feasibility and clarity of lesson objectives. Participants' post-class evaluations were then assessed to determine whether students met lesson objectives, in addition to gaining curriculum feedback.

3.1. Informed Development of Curriculum

In a study conducted by Barr et. al., undergraduates at partnering universities were recruited to participate in a semester-long CBPR course titled: Community-Based Participatory Research: An Experiential Learning Course to Improve Your Campus Environment.[32] Participants were between the ages of 18-24 and had been enrolled at their respective universities for at least one year. During this course students had the opportunity to assess the healthfulness of their campus by conducting a needs assessment.[32] At the end of the course, students attended a

3-day workshop at one of the partnering universities to share ideas and finalize plans for an intervention based on the results of the needs assessments.[32] Following completion of the workshop student researchers were invited to continue their involvement as CAB members.[32] The CAB was used to collaboratively plan details of the intervention, including program name, methods, incentives, duration, and assessment strategies.[32] This information was then used to inform the lessons of the CCC curriculum.

Timeline

Curriculum development began in the Fall of 2021 during a CBPR course offered at partnering universities. The development process was completed by October 2022. The expert review survey was developed in November of 2022 and gained approval from the University of Maine's institutional review board (IRB 2023-01-04) in January of 2023. The expert review survey was sent out in January of 2023 and closed in February. The College Cooking Connection ran from February 2023-April 2023. Quantitative analysis of data occurred in May 2023, and qualitative data was analyzed in September of 2023. See Table 3.1 for an overview of the CCC timeline.

Table 3.1: CCC Timeline

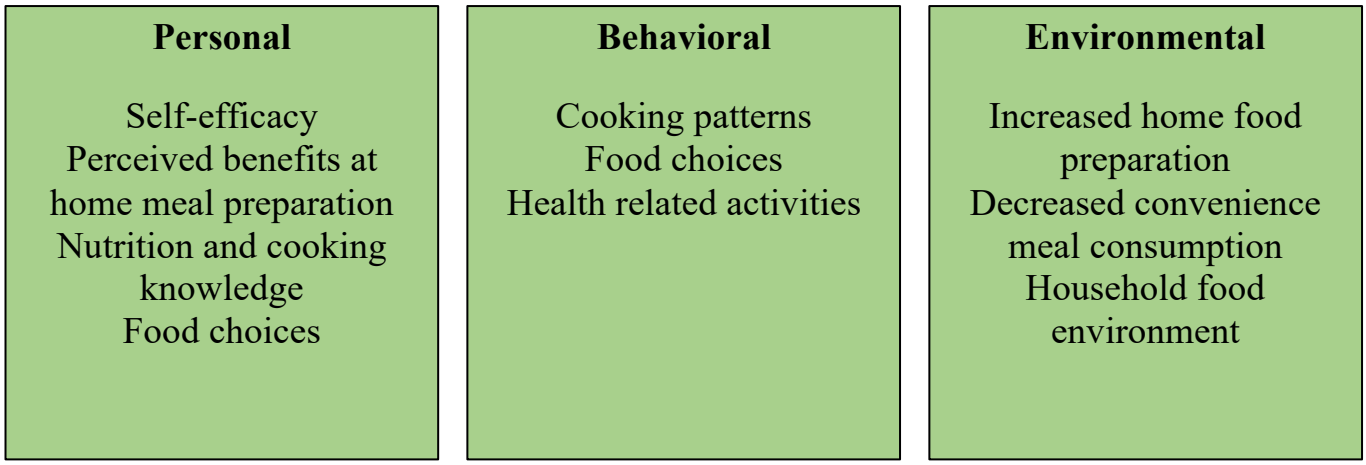
Fall 2021	**December 2021**	**June 2022**	**January 2023**	**January 2023**	**March 2023**	**February 2023**	**Summer 2023**
CBPR class begins	3-Day CBPR workshop	Curriculum development begins	IRB approved	Expert review distributed	CCC classes begin	Expert review closed	Data analysis

College Cooking Connection

This college tailored health program originated as a product of a CBPR course offered to undergraduates at partnering universities. After conducting campus-wide needs assessments at

their respective universities, undergraduate research partners and registered dietitians from both universities gathered for a three-day workshop. During this workshop, student researchers shared their ideas for a college-tailored health intervention. Of these ideas, the group decided to implement a cooking and text messaging program. From this point, graduate students at the University of Maine developed the content of this program, called the *College Cooking Connection.* Curriculum development was heavily influenced by the SCT, with each lesson focusing on interpersonal and environmental influences of human behavior (Figure 3.1). Lesson content was developed using evidence-based curricula, including: *Cooking Matters*[52] *and Culinary Bootcamp*.[54] The development of the *College Cooking Connection* was overseen by two registered dietitians.

Figure 3.1: Components of the Social Cognitive Theory Utilized in College Cooking



The *College Cooking Connection* was built upon existing evidenced based curricula and principles of the SCT and ELT. This curriculum aimed to increase the behavioral capability and self-efficacy of students by increasing general nutrition knowledge and cooking skills. At the end of each class, student's behavior was positively reinforced with the opportunity to bring home the nutritious meals they prepared. Environmental factors were addressed by providing students

with tangible, applicable knowledge that could be incorporated into their daily lives to positively change their home food environment by increasing home meal preparation and decreasing the consumption of ready-made convenience foods. To increase learning, concepts covered in the educational component of each lesson were reiterated using experiential learning. Cooking activities and recipes were specifically selected to coincide with lesson topics. The hands-on application of lesson concepts aimed to enhance students' learning through experience. Refer to Table 3.2 for details related to lesson content.

Lessons one, three, and four were designed using two evidenced based curricula: *Cooking Matters,*[52] and *Culinary Boot Camp.*[49] *Culinary Boot Camp*[49] is a four-week cooking intervention encompassing a variety of nutrition topics. Lessons within this curriculum cover mindful eating, knife safety, seasonal produce, a grocery store tour, cutting techniques, food safety, food allergies, the role of nutrients, and meal planning. Content related to knife skills, knife safety, grocery shopping, and meal planning were incorporated into the College Cooking Connection curriculum. *Cooking Matters*[52] is a hands-on nutrition and culinary program designed for low-income adults. Lessons within this curriculum cover topics like utilizing nutrition and unit price labels, fruit and vegetable preparation and selection, creating and utilizing a grocery list, and stretching ingredients across meals. Content from this program was used to develop lesson goals and objectives.

Lesson two was designed using the book *This is Your Brain on Food,*[53] written by Uma Naidoo MD, a board-certified psychiatrist and the current director of Nutrition and Lifestyle Psychiatry at Massachusetts General Hospital. This book discusses the relationship between nutrition and mental health, highlighting nutrients that both support and hinder cognitive function. This book also contains various mental health supporting recipes. The turkey gumbo

recipe used in lesson two of the College Cooking Connection was derived from the recipe archive of this book.

Table 3.2: College Cooking Connection Curriculum Overview

Lesson No.	Lesson Name	Lesson Topic	Recipe
1	Chop to the Top!	Knife safety, cutting techniques, MyPlate	Greek Lemon and Rice Soup
2	Foods for Better Moods	Gut-Brain connection, nutrients that support cognitive health	Turkey Gumbo
3	Budgeting Basics	Creating a grocery budget, tips for saving money at the grocery store	"Make Your Own" (students create a meal with a given budget)
4	Meal Prep for Success	Creating a meal plan, tips for meal prepping	Meal-Prep Breakfast Sandwiches

3.2. Participant Recruitment and College Cooking Connection Implementation

College undergraduates were recruited using a campus-wide email containing the link to a Qualtrics survey. At the end of the survey, undergraduates were given the opportunity to enlist in the CCC. Those who completed the survey were given the opportunity to enter a raffle to win one of five $25 Amazon gift cards. Students who enrolled in the CCC were offered a gift card for each class they attended. Students who attended all four classes received a total of $50 in Amazon gift cards (Class one: $5, Class two: $10, Class three: $15, Class four: $20). To accommodate for varying student schedules, each lesson of the CCC was offered at five different times. Participants were between the ages of 18-24 and enrolled as a full-time student at the University of Maine.

During the Spring semester, twenty cooking classes were taught by graduate and undergraduate nutrition students. Classes consisted of an educational component focusing on MyPlate, knife safety, budgeting, meal planning, knife skills, and nutrition and mental health, and were followed by a collaborative cooking activity. Recipes for each class were selected based on their relevance to the nutrition topics taught in the corresponding lesson. Students completed a post-lesson evaluation to assess if students met the lesson objectives. A post-survey was also provided to students at the final class with the opportunity to leave feedback about their overall experience of the program, including lesson value and perceived skill change.

3.3. Expert Review

An expert review survey was developed in Qualtrics and distributed in an email to a non-randomized sample of experts (n = 20) in nutrition, college student health, curriculum development, and education. Experts were recruited from the Healthy Campus Research Consortium Multistate group, a team of professors from across the U.S. specializing in college student health. Recruitment for the expert review received approval by the University of Maine's IRB prior to distribution. The survey consisted of thirty-five open-ended, multiple choice, and interval questions aiming to gain feedback on all aspects of the curriculum (appendix E). Clarity of lesson objectives influences curriculum efficacy and was therefore a key measure in the expert review.[54,55] Experts were given three weeks to complete the review, and those who participated were compensated with a $25 Amazon gift card. The objective of this review was to gain expert feedback to guide the CCC content revisions before enacting the intervention in February of 2023, as the majority of existing interventions do not complete the expert content review before piloting the program. [54,55] Data was analyzed to ensure saturation of expert feedback, therefore indicating that all relevant themes had been identified and explored, with no emergence of new themes.[56]

3.4. Lesson Learning Objectives

Lesson evaluation forms were distributed to participating students at the end of every lesson to assess whether lesson learning objectives were met (appendix C). These evaluations also provided space for students to give feedback on their experience with each lesson. Each lesson evaluation included four to six questions all of which directly corresponded to lesson objectives. Correctly answered questions indicated students meeting the lesson learning objectives. Evaluations were graded by graduate nutrition students and coded into an Excel file (Microsoft Excel ® Version 16.79.1) as 1 = answered the question correctly or 2 = did not answer the question correctly. Frequencies were then used to determine the percentage of student participants who met lesson learning objectives. Following the intervention, students were given the opportunity to provide open-ended feedback in a post-survey intended to assess changes in health behaviors. In this survey, students were asked to rank each lesson in order of perceived value and how much they felt their basic cooking skills, budgeting skills, meal preparation skills, and knowledge related to nutrition and mental health improved following participation in the workshops (appendix F).

3.5. Instruments, Measures, Procedures and Data Analysis

Expert review survey responses were downloaded from Qualtrics and exported into an Excel file (Microsoft Excel ® Version 16.79.1). Experts were asked a series of interval questions (0-10), with higher scores indicating greater feasibility, efficacy, and teachability of the curriculum. Qualitative and quantitative analysis were used to interpret expert review results. Quantitative data were analyzed using central tendencies for continuous data and frequencies for categorical data. For qualitative data, experts were asked a variety of questions relating to curriculum content, feasibility, and clarity. Two graduate researchers individually coded these

qualitative data to identify themes. Inductive thematic analysis was conducted by two independent coders. Once coded individually, graduate researchers met to discuss individual themes to identify commonalities.

Following completion of the program, lesson learning objective responses were coded by graduate students to determine if participants met the objectives for each lesson. Participant responses were either coded as 1 = meets objective or 2 = does not meet objective, into. Data were analyzed by frequencies to assess how many participants met the learning objectives. Post-survey responses were analyzed to determine students' rank of each lesson in order to capture perceived value and skill improvement. Rank was summarized using frequencies of the top two most valued lessons and perceived change in skill set was analyzed using frequencies of students who categorized skill improvement as "somewhat" or "a lot" for each of the categories. These items were developed for the current project to mirror the skills taught in the four lessons.

CHAPTER FOUR

RESULTS

Twenty experts specializing in nutrition (n = 13), college student health (n = 4), and curriculum development (n = 3) were contacted to participate in the curriculum review. Of the twenty experts contacted, seven completed the survey. Those who completed the survey specialized in nutrition (n = 5) and college student health (n = 2). Of the seven experts who completed the review, three were registered dietitians. Experts had an average of 4.3 years of experience in their respective fields, ranging from zero (current graduate student) to over twenty-five years of experience. Table 4.1 illustrates the spectrum of experts who were contacted and participated in the College Cooking Connection expert review.

Table 4.1: Experts Contacted for Expert Review

Field of Expertise	Nutrition	College Student Health	Curriculum Development	Total
Contacted (n)	13	4	3	20
Agreed to Review	5	2	0	7

4.1. Expert Evaluation of Curriculum

Experts (N = 7) unanimously agreed that lesson objectives were clear and adequately addressed in all four lessons. Experts supported the feasibility of running the CCC on their campuses (8.96±0.87) and felt that the program could improve the diet quality (8.37±2.08), cooking skills (9.34±0.73), self-efficacy (9.48±0.85), and cooking self-efficacy (8.43±1.52) of college students. On average, experts scored their confidence in teaching the curriculum as 8.5±1.57. See Table 4.2 for the mean and standard deviation of Likert scale scores from the expert review survey.

Table 4.2: Mean and Standard Deviations of Likert Scale Scores from Expert Review(N=7)

	Mean (SD)	Min	Max
Diet Quality	8.37(2.08)	5.06	10.00
Cooking Skills	9.34(0.73)	8.04	10.00
Self-efficacy	9.48(0.85)	7.96	10.00
Health-Related Quality of Life	8.43(1.52)	5.24	10.00

4.2. Thematic Analysis

Based on the thematic analysis, experts reported that the curriculum as a whole was valuable, organized, and clear, but found the need for additional resources and improved accessibility for instructors. Experts suggested including the PowerPoint presentations with their corresponding lessons to increase convenience and consistency for instructors, as well as additional information regarding room and kitchen set-up. Experts found the introduction of the curriculum to be clear but noted additional information regarding the timeline of the program would be beneficial. Based on both the qualitative and quantitative feedback, all experts gave similar feedback and therefore saturation was met. See Table 4.3. for an overview of introduction feedback.

Lesson One

Experts found lesson one of the curricula to be organized and educational but noted that the lesson goal and objectives could be improved with modifications. Suggested modifications included adjusting the wording of lesson objectives from students “should” to “will be able to,” as well as including an additional objective for diet quality to coincide with the MyPlate component of this lesson. See Table 4.4. for a summary of lesson one expert feedback.

Lesson Two

Experts gave positive feedback regarding the content of lesson two, noting it clearly drew the connection between nutrition and mental health, and is likely new information for many college students. Experts also noted the need for additional information related to instructor accessibility and student accommodations, including listing a vegetarian option for every recipe and providing more detail about the kitchen equipment needed. See Table 4.5. for a summary of lesson two emerging themes.

Lesson 3

Reviewers found lesson three of the curriculum to be extremely creative and engaging, noting that students would thoroughly enjoy the content and corresponding cooking activity. See Table 4.6. for an overview of lesson three feedback.

Lesson 4

Experts praised the interactive nature of lesson four but noted that the evaluation segment of this lesson would benefit from modifications. Reviewers suggested rephrasing evaluation questions and including a question about the benefits of meal planning to more accurately assess lesson objectives. See Table 4.7. for a summary of lesson four emerging themes.

Table 4.3: Overview of Introduction Emerging Themes

Lesson # / Name	Themes	Supporting Quotes
Introduction	Comprehensive	"I felt that enough information was included in the introduction for me to understand what the goal and objectives of this program are and who will participate"
	Clear	"Everything is clear" "I felt that everything was perfectly covered in the introduction"
	More detailed timeline	"……. state more standardized timeline if possible." "…….you could state: three separate classes offered Monday, March 6th"

Table 4.4: Overview of Lesson One Emerging Themes

Lesson # / Name	Themes	Supporting Quotes
(1) Chop to the Top	Organized	"The lesson is very organized and detailed."
	Modification of lesson goals/objectives	"I would like to see the term 'will be able to' instead of 'should' in all lesson objectives" "You could re-word the lesson goal about cooking SE"
	Expand on MyPlate	"…. include information regarding recommended portions of each food group" "Could include a blank MyPlate and ask students to fill it in"

Table 4.5: Overview of Lesson Two Emerging Themes

Lesson # / Name	Themes	Supporting Quotes
(2) Foods for Better Moods	Valuable	"Lesson two encourages students for improving the dietary quality and gives an idea about the ingredients which help the physical and mental health of the students"
	Interesting	"This is a very informational lesson that teaches both interesting and useful concepts."
	Student accommodations	"There is a vegetarian modification for lesson one, but not lesson two. If it's going to be offered, it should be consistent."
	Increased facilitator instruction	"For the PowerPoint presentation, you could consider including the script for the slides in the lesson plan along with the notes pages of the slide show by formatting it in the lesson plan."

Table 4.6: Overview of Lesson Three Emerging Themes

Lesson # / Name	Themes	Supporting Quotes
(3) Baking on a Budget	Creative	"Very creative idea, I think the students are going to love this one!" "Great lesson activity! I think the students are going to love this one"
	Organized	"The lesson plan is useful, thorough, and descriptive"
	Additional details	"Explain exactly what is being used for kitchen equipment in materials"

Table 4.7: Overview of Lesson Four Emerging Themes

Lesson # / Name	Themes	Supporting Quotes
(4) Meal Prep for Success	Interactive	"This is a very interactive and helpful lesson plan" "One thing that is very attractive about lesson four is that it enables students to create a list of nutritious ingredients and create a meal plan"
	Evaluation modifications	"Add some of the objectives back into "mealtime' such as having the participants discuss the three benefits of meal prepping" "One of the objectives of this lesson is for students to be able to identify benefits of meal planning, but there is no question for this on the evaluation handout"

4.3. Student Participant Demographics

Undergraduate participants (N = 64) were on average 19.4 years old (± 3.14 years), primarily White (81%), and female (70.3%). Year in college was fairly equally distributed, with 28.1% of participants in their freshman year, 23.4% of participants in their sophomore year, 25% of participants in their junior year, and 23.4% of participants in their senior year. The majority of participants (n = 38) lived on campus and had a university meal plan (n = 37). See Table 4.8 for a summary of student participants' demographic data.

Table 4.8: Undergraduate Participants' Demographic Data

Variables	Mean (SD) or %
Age	19.4 (± 3.14)
Gender	Male: 23.4%
	Female: 70.3%
	Other: 6.3%
Ethnicity	White: 81%
	Hispanic: 3.2%
	Black: 1.6%
	Native American: 12.7%
	Other: 1.6%
Grade Level	Freshman: 28.1%
	Sophomore: 23.4%
	Junior: 25%
	Senior: 23.4%
Housing	On Campus: 59.4%
	Off Campus: 40.6%
University Meal Plan	Yes: 57.8%
	No: 42.2%

4.4. Student Lesson Evaluations

Following each class, student participants completed lesson evaluations to measure whether lesson objectives were met. After lesson one, of the 44 student participants, the majority (80-98%) met all four learning objectives (Table 4.9). Of the 35 students who participated in lesson two, 89-100% met the learning objectives (Table 4.10). Following lesson three, 97-100% of the 29 participating students met the learning objectives (Table 4.11) and after lesson four, 94-100% of the 32 student participants met the learning objectives (Table 4.12).

Table 4.9: Percent of Lesson Objectives Met in Lesson One (n=44)

Lesson Name	Objective	% (n) Objectives Met
Chop to the Top!	Define the knife handling acronym SAFETY	98 (43)
	Identify five parts of the knife	89 (39)
	Identify the four different knife techniques discussed: chop, cut, dice, and mince	80 (35)
	Describe the five components of a healthy plate	91 (40)

Table 4.10: Percent of Lesson Objectives Met in Lesson Two (n=35)

Lesson Name	Objective	% (n) Objectives Met
Foods for Good Moods	Identify the nerve that connects the brain and the gut	94 (33)
	List two nutrients that support mental health	89 (31)
	List two foods that are rich in nutrients that support cognitive health	100 (35)
	Identify one food that is not supportive of mental health when consumed excessively	100 (35)

Table 4.11: Percent of Lesson Objectives Met in Lesson Three (n=29)

Lesson Name	Objective	% (n) Objectives Met
Baking on a Budget	Calculate total monthly expenses	100 (29)
	Calculate a grocery budget	97 (28)
	Identify three ways to save money at the grocery store	100 (29)
	Create and prepare a recipe using a given budget	100 (29)

Table 4.12: Percent of Lesson Objectives Met in Lesson Four (n=32)

Lesson Name	Objective	% (n) Objectives Met
Meal Prep for Success	Create a list of ingredients to prepare a recipe	97 (31)
	Identify three benefits of meal planning	94 (30)
	Plan and create a meal schedule	100 (32)
	Cook a meal prep recipe	100 (32)

4.5. Lesson Value and Perceived Skill Change

Of the four lessons, 43% of students (n=25) found lesson one: *Chop to the Top!* to be the most helpful. Thirty percent of students (n=18) found lesson three: *Baking on a Budget* to be the second most valuable. Refer to Figure 4.1 for a summary of lessons' perceived value.

4.6. Perceived Skill Change

About sixty-nine percent (68.8%) of participants reported that their basic cooking skills improved, with 79.3% reporting improved budgeting skills and 84.8 % noting improvement in

knowledge related to nutrition and mental health. Over 75 % of students reported that their meal preparation skills improved.

4.7. Post-Survey Student Feedback

At the end of the post-survey students were given the opportunity to provide feedback regarding their experience with CCC. See Table 4.13. below for a summary of student comments and suggestions.

Table 4.13: Summary of Student Feedback

Student Feedback
“I think it was a really awesome program that I would totally do in the future.”
“This course was very fun and informative.”
“The instructors were well spoken, elegant, and knowledgeable of many cooking skills and related topics.”
“It would be nice if they were not run during class times (10-4) so I was able to attend more sessions."
“I think there could have been more challenging content. I also really would love to learn more about the intersection of nutrition and mental health.”
“I felt like it wasn't that helpful if you didn't have any kind of cooking skills. It felt like you were expected to know something already. For example, we used industrial stoves and were just expected to know how to use them.”
“More options, especially for vegetarian and vegan participants.”
“More classes!!”
“More interesting and unique food selection.”

CHAPTER FIVE

DISCUSSION

Overall, experts found the College Cooking Connection curriculum to be valuable, organized, and clear. Experts unanimously found the curriculum to be feasible and program objectives to be perspicuous. Participant data also supported lesson clarity with 90% or more of participants meeting each of the learning objectives, and a majority of participants reporting a perceived increase in skills and knowledge.

The perceived clarity of the program and success in meeting lesson objectives of participants could be the result of adapting evidenced-based programming, using behavioral theory, and incorporation of CBPR. This finding has been showcased in other nutrition curriculum development. For example, in a study conducted by White et. al., a nutrition and gardening curriculum for youth and their caregivers was developed using the SCT.[57] Similar to the current study, experts found the curriculum to be clear and relevant topics to be adequately addressed but noted the need for additional details throughout the curriculum, including more specific information relating to time.[57] In a similar curriculum, called Culinary Boot Camp[49] using the SCT, undergraduate participants experienced significant improvements in cooking attitudes, cooking skills and grocery shopping self-efficacy.[49] This curriculum consisted of four lessons relating to nutrition, cooking, and grocery shopping. Within these categories' participants learned about food groups, knife safety, culinary techniques, mindful eating, grocery shopping, food allergies, and seasonal produce.[49] Unlike the current study, the curriculum was not developed using CBPR which may have resulted in missing topics especially relevant to college students such as the connection between nutrition and mental health or budgeting.

CBPR enhances the sustainability and feasibility of interventions aiming to change health behaviors by fostering an environment of collaboration between community stakeholders and researchers.[32] Community driven health programming has been highlighted as an effective and efficient strategy when developing health interventions for college students.[58] Programming developed using CBPR has led to increased community engagement and greater overall success of program outcomes.[7] For example, McKinney and colleagues developed a nutrition and fitness program for high school students using CBPR and evaluated nutrition and fitness behaviors.[59] Following the intervention, students reported considerable improvements in these behaviors, including a significant reduction in sedentary behavior and fast-food consumption and an increase in the use of nutrition labels when selecting foods.[59] Similarly, the current research utilized a CBPR approach which may have led to students being engaged in the content and therefore able to meet lesson learning objectives.

Using CBPR is unique methodologically in college health programming and the evaluation of the curriculum presented in the current research is more rigorous than most. For example, Mackey et. al. developed an email-delivered nutrition and physical activity intervention for African American college students using the SCT.[60] Unlike the current study, CBPR was not utilized in program development and lesson objectives were not evaluated.[60] In a similar intervention developed by Eun-Jeong et. al, the SCT was used to create a general nutrition education course for college undergraduates.[61] However, Eun-Jong did not incorporate CBPR in program development and lesson objectives were not evaluated.[61] Unlike the current study, these programs also failed to assess the perceived skill change of participants. Measuring lesson learning objectives and perceived skill change is advantageous. Utilizing these measures is an effective way to gauge the efficacy of an intervention and inform future research.

Interestingly, college students ranked the CCC lesson on basic cooking skills and nutrition information as being the most important, and many ranked the budgeting lesson as equally important. This may be due to the fact that college students have low food security, low cooking self-efficacy, and poor diet quality.[9-11] Higher cooking self-efficacy is associated with increased home meal preparation, which is a protective factor of diet quality.[3] Meals prepared at home tend to be higher in fruits, vegetables, and fiber and lower in saturated fat, sodium, and added sugars.[3] Comparatively, low cooking self-efficacy is correlated with increased consumption of ready-made convenience meals which tend to lack essential nutrients.[3]

College students face a unique set of barriers when it comes to consuming a nutritious diet. In addition to low cooking self-efficacy, college students experience magnified rates of food insecurity, scarcity of grocery stores on campuses, lack of transportation, and inadequate cooking facilities,[1] all of which impact the ability to consume a healthy diet. Demanding academic schedules often lead college students to choose ready-made convenience meals. [3,17] Targeting cooking self-efficacy of young adults is critical as a means of improving diet quality, which supports not only the physical health but also the mental health of this population.

Unlike cooking self-efficacy and diet quality, few college health programs focus on the connection of nutrition with mental health. During the development of the CCC, the community advisory board thought a lesson on mental health was imperative for the curriculum. This need is echoed in the literature with young adults having the highest incidence of mental health disorders (22%) of any age group, with between 25-50% of university students meeting the criteria for at least one mental health diagnosis.[6, 62]

While existing literature related to nutrition and mental health neglects college students, a study conducted by Wattick and colleagues found that added sugar intake was associated with

anxiety and depression in college undergraduates.[6] Similarly, a systematic review conducted by Solomou et. al., found that diet quality was negatively associated with depression, anxiety, stress, and general mental well-being in university students.[62] The CCC aimed to address the relationship between diet quality and mental health in college students. In lesson two of the curriculum: *Foods for Good Moods,* undergraduates learned about nutrients and foods that support mental health, and those that can be harmful when consumed in excess. Students were given the opportunity to experientially apply this knowledge by cooking a mental health supporting recipe.

Also unique to the CCC was experiential learning, or hands-on learning, which has been shown to be an effective tool for improving cooking self-efficacy and nutrition knowledge.[43] Without experiential learning, participants lack the ability to apply what they are learning. For example, Franko et. al. developed a web-based intervention aiming to improve the diet quality and physical activity of college students.[63] Following completion of the study, no significant improvements in diet quality and physical activity were documented.[63] These results could be attributed to the lack of hands-on experience this intervention offered which could have diminished participant engagement.

Unlike the current study, Franko et al. did not incorporate the ELT in curriculum development.[63] The ELT, developed by Kolb (1984), describes learning as a process transcended through experience.[64] Existing literature demonstrates experiential learning as a powerful tool to increase knowledge and self-efficacy through nutrition and cooking interventions.[43] Experiential learning was incorporated into the CCC by dividing lessons into two components: classroom style education and hands-on student-led learning. During the cooking component of each lesson, students worked collaboratively to apply lesson concepts in an experiential context.

Utilizing evidenced-based curricula is considered best practice in program development, with federally funded nutrition programs such as EFNEP and SNAP-Ed requiring the use of evidenced based curricula in program development.[54] Also considered best practices in curriculum development and evaluation are the use of clear lesson goals and objectives, behavioral theories, formative assessments of the target population, and feedback from experts related to content revision.[54] Unlike the current study, few existing curricula go through the rigorous yet necessary steps of curriculum development and evaluation, including completing an expert review before starting a pilot program.[54, 55] In a study conducted by Potvin and colleagues, nine experts participated in the content review of a nutrition education program targeting low-income, ethnically, and racially diverse youth (5^{th}-6^{th} grade).[55] Similar to the current research, despite a small sample of experts participating in the content review, themes were easily identified due to saturation of expert feedback.[55] Mean and standard deviation values of Likert scale scores were also used summarize quantitative expert feedback.[55] In a related study conducted by Baker and colleagues, ten experts participated in the curriculum revision process of a nutrition and physical activity intervention: *Eating Smart-Being Active.*[54] Expert feedback was used to determine the accuracy of program content and appropriateness of theory use.[54]

The CCC aimed to address best practices of curriculum development by utilizing evidenced based curricula, behavioral theories, community feedback, evaluation of lesson objectives and participant perceptions, and an expert review to guide content revision before piloting the intervention. Feedback from the expert review related to confidence and teachability was particularly helpful, as graduate nutrition students at multiple universities will potentially teach the CCC in the future. The benefits of utilizing an expert review has been widely demonstrated in interventions targeting nutrition and physical activity.[62] From an evaluation

standpoint, CCC utilized formative assessment of both lesson learning objectives and participant perceptions related to lesson value and skill improvement. Utilizing best practices in curriculum development established the evidence base of this study, [54-56] and resulted in an effective culinary and nutrition program, with the majority of students meeting lesson learning objectives and reporting improvements in culinary and nutrition knowledge and skills. The extensive evaluation process provided the research team with an expansive picture of program impact and areas for improvement, while also informing future evidenced-based health programming. The positive outcomes of CCC affirm the increased efficacy and buy-in behavior change of interventions incorporating an expert review, adapted evidenced-based curricula, behavioral theories, CBPR, and an extensive evaluation process.

5.2. Limitations

During the development of the College Cooking Connection, limitations were experienced. Twenty experts were contacted for curriculum review, but only seven experts participated. The sample of experts who completed the review would ideally have been larger in order to gain maximum feedback. However, saturation was met and therefore the data can be used to support program clarity and feasibility. [56] Additionally, following the first class (n = 44) student participation substantially decreased (Lesson 2: n=35, Lesson 3: n = 29, Lesson 4: n= 32). During recruitment, the research team aimed to recruit fifty students for participation in the College Cooking Connection, but the sample size of participating students unfortunately did not reach this goal.

5.3. Conclusion

College students are specifically vulnerable to unhealthful behaviors. The amalgamation of academic stress, low self-efficacy, lack of resources, and poor mental health make practicing healthy behaviors a challenge for this population[10,12] Interventions have targeted college students' diet quality and cooking self-efficacy, but no existing programs have utilized adapted evidenced-based curricula, CBPR, behavioral theories, and expert content revision. Existing programs also neglect to evaluate lesson learning objectives and perceived skill change of participants. It was hypothesized that developing a culinary and nutrition program using CBPR, behavioral theories, and adapted evidenced-based curricula would result in a feasible and acceptable program, and an increase in nutrition and cooking knowledge and self-efficacy in college undergraduates. Program outcomes support this hypothesis, with the majority of experts reporting favorable feedback and participants meeting the learning objectives and reporting a perceived increase in skills and knowledge.

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APPENDICES

APPENDIX A: CCC Curriculum

The College Cooking Connection
4-Week Core Curriculum

University of Maine
Department of Forestry and Agriculture
Food Science and Human Nutrition

Curriculum Goals and Objectives

Program Goal: The goal of this program is to improve the overall health-related quality of life (HRQOL) of college students at the University of Maine.

Program Objectives:

By the end of the program…

1. Participants will improve their cooking self efficacy.
2. Participants will improve their cooking skills.
3. Participants will improve their food budgeting self efficacy.
4. Participants will improve their overall diet quality.

Curriculum Outline for University of Maine (adapt to meet your needs)

4-week program Spread Over a Semester. 1 session in February, 2 sessions in March, 1 session in April. 90-minute sessions.

Week 1: Chop to the Top

- Recipe: Hearty Vegetable Soup
- 3 Classes on Monday February 6th
    - 11:30am-4pm
- 2 Classes on Tuesday February 7th
    - 10am-1pm

Week 2: Foods for Good Moods

- Recipes: Mood Boosting Spiced Nut Mix and Turkey Gumbo
- 3 Classes on Monday March 6th

    - 11:30am-4pm
- 2 Classes on Tuesday March 7th
    - 10am-1pm

Week 3: Baking on a Budget

- Recipe: Budget Cooking Activity
- 3 Classes on Monday March 20th
    - 11:30am--4pm
- 2 Classes on Tuesday March 21st
    - 10am-1pm

Week 4: Meal Prep for Success

- Recipe: Meal-Prep Breakfast Sandwiches
- 3 Classes on Monday April 10th
    - 11:30am-4pm
- 2 Classes on Tuesday April 11th
    - 10am-1pm

Lesson 1: Chop to the Top

Lesson Goal: Improve students' cooking skills/self-efficacy by introducing MyPlate principles and cooking knowledge.

Lesson Objectives:

- Participants will be able to define acronym SAFETY
- Participants will be able to identify 5 parts of the knife
- Participants will be able to demonstrate the four different knife techniques covered: chop, cut, dice, and mince.
- Participants will be able to identify the 5 components of a healthy plate

Time: 90 minutes total

- 30-minute lesson
    - Introduction
    - MyPlate
    - Parts of the Knife
    - Cutting Skills
    - Recipe breakdown
- 40- minute cooking experience
- 20-minute meal/cleanup

Materials:

- Lesson 1 PowerPoint Slideshow:
    - Computer
    - Projector Screen
    - PowerPoint containing lesson material

- Cooking Materials:
    - Cooking station equipped with kitchen equipment and materials (oven, pots, pans, knives, cutting boards, mixing utensils, etc.)
    - Recipe Ingredients
    - Hairnets
    - Single-Use Lab coats
    - Utensils: forks, napkins, paper plates, plastic cups, Tupperware
- Handouts (found in appendix B):
    - Greek Lemon Chicken Soup Recipe
    - Knife SAFETY handout
    - Post Class Evaluation

Preparation:

- Ensure cooking stations are clean.
- Set up the projector screen and PowerPoint presentation containing lesson concepts.
- Recipe ingredients should be laid out at cooking stations prior to the start of class.
- Print Recipe Handout and Post Class Evaluation before start of class.

Concepts: (30 minutes)

- Introduction:
    - Greet students as they enter.
    - Once students are settled, instructors introduce themselves briefly.
- Have students introduce themselves to the class. Ask their name, major, and favorite meal.
    - Transition to lesson portion.
- Diet Quality:
    - Display a picture of MyPlate on the projector screen.
    - Ask: Are any of you familiar with MyPlate? What do you know about it?
    - Transition to discussing the general principles of MyPlate.
        - MyPlate is the current nutrition guide published by the United States Department of Agriculture. MyPlate serves as a recommendation based on the Dietary Guidelines for Americans.[1]
        - MyPlate consists of five food categories:
            - Fruits
            - Grains
            - Vegetables
            - Protein
            - Dairy
    - It is important that we consume a variety of foods from these categories daily in order to be healthy.

    - Play MyPlate video: (5:51)
        - [61]Food Groups & MyPlate
    - Transition to cooking skills/self efficacy portion of the lesson.
- Display a picture of a knife. Ask students if they know any of the different parts of the knife.
- Explain the different parts of the knife, while using the displayed image to show their locations.
    - Cutting Edge—bottom edge of the blade, can be flat or tapered, or serrated.[2]
    - Point--very end of the blade, used to pierce foods, make incisions, and cut small items.[2]
    - Tip-- first few inches of the blade used to cut small or delicate items.[2]
    - Spine-- top of the blade, grip with thumb and forefinger.[2]
    - Bolster – where the blade meets the handle, thick strip of steel, protects hand if the knife slips.[2]
    - Heel – last few inches of the blade, used to cut through large, tough or hard foods.[2]
    - Rivets – hold handle to the tang, need to be tight to prevent injury, snags on clothing, and growth of microorganisms.[2]
    - Handle – many types of materials, important that it is comfortable in your hand.
    - Butt – end of the handle.[2]
    - Tang – metal that continues from the blade through the handle, some knives only have a partial tang, providing weight on the back half of the knife for stability and durability.[2]
    - Transition to discussing knife safety:
- SAFETY:
    - S – Securely hold your knife. Grip the top of the blade firmly between your thumb and forefinger. Cut things on a flat surface like a cutting board. Do not cut things while you hold them in your hand.[2]
    - A – Anchor all cutting boards to ensure they don't slip. If your cutting board easily slides on the counter, put a damp cloth underneath it, this will help it grip.[2]
    - F – Fingertips should be curled back. Hold foods with fingertips tucked under away from the knife.[2]
    - E – Eyes on the knife! When using a knife, try to avoid distractions and keep your eyes on what you're doing. It is also a good idea to keep knives where they are clearly visible, for example, do not put a knife in a sink full of dirty dishes where someone may not know it is there.[2]
    - T – Take your time. Don't rush with a knife.[2]
    - Y – Yield to falling knives. If a knife slips out of your hand or falls from the counter let it drop. Do not attempt to catch it. This is why it is a good idea to wear closed toe shoes in the kitchen.[2]

    .
- Transition to discussing knife skills:
    - Chop—cut into small pieces.[2]
    - Cut—make smaller in size, separate into segments.[2]

- Dice—cut into small-square shaped pieces, uniform in size (~ ¼ inch).[2]
- Mince—cut or chop into extremely small pieces[2]
- Play Knife Skills Video: (6:30)

- Knife Skills Video:
  - https://www.youtube.com/watch?v=G-Fg7l7G1zw
  - Transition to explaining the recipe.
  - We will be using the cutting techniques demonstrated in the material of this lesson to make a Greek Lemon Rice and Chicken Soup (recipe found in Appendix C).
    - Greek Lemon and Rice Soup: (55 minutes)
    - Recipe from: tastefulventure.com
    - Servings: 6
    - Prep Time: 10 minutes
    - Cooking Time: 45 minutes
    - Ingredients:
      - 2 Tablespoons of Olive Oil
      - 1 Large Sweet Onion, *Chopped*
      - 3 Cloves Garlic, *Minced*
      - 4 Cups Chicken Broth
      - 1 Bay Leaf
      - ½ Teaspoon Salt
      - ½ Teaspoon Black Pepper
      - 2 Boneless Skinless Chicken Breasts*
      - ½ Cup Arborio Rice
      - 1 Lemon
    - Directions:
      - In a large pot add olive oil and chopped onion.
      - Sauté onion over medium/high heat for 5-6 minutes, until onions are translucent.
      - Add minced garlic and sauté for 1 minute.
      - Add chicken broth, bay leaf, salt, pepper, and chicken breasts.
      - Bring to a boil over medium/high heat. Cover and turn heat down to medium/low.
      - Let simmer for 20 minutes.
      - Remove chicken and shred on a cutting board using two forks.
      - Add the chicken back to the pot.
      - Add Arborio rice.
      - Cover and simmer for 20 more minutes.
      - Remove Bay Leaf.
      - In a small bowl, whisk together eggs and the juice of one lemon.
      - Slowly add in 1 ladle of the broth to the egg/lemon juice mixture, while whisking, (this will ensure the egg doesn't scramble when added to the soup).
      - Add egg mixture to soup.
      - Add chopped dill weed and stir.
      - Let cook for around 5 minutes before serving.

- Taste and add more lemon juice if necessary!

*Tofu can be used in place of chicken for a vegetarian option.

- Transition into discussing the components of MyPlate in this recipe.
  - Ask students: What MyPlate food categories are present in this dish? What categories are missing?
  - Begin breaking down MyPlate components found in Greek Lemon Rice Soup.
  - Vegetables: Garlic, Onion, Dill Weed.
  - Fruits: Lemon
  - Grains: Arborio Rice
  - Proteins: Chicken, egg.
  - The only component missing from this recipe is the dairy group.
  - Ask students: Does anyone have any ideas for how the dairy group could be incorporated into this meal?
  - Tell students they will now be divided into groups and prepare students to relocate from classroom to kitchen.
  - Tell students to remember the number you assign them and go around the room counting off 1 through 5 (number will vary depending on number of available kitchen stations).
  - Tell students to find their partner and direct them to the cooking area.
  - Once in the kitchen, tell students to find a cooking station with their partner.
  - Once students are at stations, hand out printed copies of the Greek Lemon Rice and Soup recipe.

Cooking Experience (40 minutes)

- Introduction to kitchen and general safety: (5 minutes)
  Hazards:
- Begin by giving students a brief tour of the kitchen. Show students where cooking equipment is located. Demonstrate how to turn on the stovetop. Show students how to turn on the hood switch and explain this must be on any and all times the stovetop is in use.

1. Knives
   a. Store knives in knife holders when not in use.
   b. Place a wet paper towel below the cutting board to keep it from slipping when cutting.
   c. Do not soak knives in the sink. Wash, rinse, sanitize and dry knives when not in use.
   d. If cutting a large amount of food, you can use a cut resistant glove on the hand that holds the food item.
2. Heat – equipment, pans, liquids, foods

a. Use potholders and/or oven mitts when handling or removing pots and pans from the stove tops and/or ovens. Pot and pan handles can become extremely hot.

3. Chemicals- cleaners & sanitizers

a. Sanitize countertops with Ecolab Sanitizer before and after labs.

b. Utilize pot and pan detergent to clean dishes. Rinse thoroughly and use care to avoid getting detergent in your eyes or mouth.

c. The yellow SDS Binder is by the door.

4. Microbial Contamination

a. Wash your hands thoroughly at the hand wash station upon entering the kitchen. Students should re-wash their hands if for example they: touch their faces, touch the floor, sneeze, are finished eating, etc.…

b. Do not use the same utensil to taste the same product more than once (no “double dipping”).

c. Store raw meats in the bottom of the refrigerator so the juices do not drip on other foods.

d. Perishable foods should not be left at room temperature for extended periods of time.

e. Wash cutting boards thoroughly. Consider designating raw vs. finished product cutting boards.

5. Slips, Trips and Falls

a. Use caution when moving around the kitchen, be aware of your surroundings. Immediately clean up any liquid spills on the floor to avoid a slip hazard.

6. Equipment Operation: Follow manufacturer’s recommendations for use, cleaning, and maintenance of the equipment. Manuals for each piece of equipment are located in a notebook in the kitchen.

1. Kitchen Aid Mixers

a. Do not operate the Kitchen Aid mixers unless the safety guards are in place.

2. Garbage Disposals

a. Cover sink drain with drain plug before operating. Keep hands and hair away from the sink drain during operation.

7. Appropriate Dress:

a. Closed toe and closed heel shoes. Without closed toe/heel shoes you will be dismissed from the lab.

b. Lab coats

c. No shorts or skirts

d. Hair nets

e. No loose clothing (sleeves, scarves, etc.) that could potentially come in contact with flames (ranges) or moving parts (mixers).

8. General Rules:

a. No backpacks or coats in the Kitchen. Lockers are available in the hall and locks can be borrowed from the instructor.

b. Do not place notebooks or other personal items on the range tops.

c. Place dirty towels in the laundry basket.

d. If you spill it, clean it up. If you find something dirty, take the time to clean it.

e. When the class is finished, please make sure your area is clean. Sweep the floor, clean, and sanitize the countertops and sinks. Please check with your TA to make sure your area is clean before you leave class.

- Once students have finished cooking and cleaning stations, guide them back to the classroom for a group meal. Handout post-class questionnaire. When students finish the evaluation, collect them.

Lesson 2: Foods for Good Moods

Lesson Goal: To improve diet quality and overall health related quality of life by encouraging students to cook with ingredients that support mental and physical health.

Lesson Objectives:

- Participants will be able to identify the nerve that connects the brain and gut
- Participants will be able to list 2 nutrients that support brain health
- Participants will be able to list 2 foods that are rich in nutrients that support brain health
- Participants will be able to identify 1 food that is not supportive of brain health when consumed excessively

Time: 90 minutes

Materials:

- Lesson 2 PowerPoint Slideshow:
  - Computer
  - Projector Screen
  - PowerPoint containing lesson material
- Cooking Materials:

- Cooking station equipped with kitchen equipment and materials (oven, pots, pans, knives, cutting boards, mixing utensils, etc.)
- Recipe Ingredients
- Hairnets
- Single-Use Lab coats
- Utensils: forks, napkins, paper plates, plastic cups, Tupperware

- Handouts:
  - Spiced Nut Mix and Turkey Gumbo
  - Foods for Good Moods Handout
  - Post Class Evaluation

Preparation:

- Ensure cooking stations are clean.
- Set up the projector screen and PowerPoint presentation containing lesson concepts.
- Recipe ingredients should be laid out at cooking stations prior to the start of class.
- Print Recipe Handout and Post Class Evaluation before start of class.

Concepts: (30 mins)

- Introduction:
  - Greet students as they enter.
  - Once students are settled, instructors introduce themselves briefly.
  - Have students introduce themselves to the class. Ask their name, major, and favorite place they've traveled.
  - Explain that today you will be discussing the "gut-brain" connection, and how the foods we eat can impact not only our physical health, but also our mental health.
- The Gut-Brain Connection:
  - Transition to discussing the connection between the gut and the brain.
  - Display an image of the vagus nerve to the students and explain that the vagus nerve originates in the brain stem and travels all the way to the gut, connecting the gut and central nervous system. When it reaches the gut, it untangles itself to form little threads that wrap around the entire gut like a knit sweater.[3]
  - Because the vagus nerve penetrates the gut wall, it plays a major role in the digestion of food.
  - Ask students: has anyone ever been nervous or anxious and developed a stomachache or needed to use the restroom?
  - This shows us how connected the gut and central nervous system really are!
  - The key function of the vagus nerve is to ensure that nerve signals can travel back and forth between the brain and the gut, carrying important information with them.[3]
  - Signals between the gut and brain travel in both directions, making the brain and gut lifelong partners.[3]
  - The central nervous system produces chemicals like dopamine, serotonin, and acetylcholine, which play important roles in regulating our mood, emotion, and thought processing.[3]

- Serotonin, a chemical that is often deficient in the brains of depressed and anxious people, plays a major role in the regulation of the gut-brain axis.[3]
- Fun fact: More than 90 percent of serotonin receptors are found in the gut.[3]
- When stressed, the central nervous system sends signaling molecules to gut bacteria, changing bacterial behavior and composition. This can be damaging.[3]
- One kind of bacterium changed by stress is Lactobacillus. Normally, this bacterium breaks down sugars into lactic acid, eliminates harmful bacteria in the intestine, and protects your body against fungal infections. When stressed, Lactobacillus is unable to fulfill these roles.[3]
- The brain can also affect how the gut contracts and can even influence secretions of acid, bicarbonate, and mucus, all which provide the gut's protective lining.[3]
- We've established that stress can have a major impact on our gut—but how does our gut affect our brain?
- Transition to discussing foods that benefit brain function.

- Foods That Improve Mood:
  - Prebiotics and Probiotics:
    - Probiotics are live bacteria that convey health benefits when eaten.
    - Ask students: Can anyone tell me a food that contains probiotics?
    - Probiotic rich foods:
      - Yogurt with active cultures
      - Tempeh
      - Miso
      - Sauerkraut
      - Kefir
      - Kimchi (fermented cabbage)
      - Kombucha (fermented tea drink)
      - Buttermilk
      - Certain cheeses: cheddar, mozzarella, gouda
    - Prebiotics are essentially food for the helpful bacteria in our gut. Prebiotics are certain types of fiber that we cannot digest but the good bacteria in our gut can.
      - Probiotics (aka, "good bacteria") break down prebiotics to form short-chain fatty acids that help reduce gut inflammation, block the growth of cancerous cells, and help the growth of healthy cells.[2,3]
      - Ask students: Can anyone tell me a food that contains prebiotics?
    - Prebiotic Rich Foods:
      - Beans
      - Legumes
      - Oats
      - Bananas
      - Berries
      - Garlic
      - Onion
    - Probiotics aid in digestion, maintain a healthy bacterial balance, create vitamins, and support the cells that line your gut.[2,3]

- Transition into discussing Omega-3 Fatty Acids.

- Omega-3 Fatty Acids:
  - Explain to students that Omega-3s play an important role in normal body metabolism. They are a vital part of cell membranes and provide the starting point for making the hormones that regulate blood clotting, contraction and relaxation of artery walls, and inflammation.[3,5]
  - Omega-3s anti-inflammatory properties make it a huge supporter of brain health.
  - We cannot produce omega-3s on our own, so we must get them from our diet.
  - Eicosatetraenoic acid (EPA), and docosahexaenoic acid (DHA) are the two Omega-3s that play the most critical role in mood disorders.[3,5]
  - Omega-3s promote brain health by lowering inflammatory markers and protecting neurons from excessive inflammation.[3,5]
  - A low intake of omega-3s increases the risk of developing various mental health conditions. These include depression, ADHD, autism, and bipolar disorder.[3,5]
  - Foods high in Omega-3s:
    - Fatty fish, walnuts, flax and chia seeds, olive oil, avocado
    - The best source of omega-3s (especially EPA and DHA) is fish. Salmon, mackerel, tuna, herring, and sardines contain high amounts of omega-3s.[3]
    - *Fun fact:* Fish do not actually make omega-3s. Instead, they are found in microalgae. When the fish consumes phytoplankton, which consumes microalgae, they accumulate omega-3s in their tissues.[3]
    - Omega-3's are available from plant sources like edamame, walnuts, and chia seeds.[3]
  - Transition into discussing Folate.
  - Folate (B9):
    - In patients with folate deficiency, depression is the most common symptom.[3]
    - A folate deficiency can ultimately contribute to a loss of brain cells, particularly those in the hippocampus. This loss of brain cells is associated with depression.[3]
    - Studies have demonstrated an inverse relationship between folate levels and depression.[3]
    - Foods high in Folate:
      - Leafy green and cruciferous vegetables
      - Legumes
      - Bananas
      - Citrus fruits
      - Avocados
      - Asparagus
      - Nuts and seeds
      - Fish and shellfish

- Transition into discussing vitamins B1 and B6
- Vitamins B1 and B6:
  - Play a key role in preventing and easing depression, as they help the brain produce and synthesize the neurotransmitters involved in mood regulation.[3]
  - Foods high in B1 and B6:
    - Leafy green and cruciferous vegetables
    - Legumes
    - Bananas
    - Citrus fruits
    - Avocados
    - Asparagus
    - Nuts and seeds
    - Fish and shellfish
    - Whole grains
    - Soybeans
- Tryptophan:
  - Tryptophan is an amino acid that plays a big role in various important metabolic processes.[6]
  - Tryptophan aids in the synthesis of serotonin and melatonin, and is used as a supplemental treatment for anxiety and other cognitive disorders.[6]
  - Foods that are rich in tryptophan:
    - Whole milk
    - Canned Tuna
    - Turkey and chicken
    - Oats
    - Nuts and seeds

- Transition into discussing foods that are not supportive of mental health when consumed in excess.

Foods That Dull Mood:

- Sugar:
  - The brain relies on glucose, a type of sugar, from the food we eat in order to survive and function.
  - Over a 24-hour period, the brain needs only 62 grams of glucose to do its job. This need is easily met by consuming healthy, whole foods.[3]
  - Consuming processed foods like baked goods and soda, which are loaded with refined and added sugars, often in the form of high-fructose corn syrup, floods the brain with too much glucose. This "sugar flood" can lead to inflammation in the brain and may contribute to depression.[3]
- Saturated Fats:
  - Margarine, shortening, and hydrogenated oils are all examples of saturated fats

- An imbalance of Omega-3 and Omega-6 fatty acids may impact emotional regulation and lead to depression.[3]
- Transition into the introduction of recipes
- Today we will be cooking a Mood-Boosting Spiced Nut Mix and Turkey Gumbo with Brown Rice

o Recipe Explanation:

- Spiced Nut Mix: (Recipe found in Appendix C)
  - 1 teaspoon turmeric
  - ¼ teaspoon black pepper
  - ¼ teaspoon garlic powder
  - ¼ teaspoon cayenne pepper
  - 2 teaspoons kosher salt
  - 1 tablespoon olive oil
  - 1 ½ cups plain roasted pumpkin seeds
  - 1 cup brazil nuts
  - 1 cup walnuts
- Directions:
  - Preheat the oven to 300F and line a baking pan with parchment paper.
  - Mix the turmeric, black pepper, garlic powder, cayenne pepper, salt, and olive oil in a medium stainless-steel bowl. Toss in the pumpkin seeds and nuts. Spread the seeds and nuts in a single layer on the lined baking pan. Roast for about 10 minutes. Cool and serve.
- Turkey Gumbo with Brown Rice (Recipe found in Appendix C)
  - 1 tablespoon olive oil
  - ¼ cup chopped leeks
  - ¾ cup diced celery
  - 1 carrot, grated
  - 2 cloves garlic, minced
  - 1-pound ground turkey
  - 1 ½ teaspoons kosher salt
  - ½ cup broccoli (1-inch pieces)
  - 3 cups low sodium chicken broth or water
  - 1 teaspoon hot sauce
  - 2 cups brown rice
- Directions:
  - Heat oil in a pan over medium heat. Add leeks, celery, carrot, and garlic, and sauté for 6 minutes.
  - Add the turkey and salt and simmer for about 5 minutes, or until the turkey is lightly browned, stirring and chopping up the turkey while cooking.
  - Add the okra. Stir in the broth. Bring to a boil, then reduce the heat and simmer uncovered for about 10 minutes.
  - Microwave brown rice according to directions.
  - Add the hot sauce and serve over brown rice.

Cooking Experience: (40 minutes)

- Tell students they will now be divided into groups and prepare students to relocate from classroom to kitchen.
- Tell students to remember the number you assign them and go around the room counting off 1 through 5 (number will vary depending on number of available kitchen stations).
- Tell students to find their partner and direct them to the cooking area.
- Once in the kitchen, tell students to find a cooking station with their partner.
- Once students are at stations, hand out printed copies of the Spiced Nut Mix and Turkey Gumbo recipes.

- Begin by giving students a brief tour of the kitchen. Remind students about where the cooking equipment is located. Demonstrate how to turn on the stovetop. Show students how to turn on the hood switch and explain this must be on any and all times the stovetop is in use.
- Cooking Experience: (40 minutes)

Mealtime: (20 mins)

- Once students have finished cooking and cleaning stations, guide them back to the classroom for a group meal. Handout post-class evaluation. When students finish the evaluation, collect them.

Lesson 3: Baking on a Budget

Lesson Goal: Improve students' budgeting self-efficacy and diet quality by encouraging students to utilize a budget to prepare affordable nutritious meals at home.

Lesson Objectives:

- Participants will be able to calculate total monthly expenses
- Participants will be able to calculate a grocery budget
- Participants will be able to describe 3 tips to save money at the grocery store
- Participants will be able to create and prepare a meal within a given budget

Time: 90 minutes

Materials:

- Lesson 3 PowerPoint Slideshow:
  - Computer
  - Projector Screen
  - PowerPoint containing lesson material
- Cooking:
  - Cooking station equipped with kitchen equipment and materials (oven, pots, pans, knives, cutting boards, mixing utensils, etc.)
  - Recipe Ingredients

    - Hairnets
    - Single-Use Lab coats
    - Utensils: forks, napkins, paper plates, plastic cups, tupperware
- Handouts:
    - Post Class Evaluation
    - Grocery Shopping on a Budget Handout
    - Budgeting Cooking Activity Handout

Preparation:

- Ensure cooking stations are clean.
- Set up a projector screen and computer with PowerPoint presentation containing lesson concepts.
- Recipe ingredients should be laid out at cooking stations prior to the start of class.
- Print Recipe Handout and Post Class Evaluation
- Set up "Grocery Store" for cooking activity: set "grocery store" ingredients in a designated location and label with their price:
    - Garlic bulb: 99 cents
    - McCormick Garlic Powder: $4.65
    - Onion: 0.99 cents
    - Ground Turkey: $3.29
    - Salt and pepper: $1.59
    - Green pepper: $1.49
    - Whole Wheat Pasta: $1.49
    - Tomato paste: 0.65 cents
    - Roma tomatoes: 0.79 cents
    - Tortillas: $1.79
    - Taco seasoning: $1.29
    - Iceberg lettuce: $1.99
    - Olive Oil: $4.59
    - Brown rice: $1.99
    - Mushrooms: $1.49
    - Green onion: $1.29
    - Tofu $2.29
    - Vegetable Broth $2.49
    - Low Sodium Soy sauce: $1.79

Concepts: (30 mins)

- Introduction:
    - Greet students as they enter.
    - Once students are settled, instructors introduce themselves briefly.
    - Have students introduce themselves to the class. Ask their name, major, and favorite dining hall meal.

- Transition into introducing the topic of Budgeting.
- Ask students: Do any of you follow a budget?
- Today we will be discussing how to create and implement a budget.

How to Create a Budget:

- Start by creating a list of all your expenses.[8]
- Here is a sample list of basic expenses you may have:[8]
  - Rent,
  - Utilities,
  - Car payment,
  - Phone bill,
  - Netflix,
  - Gym membership,
  - Gas,
  - Groceries.
- Once you have identified what you spend money on, start adding the exact monetary amount and frequency of payment:[8]
  - Rent = $600/ every month
  - Utilities = $75/ every month
  - Car payment = $400/ every 6 months
  - Phone bill = $55/ every month
  - Netflix = $20/ every month
  - Gym membership = $20/ every month
  - Gas = $55/ 4 times every month
  - **Groceries =??**
- Go through your expenses first, including amount and frequency, and leave groceries last.[8]
- From there, you can add up your total nonnegotiable expenses for each month.
  - Total = 600 (rent) +75 (utilities) +100 (?)+20 (?)+220 (?)= $1015 of non-negotiable expenses.
- Then, based on your income, you have an estimate of your left-over money for the month, which includes money you will need to buy groceries.
  - Income: $1600/month
  - $1600-$1015 = $585 left-over money each month

- Grocery Budget
  - Consider how much you have been spending on groceries and the frequency of your trips.[8]
  - How many times a month are you going, and how much are you spending in total?[8]
  - For example, in this scenario you are estimating you go shopping about 4 times a month (spending x amount of money each time):[8]
    - February 6th = $132.00
    - February 15th = $110.00
    - February 20th = $87.00

    - February 28th = $121.00
    - Total = $450.00/ Month of February
  - This totals about $450 in grocery expenses for the month. Ask yourself, does this spending fit into my previously calculated left-over money budget? Or do I need to start thinking about ways to save money at the grocery store?

o If you want to dive deeper into your grocery store budget, you can calculate cost per meal.[8]

  - Total = $450.00/ Month of February
    § [(X meals/ Day) x (Days/Month)] = Meals/Month
    § [(3 Meals/Day) x (28 days in February)] = 84 meals/Month
    § [(Total Spent)/ (Meals per month)] = Cost/Meal
    § [($450.00/ 84)] = $5.35 per meal

- Grocery Budget Example:[8]
  - Grocery store frequency = 4 times per month
  - Cost = $80/trip
  - 4 x $80 = $320/month
  - 31 days in a month
  - 31 x 3 meals = 93 meals
  - $320/93 = $3.44/meal
- Now that we have discussed how to create a budget, we will talk about tips for saving money at the grocery store.[8]
- <u>Saving Money at the Grocery Store:</u>
  - Purchase produce that are in season[7]
    - What's in Season: Spring
      - Apricots
      - Mushrooms
      - Strawberries
      - Asparagus
      - Peas
      - Broccoli
      - Lettuce
      - Spinach
  - Purchase frozen produce instead of fresh.[7]
  - Buy sale items.[7]
  - Plan meals ahead and bring a list to the grocery store.[7]
  - Bring your own bag.[7]
  - Purchase generic brand items.[7]
  - Compare prices between local grocery stores.[7]
  - Use coupons.[7]
  - Sign up for the loyalty program at your local grocery store.[7]
  - Scan weekly grocery store flyer for items on sale before planning meals.[7]

Cooking Activity Explanation:

- Transition to introducing cooking activity.
- Now you will apply your understanding of budgeting by creating a meal of your choice with the ingredients provided. Once we are in the kitchen you will see a "grocery store." Each ingredient is labeled with a price. Each team has a budget of $10.00. You will work together with your group members to create a recipe using the ingredients provided while staying within the $10.00 budget.
- After each group has finished cooking, we will take the meals back to the classroom, where a member of each group will explain the recipe they created and the total cost.

Cooking Experience: (40 minutes)

- Tell students they will now be divided into groups and prepare students to relocate from classroom to kitchen.
- Tell students to remember the number you assign them and go around the room counting off 1 through 5 (number will vary depending on number of available kitchen stations).
- Tell students to find their partner and direct them to the cooking area.
- Once in the kitchen, tell students to find a cooking station with their partner.

- Begin by giving students a brief tour of the kitchen. Show students where cooking equipment is located. Demonstrate how to turn on the stovetop. Show students how to turn on the hood switch and explain this must be on any and all times the stovetop is in use.

Mealtime: (20 mins)

- Once students have finished cooking and cleaning stations, guide them back to the classroom for a group meal. Handout post-class evaluation. Have each group present their recipe and cost of ingredients. When students finish the evaluation, collect them.

Lesson 4: Meal Prep For Success!

Lesson Goal: Improve diet quality and budgeting self-efficacy by encouraging students to plan nutritious affordable meals for the busy school week.

Lesson Objectives:

- Students will be able to create a list of ingredients
- Students will be able to identify 3 benefits of meal planning
- Students will be able to plan and create a meal schedule

- Students will be able to cook a meal prep recipe

Time: 90 minutes

Materials:

- Lesson 4 PowerPoint Slideshow:
    - Computer
    - Projector Screen
    - PowerPoint containing lesson material
- Cooking:
    - Cooking station equipped with kitchen equipment and materials (oven, pots, pans, knives, cutting boards, mixing utensils, etc.)
    - Recipe Ingredients
    - Hairnets
    - Single-Use Lab coats
    - Utensils: forks, napkins, paper plates, plastic cups, Tupperware
- Handouts:
    - Post class evaluation
    - Stuffed Pepper Casserole Recipe
    - Grocery List and Weekly Meal Planner Handouts

Preparation:

- Ensure cooking stations are clean.
- Set up a projector screen and computer with PowerPoint presentation containing lesson concepts.
- Recipe ingredients should be laid out at cooking stations prior to the start of class.
- Print recipe, handouts, and post class evaluations

Concepts:

- Introduction:
    - Greet students as they enter.
    - Once students are settled, instructors introduce themselves briefly.
    - Have students introduce themselves to the class. Ask their name, major, and favorite season.
    - Give students a few minutes to complete the questionnaire and collect them when all students have finished.
    - Begin to introduce the topic of meal planning.
    - Ask students: Do any of you plan your meals, or have you in the past?
    - Today we are going to be discussing the benefits of implementing a meal plan, and how to actually create one.
    - Ask students: Can anyone think of a potential benefit of meal planning?
    - Benefits of Meal Planning:
        - Saves money[7]
        - Saves time[7]

    - Reduces stress around cooking[7]
    - Provides variety and control[7]
- Transition to discussing how to create a meal plan.
- Creating a Meal Plan:
    - Step 1: Compile a collection of recipes.[7]
    - Step 2: Think about your schedule that week.[7]
        - This will allow you to plan for the appropriate number of meals and determine when you will have time to cook during the upcoming week.[7]
    - Step 3: Pick the recipes/snacks you want to eat that week and assign them to specific days.[7]
        - Look in your pantry—are there any ingredients that need to be used?[7]
        - Browse the weekly sales flyer (available online) at your local grocery store.[7]
        - Assign recipes based on your schedule.[7]
    - Step 4: Create a grocery list consisting of recipe ingredients.
        - Crosscheck list with what's in your pantry to avoid unnecessary spending, and ensure you aren't missing any essentials.[7]
    - Step 5: Grocery shop
    - Step 6: Prepare and enjoy!
- Transition to providing an example of a weekly meal plan.
- Meal Plan Example:
    - Monday:
        - Breakfast: Overnight Oats
        - Lunch: Fried Rice
        - Snack: Tuna salad with crackers
        - Dinner: Spaghetti and Meatballs
    - Tuesday:
        - Breakfast: Overnight Oats
        - Lunch: Tuna salad sandwich
        - Snack: Apple w/ PB and crackers
        - Dinner: Chicken Teriyaki bowl
    - Wednesday:
        - Breakfast: Whole Wheat Toast w/ PB and Banana
        - Lunch: Chicken Teriyaki Bowl
        - Snack: Veggies and Hummus
        - Dinner: Stuffed Pepper Casserole
    - Thursday:
        - Breakfast: Whole Wheat Toast w/ PB and Banana
        - Lunch: Stuffed Pepper Casserole
        - Snack: Veggies and Hummus
        - Dinner: Fried Rice
    - Friday:
        - Breakfast: Oatmeal with Fruit

- Lunch: Spaghetti and Meatballs
- Snack: Apple w/ PB and crackers
- Dinner: Stuffed Pepper Casserole

o Saturday:
- Breakfast: Oatmeal with Fruit
- Lunch: Fried Rice
- Snack: Apple w/ PB and crackers
- Dinner: Spaghetti and Meatballs

o Sunday:
- Breakfast: Whole Wheat Toast w/ PB and Banana
- Lunch: Tuna Salad Sandwich
- Snack: Veggies and Hummus
- Dinner: *Take out*

- Recipe Explanation:

Stuffed Pepper Casserole (Serves 5):[8](Recipe found in Appendix C)

- Ingredients:
  - 1 Tablespoon Olive Oil
  - 1 Pound Ground Turkey
  - 1 Medium Yellow Onion
  - 1 Tablespoon Italian Seasoning
  - 2 Teaspoons Ground Cumin
  - 3 Cloves Garlic
  - 1 Red Pepper
  - 2 Green Peppers
  - 1 14.5oz Can Fire Roasted Diced Tomatoes
  - 1 8oz Can Tomato Sauce
  - 2 Cups Water
  - 1 Tablespoon Worcestershire Sauce
  - 1 Cup Rice
  - 2 Cups Shredded Cheese

- Directions:
  - Prepare the vegetables: dice the yellow onion, one red pepper, and two green peppers. Mince the garlic.
  - In a deep sturdy pot, heat the olive oil over medium heat. Add the onion and cook for about one minute. Then add the ground turkey and break up the ground turkey with your cooking utensil. Cook the turkey until it is browned and fully cooked (8-10 minutes).
  - Add Italian seasoning, cumin, and garlic to the turkey/onion mixture. Cook for about 1 minute. Then, add in the cut-up peppers. Mix well, tomatoes, tomato sauce, Worcestershire, and cooked brown rice. Stir to evenly combine all ingredients.

- After 30 minutes open the top, stir well, and determine if rice needs a few more minutes to cook.
- Sprinkle cheese on top and recover for 1-2 minutes to let cheese melt!

Cooking Experience: (40 mins)

- Tell students they will now be divided into groups and prepare students to relocate from classroom to kitchen.
- Tell students to remember the number you assign them and go around the room counting off 1 through 5 (number will vary depending on number of available kitchen stations).
- Tell students to find their partner and direct them to the cooking area.
- Once in the kitchen, tell students to find a cooking station with their partner.

- Begin by giving students a brief tour of the kitchen. Show students where cooking equipment is located. Demonstrate how to turn on the stovetop. Show students how to turn on the hood switch and explain this must be on any and all times the stovetop is in use.
- Cooking Experience **(40 mins)**

Mealtime: **(20 mins)**

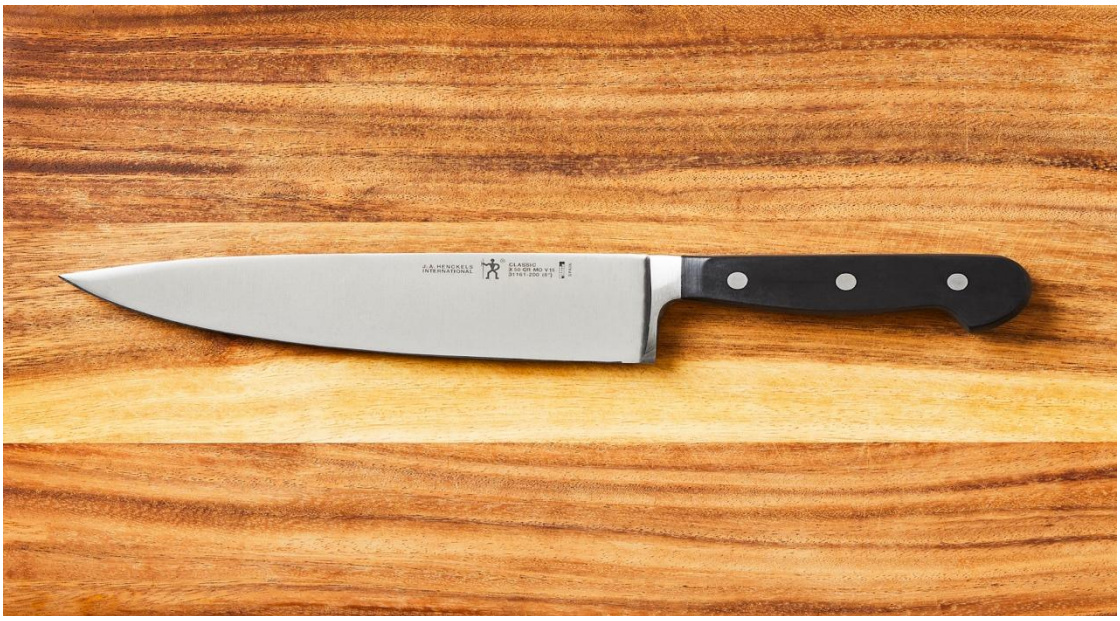
- Once students have finished cooking and cleaning stations, guide them back to the classroom for a group meal. Handout post-class evaluation. Once students complete post class evaluations, collect them.

APPENDIX B: CCC Lesson Evaluations

Lesson 1 Evaluation

1. **What are the five MyPlate food groups?**

2. **Identify 5 parts of the knife.**



3. Label each image with the correct cutting technique (mince, cut, chop, dice).

4. Define the acronym SAFETY:

S –

A –

F –

E –

T –

Y –

5. What did you like most about this lesson?

6. What could be improved for next time?

Lesson 2 Evaluation:

1. **What is the name of the nerve that connects the brain and gut?**

2. **Provide an example of 2 nutrients that are beneficial for brain function.**

3. **Give an example of 2 foods that are rich in nutrients that are beneficial for brain health.**

4. **Give an example of a food that, when eaten in excess, is not supportive of brain health.**

5. **What did you like most about this lesson?**

6. **What could be improved for next time?**

Lesson 3 Evaluation:

1. **What meal did your group cook using the given budget/ ingredients?**

2. **Jane is a first year college student trying to calculate her grocery budget. Her monthly expenses are as follows: $600 in rent, $50 wifi bill, $40 electric bill, $150 gas expenses, $10 netflix bill, $10 gym membership. If Jane makes $1200 a month at her waitressing job, after her other expenses, how much money does she have left over for groceries? How much does she have to spend on groceries each week?**

3. **Provide 3 examples of ways to save money when grocery shopping.**

4. **What did you like most about this lesson?**

5. **What could be improved for next time?**

Lesson 4 Evaluation:

1. **List a recipe you have made or would like to make and create a list of ingredients you would need to create this recipe. (Ex. Oatmeal and fruit: oats, milk, frozen berry mix, cinnamon…)**

2. **Give an example of one day of meals you could consume on a typical school/work day. (List a realistic meal schedule for breakfast, lunch, dinner, and snacks).**

3. **How confident are you in your ability to create and follow a grocery list (On a scale from 1-5, 1 being not confident at all, 5 being extremely confident)**

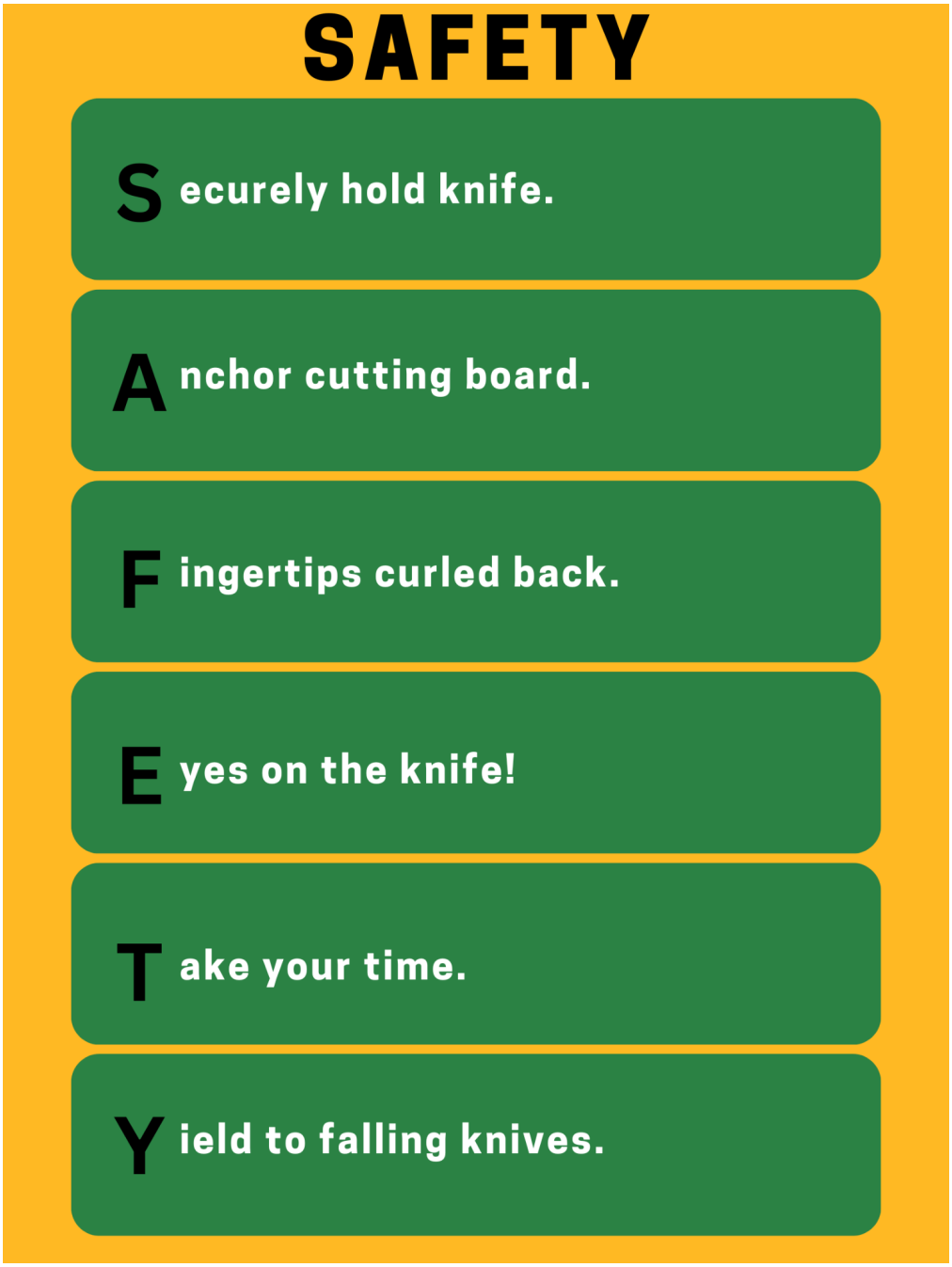
4. **How confident are you in your ability to meal prep a recipe to make 3 servings? (On a scale from 1-5, 1 being not confident at all, 5 being extremely confident)**

5. **What did you like most about this lesson?**

6. **What could be improved for next time?**

APPENDIX C: CCC Lesson Handouts

Lesson 1 Handout:



Lesson 2 Handout:

Lesson 3 Handouts:

Grocery Shopping on a Budget!

Eating healthy does not have to be expensive.
Try these tips to help you save money
at the grocery store!

10 Tips for the Grocery Store:

1. Go with a grocery list and stick to it! Only buy what you need and can afford.
2. Eat a healthy snack before you head to the store to avoid overbuying on an empty stomach.
3. Join your grocery store's discount card program. Look for sales as you shop!
4. Buy store brand items. They are usually cheaper and taste just as good as name brand foods.
5. Use store and manufacturer coupons.

6. Check the unit price for the best deal. Sometimes larger size items have a higher price, but cost less per unit.
7. Buy family size packages. A bag of apples typically costs less than buying individual apples.
8. Steer away from packaged convenience foods. Chop your own veggies and shred your own cheese.
9. Buy meats on sale and store some in your freezer for a future meal. Buy family pack meats to save money, too.
10. Buy canned and frozen fruits and veggies when they are not in season.

Meal Planning Tips:

- Plan your meals for the week.
- Plan meals to save leftovers for the next day. Pasta dishes and stir-fries make great leftovers!
- Get creative with your meals to clean out the fridge and pantry, and to reduce food waste.
- Learn how to prepare premade foods you usually buy, like marinated chicken and muffins.
- Get recipe ideas from friends, family, cookbooks, and websites. For low cost, healthy recipes, go to USDA's SNAP-Ed website: https://snaped.fns.usda.gov/nutrition-education/recipes
- Check expiration dates to see what foods to use first in your refrigerator and pantry.

Food Storage Tips:

- Meat and poultry can be kept in your freezer for 3-4 months
- Frozen vegetables last for up to 8 months in the freezer
- Frozen fruits last for 6 months in the freezer
- Unopened canned foods can last for 2-5 years

This material was funded by USDA's Supplemental Nutrition Assistance Program (SNAP). This institution is an equal opportunity provider. Created by UConn Dietetics student Sara Borrello. Adapted from MyMoneyCoach, "25 Budget Grocery Shopping Tips to Save Money" by Julie Jaggernath

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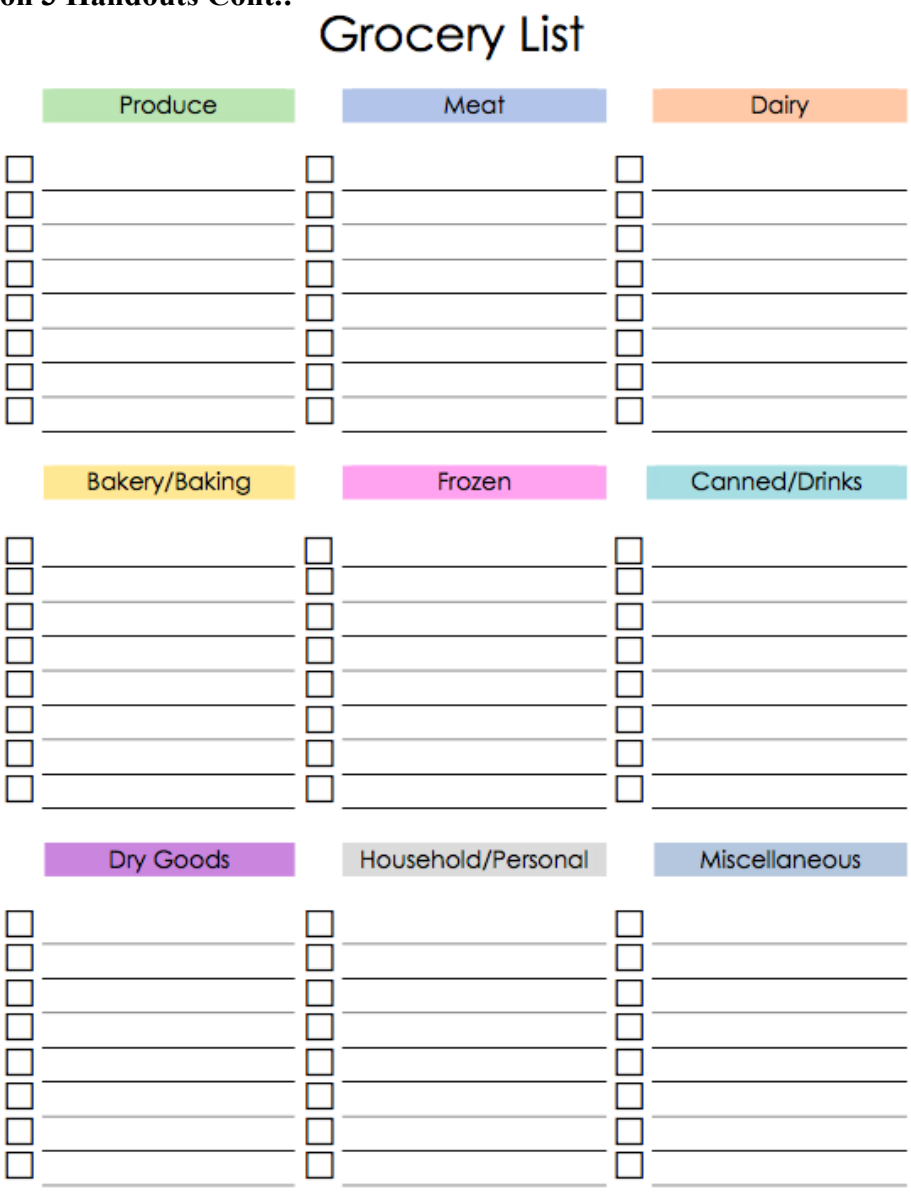
Lesson 3 Handouts Cont.:



Lesson 4 Handout:

APPENDIX D: CCC Recipes

Lesson One Recipe:

- Greek Lemon and Rice Soup: (55 minutes)
- Recipe from: tastefulventure.com
- Servings: 6
- Prep Time: 10 minutes
- Cooking Time: 45 minutes
- Ingredients:
  - 2 Tablespoons of Olive Oil
  - 1 Large Sweet Onion, *Chopped*
  - 3 Cloves Garlic, *Minced*
  - 4 Cups Chicken Broth
  - 1 Bay Leaf
  - ½ Teaspoon Salt
  - ½ Teaspoon Black Pepper
  - 2 Boneless Skinless Chicken Breasts*
  - ½ Cup Arborio Rice
  - 1 Lemon
- Directions:
  - In a large pot add olive oil and chopped onion.
  - Sauté onion over medium/high heat for 5-6 minutes, until onions are translucent.
  - Add minced garlic and sauté for 1 minute.
  - Add chicken broth, bay leaf, salt, pepper, and chicken breasts.
  - Bring to a boil over medium/high heat. Cover and turn heat down to medium/low.
  - Let simmer for 20 minutes.
  - Remove chicken and shred on a cutting board using two forks.
  - Add the chicken back to the pot.
  - Add Arborio rice.
  - Cover and simmer for 20 more minutes.
  - Remove Bay Leaf.
  - In a small bowl, whisk together eggs and the juice of one lemon.
  - Slowly add in 1 ladle of the broth to the egg/lemon juice mixture, while whisking, (this will ensure the egg doesn't scramble when added to the soup).
  - Add egg mixture to soup.
  - Add chopped dill weed and stir.
  - Let cook for around 5 minutes before serving.
  - Taste and add more lemon juice if necessary!

*Tofu can be used in place of chicken for a vegetarian option.

Lesson Two Recipe:

Turkey Gumbo with Brown Rice

- 1 tablespoon olive oil
- ¼ cup chopped leeks
- ¾ cup diced celery
- 1 carrot, grated
- 2 cloves garlic, minced
- 1-pound ground turkey
- 1 ½ teaspoons kosher salt
- ½ cup broccoli (1-inch pieces)
- 3 cups low sodium chicken broth or water
- 1 teaspoon hot sauce
- 2 cups brown rice

- Directions:
  - Heat oil in a pan over medium heat. Add leeks, celery, carrot, and garlic, and sauté for 6 minutes.
  - Add the turkey and salt and simmer for about 5 minutes, or until the turkey is lightly browned, stirring and chopping up the turkey while cooking.
  - Add the okra. Stir in the broth. Bring to a boil, then reduce the heat and simmer uncovered for about 10 minutes.
  - Microwave brown rice according to directions.
  - Add the hot sauce and serve over brown rice.

Lesson 3 Recipe: (Budgeting Activity)

- Garlic bulb: 99 cents
- McCormick Garlic Powder: $4.65
- Onion: 0.99 cents
- Ground Turkey: $3.29
- Salt and pepper: $1.59
- Green pepper: $1.49
- Whole Wheat Pasta: $1.49
- Tomato paste: 0.65 cents
- Roma tomatoes: 0.79 cents
- Tortillas: $1.79
- Taco seasoning: $1.29
- Iceberg lettuce: $1.99
- Olive Oil: $4.59
- Brown rice: $1.99
- Mushrooms: $1.49
- Green onion: $1.29
- Tofu $2.29

- Vegetable Broth $2.49
- Low Sodium Soy sauce: $1.79

Lesson 4 Recipe:

Stuffed Pepper Casserole (Serves 5):

- Ingredients:
  - 1 Tablespoon Olive Oil
  - 1 Pound Ground Turkey
  - 1 Medium Yellow Onion
  - 1 Tablespoon Italian Seasoning
  - 2 Teaspoons Ground Cumin
  - 3 Cloves Garlic
  - 1 Red Pepper
  - 2 Green Peppers
  - 1 14.5oz Can Fire Roasted Diced Tomatoes
  - 1 8oz Can Tomato Sauce
  - 2 Cups Water
  - 1 Tablespoon Worcestershire Sauce
  - 1 Cup Rice
  - 2 Cups Shredded Cheese

- Directions:
  - Prepare the vegetables: dice the yellow onion, one red pepper, and two green peppers. Mince the garlic.
  - In a deep sturdy pot, heat the olive oil over medium heat. Add the onion and cook for about one minute. Then add the ground turkey and break up the ground turkey with your cooking utensil. Cook the turkey until it is browned and fully cooked (8-10 minutes).
  - Add Italian seasoning, cumin, and garlic to the turkey/onion mixture. Cook for about 1 minute. Then, add in the cut-up peppers. Mix well, tomatoes, tomato sauce, Worcestershire, and cooked brown rice. Stir to evenly combine all ingredients.
  - After 30 minutes open the top, stir well, and determine if rice needs a few more minutes to cook.
  - Sprinkle cheese on top and recover for 1-2 minutes to let cheese melt!

APPENDIX E: CCC Grocery Shopping Lists

Lesson 1 Grocery List:

Item	**Amount Needed 1 Class** (15 people, 5 groups of 3)	**Amount Needed 5 Classes** (75 people, 25 groups of 3)
Sweet Onions	5 large	25 large
Olive Oil	10 tbsp	50 tbsp
Garlic	15 cloves (2 heads)	75 cloves (10 heads)
Chicken Broth	20 cups (160oz or 4.7L)	100 cups (800oz or 23L)
Bay Leaf	5 leaves	25 leaves
Salt	2.5 tsp	12.5 tsp
Pepper	2.5 tsp	12.5 tsp
Boneless Skinless Chicken Breasts	5 breasts	25 breasts
Arborio rice	2.5 cups	12.5 cups
Lemons	5	25
Tofu	As needed	As needed

Lesson 2 Grocery List:

Item	**Amount Needed 1 Class** (15 people, 5 groups of 3)	**Amount Needed 5 Classes** (75 people, 25 groups of 3)
Turmeric	5 tsp	25 tsp
Black Pepper	1 ¼ tsp	6.25 tsp
Garlic Powder	1 ¼ tsp	6.25 tsp
Cayenne Pepper	1 ¼ tsp	6.25 tsp
Kosher salt	10 tsp	50 tsp
Olive Oil	10 tbsp	50 tbsp
Plain Roasted Pumpkin Seeds	7 ½ cups	37.5 cups
Brazil Nuts	5 cups	25 cups
Walnuts	5 cups	25 cups
Leeks	1 ¼ cup (chopped)	
Celery	3 ¾ cup (diced)	
Carrot	5	25
Ground Turkey	5lbs	25lbs
Garlic	10 cloves	50 cloves
Salt	7 ½ tsp	37.5 tsp
Broccoli	2 ½ cups (chopped)	12.5 cups (chopped)
Low Sodium Chicken Broth	15 cups	75 cups
Hot Sauce	5 tsp	25 tsp
Brown Rice (Microwaveable)	10 cups	50 cups

Lesson 3 Grocery List:

Item	**Amount Needed 1 Class** (15 people, 5 groups of 3)	**Amount Needed 5 Classes** (75 people, 25 groups of 3)
Garlic bulbs	5 cloves	25 cloves (2 heads)
Garlic powder	To taste	2 shakers
Ground turkey	5lbs (each groups gets ⅓ lb)	25 lbs
Salt and pepper	To taste (should have left over from previous classes)	
Green pepper	3 peppers	15 peppers
Whole wheat pasta	3 boxes	15 boxes
Tomato paste	3 cans	15 cans
Roma tomatoes	3 tomatoes	15 tomatoes
Tortillas	15 tortillas	70 tortillas
Taco seasoning	5 packs	25 packs
Iceberg lettuce	1 head	5 heads
Olive oil	To taste (should have left over from previous classes)	
Brown rice	2.5 cups	12.5 cups
Mushrooms	2.5 cups	12.5 cups
Green onion	10 spears	50 spears
Tofu	1 package	5 packages
Vegetable broth	3 containers	15 containers
Low sodium soy sauce	To taste (should have left over from previous classes)	

Lesson 4 Grocery List:

Item	**Amount Needed 1 Class** (15 people, 5 groups of 3)	**Amount Needed 5 Classes** (75 people, 25 groups of 3)
Olive Oil	3 TBSP	15 TBSP
Ground Turkey	3 lbs	15 lbs
Yellow Onion	3 each	15 each
Red Pepper	3 each	15 each
Green Pepper	6 each	30 each
Garlic Cloves	9 each	45 each
Italian Seasoning	3 TBSP	15 TBSP
Ground Cumin	6 tsp	30 tsp
14.5oz Can Fire Roasted Diced Tomatoes	3 cans	15 cans
8oz Can Tomato Sauce	3 cans	15 cans
Worcestershire Sauce	3 TBSP	15 TBSP
Shredded Cheese	6 cups	30 cups
Rice	3 cups	15 cups

APPENDIX F: EXPERT REVIEW SURVEY

Thank you for your participation in the process of reviewing the College Cooking Connection curriculum. Please answer the following questions with your expertise and area of work in mind. At the end of the survey there will be a link that will take you to a separate survey to enter your email address to sign up to receive a $20 honorarium in the form of a gift card for your participation. Also, there will be a box to mark if you would like to be contacted in the future about updates on the program.

You are invited to participate in a research project being conducted by Jade McNamara, a faculty member in the Department of Food Science and Human Nutrition at the University of Maine. Your email was supplied by Dr. McNamara. The purpose of the research is to capture the feasibility of implementation of the College Cooking Connection curriculum. You must be over the age of 18 to participate, and work within the area of community health.

What Will You Be Asked to Do? If you decide to participate, you will be asked to take a 30 minute anonymous online survey seeking your expert feedback and opinion on the developed curriculum with a specific focus on feasibility, clarity, and effectiveness.

Risks: Time and inconvenience.

Benefits: While this study will have no direct benefit to you, this research may help us learn what changes to the curriculum should be made to improve feasibility.

Confidentiality: If you choose to participate in this survey, all responses will remain anonymous. At the end of the survey you will have the opportunity to be sent to a separate page to enter your contact information to receive the $20 gift card for your participation.

Voluntary: Participation is voluntary. You may skip any questions and stop the survey at any time. If participants stop the survey before completion they will not be eligible to receive the honorarium.

Contact Information: If you have any questions about this study, please contact me at 207-581-4895 or jade.mcnamara@maine.edu. If you have any questions about your rights as a research participant, please contact the Office of Research Compliance, University of Maine, 207/581-2657 (or e-mail umric@maine.edu).

Q1 Which category or categories best describes your area of work?

- [ ] Curriculum Development (1)
- [ ] College Student Health (2)
- [ ] Human Nutrition (3)
- [ ] Teacher (4)
- [ ] Graduate Student (5)
- [ ] Other (6) _____
- [ ] Researcher (8)

Q52 What is the highest degree or level of education you have completed

- ○ Some high school (1)
- ○ High school (2)
- ○ Bachelor's (3)
- ○ Master's (4)
- ○ Ph.D. or higher (5)

Q53 Are you currently a registered dietitian?

- ○ Yes (1)
- ○ No (2)

Q3 How many years have you been working in your field?

_____

Q49 Please click below to access the College Cooking Connection curriculum.

CLICK HERE

Q12 The next questions will ask about the **INTRODUCTION section of the CCC curriculum.**

Q13 Were there any areas that were confusing when reading through the introduction of the program?

_____

_____

_____

_____

_____

Q14 What additional information should be included in the introduction?

_____

_____

_____

_____

_____

Q15 The next questions will ask about **LESSON ONE**.

Q17 Are the learning objectives for the lesson clear?

- ○ Yes (1)
- ○ No (2) _____

Q38 Are the learning objectives being adequately addressed throughout lesson one?

- ○ Yes (1)
- ○ No (2)

Q43 Please provide feedback on lesson one: Likes, dislikes, areas of confusion, etc.

_____

_____

_____

_____

_____

Q19 The next questions will ask about **LESSON TWO**.

Q20 Are the lesson objectives for the lesson clear?

- ○ Yes (1)
- ○ No (2) _____

Q39 Are the learning objectives being adequately addressed throughout lesson two?

- ○ Yes (1)
- ○ No (2) _____

Q44 Please provide feedback on lesson two: Likes, dislikes, areas of confusion, etc.

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Q21 The next questions will ask about **LESSON THREE**.

Q22 Are the learning objectives for the lesson clear?

- ○ Yes (1)
- ○ No (2) _____

Q40 Are the learning objectives being adequately addressed throughout lesson three?

- ○ Yes (1)
- ○ No (2) _____

Q45 Please provide feedback on lesson three: Likes, dislikes, areas of confusion, etc.

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_____

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_____

Q23 The next questions will ask about **LESSON FOUR**.

Q24 Are the learning objectives for the lesson clear?

- ○ Yes (1)
- ○ No (2) _____

Q41 Are the learning objectives being adequately addressed throughout lesson four?

- ○ Yes (1)
- ○ No (2) _____

Q46 Please provide feedback on lesson four: Likes, dislikes, areas of confusion, etc.

_____

_____

_____

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_____

Q25 **This next section will ask for feedback based on your expert opinion and personal experience.**

Q26 The resources that are provided are helpful in achieving the learning objectives?

- ○ strongly agree (1)
- ○ agree (2)
- ○ neutral (4)
- ○ disagree (5)
- ○ strongly disagree (6)

Q47 What additional resources would be helpful for leaders in order to deliver the curriculum?

_____

_____

_____

_____

_____

Q27 On a scale of 0 to 10 what is the feasibility of running the College Cooking Connection on your college campus?

0 1 2 3 4 5 6 7 8 9 10

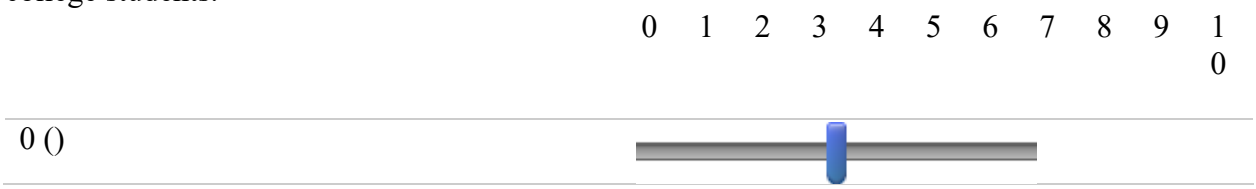
0 ()

Q28 On a scale of 0 to 10 would the College Cooking Connection improve diety quality of college students.

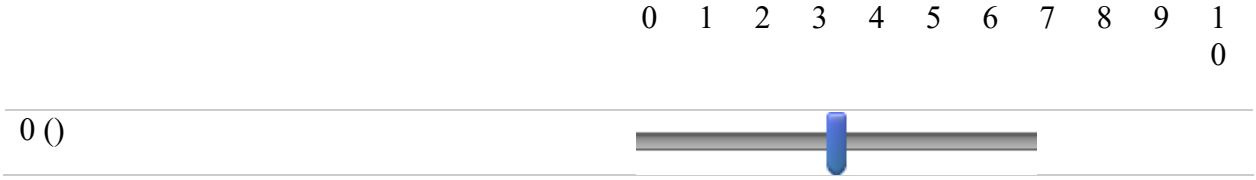
0 1 2 3 4 5 6 7 8 9 10

0 ()

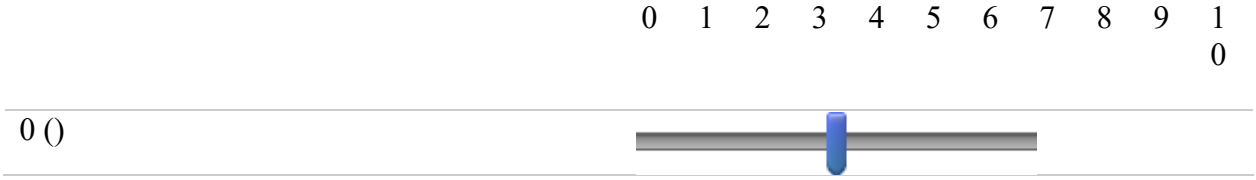
Q29 On a scale of 0 to 10 would the College Cooking Connection improve cooking skills of college students.



Q30 On a scale of 0 to 10 would the College Cooking Connection improve self-efficacy of college students.



Q31 On a scale of 0 to 10 would the College Cooking Connection improve health related quality of life of college students.



Q4 The following questions will ask you about your overall understanding and thoughts of the College Cooking Connection. For this section you will have had to read through the College Cooking Connection curriculum.

Q5 After reading the College Cooking Connection curriculum how confident do you feel that you could teach the program? Rank 0-10 for understanding the curriculum.

0 1 2 3 4 5 6 7 8 9 10

0 ()

Q7 What was difficult to understand about the curriculum overall? What might be missing?

_____

_____

_____

_____

_____

Q8 What was easy to understand about the curriculum overall? What did you like?

_____

_____

_____

_____

_____

Q9 Does the overview of the curriculum explain the scope and materials needed to run the College Cooking Connection?

- ○ Yes (1)
- ○ No (2) _____

Q10 Is the lesson content and culinary application appropriate and occurring in sequential order?

- ○ Yes (4)
- ○ No (5) _____

Q32 Please provide any additional feedback or comments you have about the College Cooking Connection curriculum.

_____

_____

_____

_____

_____

Q33 Would you like to be kept updated on the development of the program curriculum?

- ○ Yes (1)
- ○ No (2)

APPENDIX F: PERCEIVED SKILL CHANGE AND LESSON VALUE

Display This Question:

If Please select which of the following programs you participated in. = Cooking classes

Q150 Rank the classes in order you felt were the most valuable.

_____ Introducing Basic Cooking Skills (1)
_____ Budgeting (2)
_____ Eating for a Healthy Mind (3)
_____ Meal Prepping (4)

Display This Question:

If Please select which of the following programs you participated in. = Cooking classes

Q151 How much did the following skills improve after attending the workshops?

	Not at all (1)	Very little (2)	Somewhat (3)	A lot (4)
Basic cooking skills (1)	○	○	○	○
Budgeting skills (2)	○	○	○	○
Knowledge related to nutrition and mental health (3)	○	○	○	○
Meal preparation skills (4)	○	○	○	○

Display This Question:

If Please select which of the following programs you participated in. = Cooking classes

Q152 Do you have any comments or suggestions for this program for future semesters?

_____

_____

_____

_____

APPENDIX G: Adjustments Made to the Curriculum Based on Pilot: Future Work

Based on expert review feedback, lesson objectives were reworded from "students should be able to" to "students will be able to," and lesson goals were adjusted to better address the topics and skills covered in the lesson. To address feedback related to the need for additional information and student accommodations, scripts for lesson PowerPoints were added into the curriculum and vegetarian options were incorporated into each lesson to account for students with dietary restrictions. During lesson one: *Chop to the Top,* the recipe selected for the cooking activity took longer than anticipated, which resulted in a minor overlap of class times. To fix this problem going forward, a simpler recipe should be selected, or classes should be extended to two hours. While the original curriculum allotted twenty minutes at the end of each class for a group mealtime, students who participated in the intervention opted to take their meals to go rather than stay and eat together.

BIOGRAPHY OF THE AUTHOR

Caitlyn was born in Bangor, Maine and raised in Windham, Maine. She graduated from Windham High School in 2017 with plans to take a gap year. Caitlyn quickly realized her life was lacking the fulfillment she once garnered in academics and decided to apply to the University of Maine to study nutrition. She received her B.S. in Food Science and Human Nutrition from the University of Maine Summa Cum Laude. She is currently pursuing a M.S. in Food Science and Human Nutrition, and will be completing a dietetic internship in Southern, Maine in 2024. Caitlyn's long-term goals are to become a Registered Dietitian Nutritionist and earn her PhD in nutrition.

As an undergraduate, Caitlyn was a member of Alpha Phi Sorority and served as the treasurer for the Nutrition Club and Kappa Omicron Nu Honor's Society. During her Senior year Caitlyn joined Dr. McNamara's community nutrition lab where she developed a strong passion for research. So far as a graduate student Caitlyn has served as both a teaching assistant and research assistant and presented research at both national and international conferences. Caitlyn is the first author of three abstracts and the co-author of eight abstracts and two manuscripts. She is currently a student member of the Academy of Nutrition and Dietetics and serves on the Maine Academy of Nutrition and Dietetics annual conference planning committee. In her free time Caitlyn enjoys cooking, reading, exercising, and spending quality time with her family, friends, and pets. Caitlyn is a candidate for the Master of Science degree in Food Science and Human Nutrition from the University of Maine in August 2024.