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## Impact of Acquiring Childhood Cooking Skills on Adults' Dietary Behaviors

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## ABSTRACT

### IMPACT OF ACQUIRING CHILDHOOD COOKING SKILLS ON ADULTS' DIETARY BEHAVIORS

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The ability to cook and prepare foods from fresh ingredients is a necessary life skill to improve overall diet quality and to prevent or reduce the risk of chronic diseases. Limited research exists on the appropriate time to develop these skills to have a long-term impact on diet quality and health. The primary objective of this study was to determine whether the age of learning cooking skills promotes higher cooking confidence and diet quality during adulthood. In addition, the study investigated the impact of learning cooking skills from various sources on diet quality and cooking confidence in adulthood.

A cross-sectional survey study was conducted at Northern Illinois University on college students between the ages of 20 and 40 years old. There were 487 study participants who completed the online survey, and the mean age of participants was  $24.95 \pm 5.07$  years old. The results of the study indicate that the mean adults' diet quality score was  $45.76 \pm 11.4$ , as measured by the Short Healthy Eating Index scale. The age for acquiring cooking skills did not significantly impact adults' diet quality,  $F(df1, df2) = 1.404, p = 0.247$ . Most participants reported the main influence for the development of their cooking skills was their mother, or they

taught themselves through books, videos, or the internet. However, no significant relationship was found between the most influential source of learning cooking skills and adults' diet quality,  $F(df1, df2) = 1.253$  and  $p = 0.272$ . The study also found that females had significantly higher diet quality scores than males,  $p = 0.001$ .

Significant differences between acquiring cooking skills before adulthood on adults' cooking skills confidence was found ( $F(df1, df2) = 5.030$  and  $p = 0.007$ ). Study participants who learned cooking skills during childhood and as teenagers had higher Cooking Skills Confidence scores than those who learned cooking skills during adulthood. Additionally, participants who taught themselves to cook had significantly higher cooking skills confidence scores than those who were taught by their mother ( $F(df1, df2) = 3.048$ ,  $p = 0.019$ ).

Many factors influence whether cooking skills can be learned earlier in life to help in eating healthier foods. Despite the complexity of these issues, this study shed light on the influence that learning cooking skills at a younger age can have on building stronger confidence in cooking skills later in life to make healthier food choices. Since the development of cooking skills can influence diet quality, it is important to further explore this relationship to improve diet quality and decrease the prevalence of chronic diseases.

NORTHERN ILLINOIS UNIVERSITY  
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IMPACT OF ACQUIRING CHILDHOOD COOKING SKILLS  
ON ADULTS' DIETARY BEHAVIORS

BY

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A THESIS SUBMITTED TO THE GRADUATE SCHOOL  
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## TABLE OF CONTENTS

	Page
LIST OF TABLES .....	vi
LIST OF FIGURES .....	vii
LIST OF APPENDICES .....	viii
Chapter	
I. INTRODUCTION .....	1
Statement of the Problem .....	4
Objectives .....	5
Research Questions and Hypotheses .....	5
Background and Significance .....	6
II. REVIEW OF LITERATURE .....	8
Home Cooking Skills Among Adults and Diet Quality .....	8
Child Involvement in Home Meal Preparation .....	11
Where Do People Learn to Cook? .....	15
Cooking Confidence and Diet Quality .....	16
Summary of the Literature .....	18
III. METHODS AND DESIGN .....	19
Research Design .....	19
Study Population .....	19
Recruitment and Consent .....	20

Pilot Testing of Instrument .....	21
Data Collection .....	22
Description of Survey Instrument .....	22
Measures and Outcomes .....	24
Data Analyses .....	26
Data Safety and Monitoring .....	28
Expected Findings .....	28
Summary of Chapter Three .....	29
IV. RESULTS .....	30
Demographic Characteristics .....	30
Diet Quality Scores .....	33
Cooking Skills Confidence Scores .....	34
Research Questions .....	36
Additional Findings .....	42
Summary of Research Findings .....	49
V. IMPLICATIONS OF THE RESEARCH .....	50
Discussion .....	50
Strengths and Limitations .....	54
Implications for Research and Dietetic Practice .....	55
Conclusion .....	56
REFERENCES .....	59
APPENDICES .....	62

## LIST OF TABLES

Table	Page
1. Summary of Hypotheses and Variables.....	27
2. Demographic Distribution of Study Sample (n=487) .....	32
3. Comparison of Mean Cooking Skills Confidence Scores to Level of Adults' Diet Quality .....	36
4. Comparison of Mean Diet Quality Scores to Age for Acquiring Cooking Skills .....	38
5. Comparison of Mean Diet Quality Scores to Cooking Skills Source .....	40
6. Comparison of Mean Cooking Skills Confidence Scores to Age of Acquired Cooking Skills .....	42
7. Comparison of Diet Quality Scores with Education Level and Perceived Health .....	43
8. Comparison of Mean Cooking Skills Confidence Scores to Education Level.....	44
9. Comparison of Mean Cooking Skills Confidence Scores to Level of Perceived Health .....	45
10. Comparison of Mean Cooking Skills Confidence Scores to Source of Acquired Cooking Skills .....	47



## LIST OF FIGURES

Figure	Page
1. Current Household Size of Study Participants .....	33
2. Study Participant Diet Quality Score .....	34
3. Study Participant Cooking Skills Confidence Score .....	35
4. Study Participants' Age of Acquired Cooking Skills .....	37
5. Main Influence of Study Participants' Cooking Skills .....	39
6. Total Number of Sources for Teaching Cooking Skills .....	48

## LIST OF APPENDICES

Appendix	Page
A. SURVEY QUESTIONNAIRE .....	62
B. IRB EXEMPTION NOTICE .....	69
C. REQUEST FOR STUDENT DATA FORM .....	71
D. CONSENT FOR PILOT STUDY .....	73
E. NORTHERN ILLINOIS UNIVERSITY CLEARINGHOUSE REVIEW AND MASS EMAIL REQUEST FORM .....	75
F. PERMISSION TO USE SHEI SCALE .....	78
G. PERMISSION TO USE COOKING SKILLS SCALE .....	80
H. SHEI TOTAL DIETARY QUALITY SCORE INSTRUCTIONS .....	82
I. RESEARCH TIMELINE .....	86
J. BUDGET .....	88

## **CHAPTER ONE**

### **INTRODUCTION**

A healthy diet, consisting of whole, low-processed nutrient-rich foods, throughout the lifespan has been shown to reduce the risk of obesity and chronic diseases such as heart disease, stroke, type 2 diabetes, and some types of cancers.<sup>1</sup> Currently in the United States, Americans fail to meet national dietary recommendations for daily consumption of fruits and vegetables, and they overconsume fats and sugar.<sup>2</sup> According to the 2020-2025 Dietary Guidelines, adults should consume two cups per day of fruit and two and a half cups per day of vegetables as part of a healthy diet.<sup>3</sup> However, only one in ten adults meet these recommendations.<sup>4</sup> A healthy diet should also include at least half of total grains intake from whole grains, and 98% of all Americans have not met this recommendation.<sup>3</sup> Furthermore, the Dietary Guidelines also recommend less than ten percent of total calories per day should come from added sugar and saturated fat, and less than 2,300 milligrams of sodium per day should be consumed.<sup>3</sup> However, most Americans exceed these recommendations.<sup>3</sup> The eating patterns of Americans demonstrate the need for a shift in making healthier food choices to help support a healthier body weight, consume adequate nutrients, and decrease the risk for chronic diseases.<sup>3</sup>

According to the Center for Disease Controls and Prevention, approximately six in ten adults have at least one chronic disease, and the prevalence of obesity has increased in the United States from 30.5% in 2000 to 42.4% in 2018.<sup>1</sup> Due to these high rates, public health interventions have been created to improve dietary choices and eating patterns among adults and children.<sup>5</sup>

The teaching of cooking and food skills, consisting of domains such as mechanical, planning and perceptual skills related to food, as well as knowledge of food safety and nutrition, have been incorporated in these interventions to address this public health concern and have targeted all ages to improve dietary outcomes.<sup>2,5</sup> However, there is little evidence suggesting the most optimal age to learn these skills to have a positive effect on long term health and diet quality. The current research aimed to determine the long-term benefits of learning these skills at a young age.

In the United States, cooking and food skills have declined due to several factors including time constraints, work schedules, and the accessibility of processed, ready prepared foods.<sup>6</sup> Furthermore, the change in frequency of home meal preparation and level of cooking skills have decreased due to changes in family roles with more women working outside of the home, and greater affordability of convenience foods.<sup>7</sup> Cooking is an essential life skill that involves the ability to transform and assemble ingredients to prepare a meal through physical or mechanical skills such as mixing or chopping foods.<sup>6,7</sup> Food skills involve the ability to plan meals, grocery shop and work within a food purchasing budget.<sup>7</sup> Since increased level of cooking skills are known to achieve healthy dietary consumption, the ability of children to acquire these skills in the home may be difficult given the current challenges families experience to prepare meals more frequently at home.<sup>7</sup>

Since the 1980's, Americans have grown to rely on ready prepared foods or food prepared outside the home due to lack of time and cooking skills, as well as affordability.<sup>7</sup> These ready prepared foods or food prepared outside the home foods are often calorie-dense and rich in fat, sodium, and added sugar, all of which result in poor dietary intake and negative long-term

health outcomes.<sup>8,9</sup> Studies have shown that learning to cook with wholesome ingredients can lead to improved diet quality, weight control, and increased life span.<sup>7,10</sup> People who prepared their own food frequently at home have increased fruit and vegetable consumption, make healthier food choices, and have a healthier body mass index.<sup>6,9,11</sup>

Cooking skills education has been used in recent community interventions for adults and children in public health initiatives as a part of a multidisciplinary approach by the World Health Organization in the prevention of chronic diseases and obesity due to the decline in home cooking.<sup>5,11</sup> National and local campaigns have included ‘What’s Cooking,’ ‘Get Cooking,’ and ‘Cooking Matters.’<sup>5</sup> These nutrition and cooking interventions target parents and children to improve their cooking skills, eating behaviors, and cooking confidence to make an impact on their diet quality.<sup>5</sup> The structure and delivery of these programs vary in course content and length, modes of delivery, and outcome measurements, such as fruit and vegetable intake.<sup>5</sup> However, limited evidence exists on the impact of these interventions on the children’s dietary quality when they become adults.<sup>5,6</sup>

Childhood and early adolescence have proven to be an important and effective time in life to acquire various life skills.<sup>11</sup> In the past, children have been taught cooking skills in both the home and school environment. In the home setting, providing these cooking experiences with children is a challenge among families in the United States.<sup>12</sup> Recent studies have suggested that parents lack the knowledge of cooking skills and the time to teach these skills, resulting in the inability to pass on these skills to their children.<sup>12,13</sup> In the school environment, children may learn cooking skills through a home economics course, now known as a family and consumer science, the only subject area that focuses on the dissemination of food skills and knowledge.<sup>14</sup>

However, schools have limited or discontinued these classes with the replacement of other scientific classes, and ultimately removing the ability to teach these important life skills to children.<sup>14</sup> Student enrollment of these classes in the United States decreased by thirty eight percent due to lack of teaching professionals, more focus on core academic offerings, and school funding.<sup>15</sup>

### **Statement of the Problem**

The ability to prepare food involves acquiring numerous complicated skills that are conducive to one's food environment, time constraints, and budget. Furthermore, cooking practices can develop at different stages of life and have an impact on adults' dietary behaviors.<sup>6</sup> One study hypothesized that self-perceived cooking skills, confidence, attitudes, and perceptions learned throughout childhood about cooking could possibly have an impact on dietary behavior during adulthood, but further research was needed.<sup>16</sup>

Children are at a pivotal stage in life where acquiring new knowledge and skills can prove to have lasting effects on their life. It remains unclear whether the impact of developing cooking skills during childhood can have an effect on the child's dietary quality during adulthood, as well as when the ideal time children can accrue these skills to have a lasting effect on their dietary consumption. Although community interventions aim to help parents and children improve their dietary behaviors, there is little evidence suggesting that these interventions are affecting children long term.<sup>5, 6</sup> Furthermore, the long-term impact of developing cooking skills as a child in the home environment or school setting can further determine the need for where to focus health interventions.

The purpose of the study is to determine if acquiring cooking skills at a particular age during childhood has an impact on adults' dietary behaviors. This research proposes that learning cooking skills during childhood can have a positive impact on dietary quality later in life and prove to be an effective strategy in helping in the prevention of chronic diseases. This retrospective study examined the long-term effects of learning various cooking skills from different sources at various ages and compared it with the diet quality of current adults. The results aimed to help determine the most effective time to teach cooking skills.

## **Objectives**

The objectives of this study were to:

1. Determine the age at which children began to develop cooking skills and its impact on adults' dietary behaviors, as measured by the Short Healthy Eating Index (sHEI).
2. Compare the effect of the sources in the development of cooking skills as a child in relationship to adults' dietary behaviors, as measured by the Short Healthy Eating Index (sHEI).
3. Determine if learning cooking skills during childhood improved cooking skills confidence as an adult, as measured by Cooking Skills Scale (CSS).

## **Research Questions and Hypotheses**

### Research Questions:

1. To what extent does learning cooking skills at a particular age impact adult's dietary behavior, as measured by the Short Healthy Eating Index (sHEI)?

2. What is the effect of cooking skills from a particular source have on adults' dietary behaviors, as measured by the Short Healthy Eating Index (sHEI)?
3. What is the effect of acquiring cooking skills during childhood on cooking skills confidence as an adult, as measured by the Cooking Skills Scale (CSS)?

#### Hypotheses:

1. Adults who developed cooking skills during early childhood and adolescence will show higher diet quality, as measured by the sHEI than those who developed cooking skills during adulthood.
2. Adults who developed cooking skills in a public setting during childhood will show higher diet quality, as measured by the sHEI, than adults who developed cooking skills in a household setting during childhood.
3. Adults who developed cooking skills during early childhood and adolescence will show higher cooking skills confidence, as measured by the CCS, than those who developed cooking skills during adulthood.

#### **Background and Significance**

Previous studies suggested that further research on the long-term implications on dietary behaviors of learning how to cook as a child is needed.<sup>8, 10, 14</sup> Cooking with children has been a public health initiative, and many studies have been done to show that it increases fruit and vegetable consumption and improves their willingness to eat healthier foods.<sup>6, 16</sup> However, more research is needed to determine the age at which cooking skills should be introduced to have a greater impact on diet quality as an adult. Ultimately, research is lacking in determining the



long-term effects of learning and developing cooking skills as a child and within the most effective setting to determine the appropriate intervention strategy.

The aim of this research study was to determine if the development of cooking skills during childhood could have a beneficial impact on dietary behaviors during adulthood. This research determined whether cooking interventions could be an effective preventative measure as a strategy to decrease the risk of chronic diseases and obesity among children in their future. It also helped in identifying the most effective age to begin implementing the teaching of cooking skills, as well as the most effective teacher in this type of intervention to have the greatest impact on this growing generation over time.

## **CHAPTER TWO**

### **REVIEW OF LITERATURE**

Many factors influence a person's dietary quality including their ability to prepare their own food. An examination of the literature can provide significant correlations between each of these factors that can contribute to the problem. Factors such as diet quality among adults with varying cooking skills, home meal preparation frequency, child participation in meal preparation and the integration of food and cooking skills into school curriculum will be discussed in the following review of the literature to provide ample evidence for the need of the current research.

#### **Home Cooking Skills Among Adults and Diet Quality**

Adults who cook at home have been known to have better nutrition knowledge and cooking skills, which allows for improved dietary intake.<sup>7, 17, 18, 19</sup> A cross-sectional study conducted by Wolfson and Bleich examined dietary intake and frequency of home cooked meals among 9,569 American adults aged 20 years old and over.<sup>17</sup> Results indicated that 48% of the participants cooked dinner 6-7 times per week.<sup>17</sup> In addition, those with higher frequency of cooking consumed fewer total calories, more grams of fiber and less grams of carbohydrates, fat, and sugar, as well as relied less on ready prepared foods.<sup>17</sup> Furthermore, higher frequency of cooking in the past thirty days resulted in fewer meals from fast food restaurants, frozen meals, or meals containing ready-to-eat foods.<sup>17</sup> The study suggested that higher home cooking frequency was associated with following a generally healthier diet and should be considered for

obesity prevention efforts.<sup>17</sup> The study implicated the need for reintroducing cooking at a younger age as part of a home economics curriculum to build cooking skills, healthy eating habits, nutrition knowledge and self-confidence.<sup>17</sup> Many schools, especially in the United States, have renamed home economics courses to Family and Consumer Sciences (FACS) to more accurately reflect the evolving changes of social and economic issues associated with various critical skills including nutrition and cooking skills.<sup>20</sup>

The frequency of preparing meals at home as an adult can have a stronger impact in consuming a healthier diet.<sup>18</sup> According to a study conducted by Mills, et al, adults who consumed home prepared meals more than five times per week consumed 62.3 grams more fruit and 97.8 grams more vegetables each day than those adults who consumed less than three meals per week at home.<sup>18</sup> Furthermore, those who consumed more than five meals at home per week were more likely to have improved cardio metabolic health, including lower cholesterol, normal range body mass index, and lower HbA1C levels.<sup>18</sup> The results of this study indicated that preparing meals frequently at home produces a higher diet quality and a higher health advantage.<sup>18</sup> Mills and her research team suggested future research regarding the factors related to determining effective approaches to learning home cooking through tailored interventions.<sup>18</sup> The current study compared perceived health status to level of cooking skills and adult quality to determine if a relationship exists among those with higher diet quality and cooking confidence.

Furthermore, the ability to prepare foods at home contributes to reduction in ultra-processed foods that often contain higher amounts of saturated fats, sodium and sugar compared to other foods.<sup>19</sup> In a study conducted by Chak Leung Lam and Adams, data was collected from the United Kingdom National Diet and Nutrition Survey of 509 adults, aged 19 years and older

to determine their level of cooking skills and use of ultra-processed foods.<sup>19</sup> The results showed that those adults who were more confident in preparing their own meals consumed three to four percent less calories from ultra-processed foods per day.<sup>19</sup> The authors emphasized the need for greater encouragement to teach cooking skills to increase the number of home-cooked meals in each household, as well as decrease the reliance on ultra-processed foods.<sup>19</sup>

According to Slater, et al, a study of Canadians from the Canadian Community Health Survey demonstrated that gender and age can have an impact on proficiency of cooking skills.<sup>21</sup> They found that participants ages 12-29 years old were less able to prepare most dishes from scratch and more likely to use convenience foods.<sup>21</sup> This was attributed to a lack of in-home learning and fewer formal educational opportunities to learn about cooking food and nutrition. Additionally, 72% of women were able to prepare their own meals compared to only 55% of men, and women were more likely to cook with whole, basic foods.<sup>21</sup> When compared to men, women were significantly more likely to report good or very good for mechanical cooking skills such as using a knife, peeling, chopping, and cooking raw meats, casserole, or stews.<sup>21</sup> In addition, those with a lower education level were less likely to have basic cooking skills.<sup>21</sup> The study implicates the need for teaching younger populations and men as the main target for meal preparation habits and food skills to improve dietary quality.<sup>21</sup> With the stigma attached to teaching cooking skills in schools, and the perception that the kitchen and preparing meals are the woman's domain, it is no wonder that men would report less of these skills. The current study elucidated more findings on men's ability to perform these mechanical skills.

Cooking skills and food skills have been evaluated to determine the impact on consumption of nutrient-rich foods.<sup>7</sup> Food skills encompasses different components of meal

preparation compared to cooking skills including meal planning, food shopping and budgeting.<sup>7</sup> In a cross-sectional study, Lavelle, et al sought to determine this relationship among 910 Australian adults.<sup>7</sup> Results of the study showed that food skills and cooking skills had a significant impact on dietary quality.<sup>7</sup> Furthermore, food skills, including meal planning, food shopping and budgeting were determined to have a greater impact on diet quality, including the consumption of vegetables, compared to cooking skills and may need to be considered in future interventions to impact diet quality.<sup>7</sup>

### **Child Involvement in Home Meal Preparation**

The significance of family meal preparation to improve dietary quality among children has been discussed to address social and health indicators in various campaigns and interventions to develop food skills programs.<sup>5, 11</sup> Slater and her research team sought to identify trends in children's participation in family meals among 10,098 Canadians.<sup>13</sup> The results of the study determined that almost two thirds of households have children helping to prepare meals, while 42% of adults prepare meals by themselves.<sup>13</sup> Furthermore, children were more likely to participate in meal preparation and cooking or prepare meals on their own if they lived in widowed, separated, or divorced households.<sup>13</sup> Of those participants who reported their children not being involved in meal preparation, 70% reported the primary reason was that the child was too young to participate.<sup>13</sup> Other reasons included lack of time, insufficient skills, believing it was not the child's responsibility too much effort and safety concerns. Slater and her research team determined that "high risk" children should not be the only target of future interventions to improve dietary quality because all levels of socioeconomic status are in need of developing food

skills.<sup>13</sup> The current study also examined whether a significant difference existed between participants' age for acquiring the majority of their cooking skills based on whether they lived in a household where their parents' marital status was married, divorced, widowed or separated.

Adolescence is a critical time to develop healthy behaviors and cooking skills to be able to transition into young adulthood with better diet quality. A 10-year longitudinal study conducted by Laska and her research team examined food preparation involvement of 1,321 Minnesota public secondary school participants of Project EAT beginning at the age of 15-18 years old through 24-28 years old in the United States.<sup>10</sup> The study found that adolescents who helped prepare dinner one to two times weekly were more likely to be involved in food preparing behaviors such as preparing a grocery list and preparing an entire dinner for two or more people in their later twenties.<sup>10</sup> Participants who were involved in meal preparation during adolescence also enjoyed food preparation as an adult. However, there was no association with participating in meal preparation with frequency of home cooked meals in adulthood.<sup>10</sup> This study suggested that further research was needed to determine what young people learn about food preparation within schools and other settings to determine if children are being well equipped with these life skills to develop a more enthusiastic attitude towards healthy dietary habits.<sup>10</sup> The researchers urged efforts to be targeted towards schools, within the home environment and community settings.<sup>10</sup> The current study aimed to determine where cooking skills were most likely to be learned and if the setting for learning these skills would have significantly impacted the use of these skills in later life.

Another study by Vanderlee, et al examined the impact of participation in meal preparation during adolescence and young adulthood on eating habits.<sup>22</sup> In a cross-sectional

online survey of 1,981 Canadians, ages 16-24 years old, only one out of every ten participants helped with dinner preparation daily and there were significantly low levels of self-reported nutrition knowledge.<sup>22</sup> Children who were more frequently engaged in preparing dinner had more positive diet behaviors including consuming more fruits and vegetables, eating breakfast more frequently, and consuming meals prepared outside of the home less frequently.<sup>22</sup> The literature stressed the need for future research to evaluate the behaviors of involvement in dinner preparation over time to strengthen the evidence between cooking meals and diet quality among young adults.<sup>22</sup>

In an effort to determine the optimal age to begin developing cooking skills, Lavelle and her team explored how learning these skills impacted skill retention, cooking practices and attitudes, diet quality and health in 1,049 Irish adults between the ages of 20 and 60 years old through a cross-sectional survey.<sup>11</sup> The study found that teenage learners (12-18 years old) had more cooking and food skills confidence. In addition, child learners and teenage learners had a higher food safety score.<sup>11</sup> Child learners were more interested in eating healthy, consumed significantly more fruit, wasted less food, prepared foods with basic, fresh ingredients, consumed less processed foods, and were more creative in the kitchen in adulthood.<sup>11</sup> Furthermore, those that learned cooking and food skills in adulthood were more likely to use pre-prepared ingredients to prepare meals.<sup>11</sup> As far as their source of learning these skills, 60.1% of participants learned to cook from their mother.<sup>11</sup> Lavelle encouraged further research of learning cooking skills at different ages from various sources as their study was a baseline to explore the effects of learning cooking skills at an early age to impact health, cooking behaviors and food sustainability.<sup>11</sup> She indicated that the knowledge transfer of mother to child may not be a

practical way of teaching these skills, thus requiring the need for high quality practical cooking curriculum.<sup>11</sup>

Dietary behaviors, like other human behaviors, are learned through modeling, an act of learning by observing and imitating the behaviors of others.<sup>23</sup> Hagmann, et al aimed to investigate the effects of frequent involvement in meal preparation as a child with better cooking skills in adulthood, evaluating the information source for acquiring these skills, and the link between cooking skills and eating behavior among 3,659 Swiss adults, ages 20 years and older.<sup>8</sup> The study found that involvement in cooking activities of both men and women at a younger age predicted better cooking skills in adulthood.<sup>8</sup> The most effective sources for learning cooking skills aside from the mother as the primary source, was learning through cooking courses, books, the internet, and applications.<sup>8</sup> These sources proved to be the strongest predictor of cooking skills in adulthood.<sup>8</sup> Hagmann and her research team attributed stronger results in learning cooking skills at an earlier age to being provided more opportunities to learn through observation and becoming familiar with the activities.<sup>8</sup> This study also identified a gender gap in the way of female children being introduced to cooking in the home, resulting in males with poor cooking skills in adulthood. Males were more likely to have learned cooking skills from their partner or spouse, rather than their mother, indicating they are learning how to cook later in life than women.<sup>8</sup> Further, 75% of women reported to learn their cooking skills from school cooking classes, primarily due to being a mandatory requirement among Swiss girls.<sup>8</sup> Lastly, younger adult participants, ages 20-39 years old were found to more likely be involved in meal preparation as children.<sup>8</sup> The study noted that although cooking has become a component of many school interventions and programs, many do not follow the long-term effect of these



interventions on diet quality.<sup>8</sup> The current study added to the literature on age and gender in developing cooking skills and the impact on diet quality in later adulthood

### **Where Do People Learn to Cook?**

The optimal source for learning and applying of cooking skills has been debated between being acquired from various outlets such as the home, schools, and the media.<sup>16</sup> There are concerns of the current generation of young children not having the opportunity to develop cooking skills in the home. A study conducted by Utter et al. explored where children were learning their cooking skills.<sup>16</sup> Of 8,500 New Zealand secondary school students, almost all students reported learning from more than one source, but 95% of those that learned how to cook, learned from their family.<sup>16</sup> Those students with socioeconomic deprivation were more likely to learn their cooking skills from school, rather than their mothers or media outlets.<sup>16</sup> Furthermore, other outlets of learning to cook were reported among 70% of participants including cookbooks, the internet and television.<sup>16</sup> These findings suggest a need for interventions aimed at involving both media and family to influence children's ability to learn cooking skills.<sup>16</sup>

Furthermore, the transference of cooking skills by the mother has been consistently identified as the primary source and key influence on the child's diet quality, and therefore emphasizes the important role they play in cooking skills development.<sup>12</sup> However, due to modern lifestyles, Lavelle et al. suggested that mothers may not possess these skills to transfer to their children.<sup>12</sup> In her study of 141 Northern Ireland mothers, ages 20-39 years old, six focus group discussions were conducted to determine how the mothers learned to cook, attitudes of

child involvement in meal preparation, and children's interest in cooking.<sup>12</sup> The study determined that the current climate of at home meal preparation does not invite children into the kitchen compared to previous generations where children were more actively involved.<sup>12</sup> Mothers responded that children cause added stress and negativity to the cooking experience, children create more messes in the kitchen, and mothers also feared for their child's safety in the kitchen.<sup>12</sup> In addition, any child involvement in cooking activities did not involve daily meal preparation responsibilities and were noted to be more rare, fun activities, thus removing the ability to learn fundamental life skills.<sup>12</sup> Lavelle concluded that future research should determine the effects of the current shift in the transference of cooking skills to children on long term diet quality and weight status.<sup>12</sup>

Schools have also been a source of learning cooking skills through home economics courses to provide food skills and nutrition knowledge to children.<sup>14</sup> Worsley, et al examined the food knowledge associations among 4,168 Australian adults from their school home health economics education.<sup>14</sup> Participants ages 30 years old and above reported cooking and preparation skills to be what they most remember from home economics.<sup>14</sup> Furthermore, those who took the class were more likely to have higher diet quality as adults. The study suggested future research to confirm and extend their findings as other factors could have influenced their causation.<sup>14</sup>

### **Cooking Confidence and Diet Quality**

Opportunities to develop cooking skills can have a positive impact on increasing confidence and self-efficacy to provide benefits to nutritional well-being.<sup>16</sup> In a longitudinal

study, Utter, et al sought to determine whether self-perceived cooking skills, including confidence in cooking techniques knowledge and attitudes towards eating new foods, during early adulthood predicts better nutrition later in life.<sup>16</sup> Among 1,158 midwestern American participants, 56% of participants reported adequate cooking skills and 24.9% reported very adequate cooking skills at age 18-23 years.<sup>16</sup> The study also predicted these participants also consumed a meal with vegetables on most days, usually prepared their own foods, consumed less fast food, and had fewer food preparation barriers in adulthood ten years later.<sup>16</sup> This study lacked in the ability to identify attributes of adequate cooking skills, as well as the resources from which the participants learned to prepare their own healthy meals.<sup>16</sup> Utter stressed the need to identify these measures in order to determine which strategy is best to have a long-term impact on adolescent interventions aimed to improve cooking skills and diet behavior in children to have a lasting effect in adulthood.<sup>16</sup>

The ability to prepare a meal during adulthood relies on a person's social, physical, and economic environment.<sup>6</sup> According to Wolfson and Garcia Gonzalez, cooking skills, food skills, cooking confidence, and attitudes and perceptions are more likely to impact the ability to prepare a home cooked meal than socioeconomic status or demographics.<sup>6,9</sup> They determined that there is a multidimensional measure in how food and cooking is approached including their level of confidence in these skills to influence their diet quality.<sup>6,9</sup> Those with higher food agency had higher consumption of fruits and vegetables, had increased cooking frequency, especially for scratch cooking, and had higher diet quality.<sup>6,9</sup> Furthermore, Garcia Gonzalez determined that the gender gap in ability to prepare foods in younger participants, ages 18-30 years old, was

significantly smaller, indicating that more men are acquiring cooking skills compared to older generations.<sup>9</sup>

### **Summary of the Literature**

According to the literature, the development of cooking skills can have a positive impact on dietary quality and may be an effective measure included in interventions to prevent obesity and chronic diseases.<sup>6, 9, 11, 16</sup> The ability to prepare food at home requires obtaining cooking knowledge from a family member or public resources including schools or community programs. Children are at an optimal stage in life to develop this life skill to improve their consumption of a healthy diet, build confidence of skills and feel adequately prepared to continue cooking later in life.<sup>11</sup> Research is still limited in the relationship between acquiring these skills during childhood to have a positive impact on adults' dietary quality. The literature stresses the need for determining effective approaches to promote and teach cooking skills to result in consuming a healthy diet as an adult.

## **CHAPTER THREE**

### **METHODS AND DESIGN**

#### **Research Design**

A retrospective cross-sectional study design was conducted to gather data from adults ages 20-40 years old. Participants completed an online survey administered through the survey program, Qualtrics. This survey used several previously validated surveys including the Short Healthy Eating Index (sHEI) to assess adults' dietary behaviors, and the Cooking Skills Scale to assess cooking skills confidence.<sup>24, 25</sup> The survey is described below and can be found in the appendix section (Appendix A). A pilot test was also administered to test for clarity and readability prior to the beginning of the study. Prior to study initiation, permission to conduct this study on human subjects was obtained from the Institutional Review Board (IRB) Northern Illinois University, and the results indicated the study was exempt (Appendix B).

#### **Study Population**

The population of interest included adults between the age of 20 and 40 years old. This age group was chosen primarily due to their childhood experiences being the most recent and helped to be representative of the most current effects of learning to cook during childhood, on adults' dietary behaviors. The sample population included students from Northern Illinois University. According to university statistics, approximately 12,500 students are enrolled at

Northern Illinois University with a minimum of sophomore-level status, indicating that they will likely meet the age requirement of 20 to 40 years old.<sup>26</sup> To detect a significant impact of cooking experiences during childhood on adults' dietary behaviors, 351 participants was needed to determine a significance in the effects of childhood cooking experiences, cooking skills confidence and diet quality during adulthood, with a significance level set at an alpha level of .05 and a power of 0.80.

Inclusion criteria for this study requires that participants be an adult between the ages of 20 and 40 years old and a current student at Northern Illinois University with a minimum of sophomore level standing at the time of completing the survey. Participants will be excluded if they do not fit the inclusion criteria and if they do not provide adequate data for statistical evaluation.

### **Recruitment and Consent**

Participants were recruited through Northern Illinois University that fit the eligibility criteria. Upon IRB approval, a list of eligible student email addresses was compiled and approved by the Provost Officer through the Office of Registration and Records, and a Request for Student Data with the intention to disperse the email invitation to participate in the research study (Appendix C) was made. In the email invitation, participants were informed about the purpose and conditions of the study with a link to complete the Qualtrics survey. They also were informed that by choosing "yes" to begin the survey, they will consent to participate, and they can withdraw at any time from the survey without penalty (Appendix C). The informed consent disclosed the rights of the participant, confidentiality of all information provided to the

researcher and contact information for any further questions or concerns. Lastly, the participant was incentivized to complete the survey by voluntarily emailing their contact's email address to the researcher to be eligible to enter a raffle for an Amazon \$25 gift card. The purpose of this incentive was to increase the response and participation in the study.

### **Pilot Testing of Instrument**

A pilot test was conducted by giving a small group of eight participants from the School of Health Studies at Northern Illinois University the Qualtrics survey via email to test for each question's clarity and readability. In order to participate, the students must have been 20 years or older. They reviewed the instructions of study participation and evaluate the content of the questionnaire (Appendix D). One additional free text box was made available as the last question of this survey to provide the total amount of time to complete the survey as well as providing feedback on the design of the survey including question wording and language, comprehensive measurement, and additional comments. All feedback was reviewed, and any necessary corrections were made prior to dispersing the final Qualtrics survey.

While the majority of the participants in the pilot study found that the survey was clear and easy to understand, some prominent suggestions were taken into consideration. To reduce confusion, the diet quality questions were also given the option of "none at all." In addition, the diet quality question asking to describe water intake was changed to include answers with concrete cup measurement amounts that correlated with the vague options originally listed.

## **Data Collection**

Following completion and corrections of the pilot test, a mass e-mail was distributed through the Division of Information Technology at Northern Illinois University of eligible students between the ages of 20 and 40 years old. The email invited the eligible participant to complete an online survey through Qualtrics with a deadline of two weeks following receiving the email (Appendix E). A reminder email was sent two weeks after the initial email to encourage more participation of those who have not completed the survey. The target sample size was achieved with the time frame provided to gather survey responses.

Data was collected using a free online Qualtrics survey software through Northern Illinois University's Division of Information Technology Department. Responses were exported into a computer scoring system, Statistical Package for the Social Sciences (SPSS), version 26 by IBM, to evaluate the results of the study. Participant identification information was not included within the survey data. The study subject's email address for the raffle drawing was provided in a separate Qualtrics survey following completion of the questionnaire.

## **Description of Survey Instrument**

As previously stated, the survey tool served as the instrument of the study and consisted of questions that have been previously validated with consent from the authors (Appendix F, Appendix G). The first section of the survey gathered demographic information such as age, gender, ethnicity, level of income, major, marital status, education level, and perceived health status. To assess diet quality, Colby and her research team<sup>25</sup> developed and validated the Short



Healthy Eating Index Survey to be used by researchers to accurately estimate overall diet quality with inclusion of individual nutrient and food group consumption. The tool was developed using classification and regression tree (CRT) algorithm methodology that was compared to the Healthy Eating Index scores of a 24-hour food frequency questionnaire with correlation of  $>0.49$ .<sup>25</sup> Reliability of the Healthy Eating Index (HEI), a tool that reflects the Dietary Guidelines for Americans, using correlations with the HEI components, a total score of  $r= 0.79$  was obtained.<sup>25</sup> The scoring system used mirrors the HEI scoring system of 0-100, with higher numbers indicating higher diet quality (Appendix H).

In the next section of the survey, cooking skills and cooking skills confidence was determined. In a study conducted by Lavelle, et al,<sup>24</sup> a validated tool consisting of 14 items was developed to measure cooking skills confidence. To measure confidence in these skills, a seven-point Likert scale of very poor to very good was used with one additional option “never/rarely do it.” Cooking skills such as “chop, mix and stir foods,” “blend foods to make them smooth,” and “boil or simmer food” are examples of items in this section of the questionnaire.<sup>24</sup> To measure the level of cooking skills confidence, the sum of the Likert scale ratings for the skills that were stated as used.<sup>24</sup> If the participant uses the “never/rarely do it,” the confidence measure would be designated as zero. A higher cooking score indicated higher number of skills or a higher level of confidence in those cooking skills. The Cronbach’s Alpha acceptable reliability for the cooking skills component for this tool was  $>0.90$ .<sup>24</sup>

The final section of the survey tool assessed acquisition of cooking skills used questions previously from a previous study to help identify the objectives of the current study. In a study conducted by Lavelle, et al,<sup>11</sup> a question to determine the age of learning majority of cooking

skills was developed using age range classifications including as a child (under 12 years), as a teenager (13-18 years), and as an adult (18+ years) to keep responses objective. This helped to identify when cooking skills were learned. To determine the sources of learning to cook, Lavelle<sup>11</sup> asked about from whom and or where participants learned these skills with multiple sources allowed to be selected including sources such as mother, father, grandparents, partner or spouse, another family member, friends, and acquaintances, cooking class at school, and self-teaching through courses, books, magazines, internet tutorials, videos, or cooking shows. Follow up questions were also used to identify the participant's most influential learning source by asking out of all of the sources chosen in the previous question, who had the greatest impact on their cooking skills.<sup>11</sup>

## **Measures and Outcomes**

The constructed survey tool from the pilot test was used to evaluate the objectives of the study. This survey tool combined several previously validated tools that incorporate a self-assessment of diet quality and cooking skills confidence. In addition, it identified the time and source of learning cooking skills to associate with the objectives of the study. These tools were used to help measure the outcomes of the research questions that have been used in similar studies. Furthermore, demographic information was collected to compare research outcomes based on age, gender, ethnicity, education level, marital status, income level, and parents' marital status during the participants' childhood.

To measure diet quality, the survey questions from the Short Healthy Eating Index were assessed using the scoring system developed by Colby and her research team<sup>25</sup> which identified

consumption of fruit, vegetables, green vegetables, whole grains, refined grains, dairy, protein, saturated fat, added sugar, and water (Appendix I). The scoring method was reflective of the Healthy Eating Index, a tool used to measure how well a diet follows the Dietary Guidelines for Americans (Appendix H).<sup>25</sup> The Healthy Eating Index scoring ranged from zero to one hundred, with higher numbers closer to one hundred indicating higher diet quality.<sup>25</sup> Scores for the Healthy Eating Index that were greater than 80 indicate “good” diet quality, scores ranging from 51 to 80 indicate the diet “needs improvement,” and a score below 51 implies “poor” diet quality.<sup>27</sup> Since the total possible score for the Short Healthy Eating Index was 79, diet quality scores that were adjusted proportionately to match the levels of diet quality: scores lower than 0-40.28 were categorized as “poor diet quality,” scores within the range of 40.29-63.2 were categorized as diet quality that “needs improvement,” and a score of 63.3 or higher indicated “good diet quality.” This score was compared to the participant’s age for learning cooking skills and cooking skills score to determine if a relationship exists between the age for acquiring cooking skills and adults’ diet quality.

The cooking skills confidence scoring system was used to measure the participant’s level of cooking skills confidence. As previously stated, a higher cooking score from this section of 14 survey questions, using a Likert scale of one through seven, indicates higher number of skills or a higher level of confidence in those cooking skills, the highest score being a 98.<sup>24</sup> A score of greater than 56 indicates the participant is confident in their ability to cook. A score of 84 or higher indicates the participant perceives themselves to have excellent or excellent cooking skills.<sup>24</sup> This score will be compared to the age of the participant acquiring these cooking skills to determine if learning at a younger age, using the age groups of children (under 12 years of age),

teenager (13-18 years of age), and adult (older than 18 years of age), impacts cooking skills confidence as an adult.

### **Data Analyses**

The study used the Statistical Package for the Social Sciences (SPSS), Version 26, a 2016 licensed computer software program from IBM, for statistical analysis to evaluate the results of the study. Descriptive statistics including means, standard deviations, and ranges were calculated for demographical characteristics, cooking skills confidence scores, and diet quality scores. Pearson's correlations, two independent samples *t*-tests, and one-way ANOVA analyses were used to determine if demographics such as gender and socioeconomic status influence diet quality and cooking skills confidence scores.

Statistical tests were also used to test each hypothesis in the study. A one-way ANOVA test compared diet quality scores of adults who acquired cooking skills during early childhood and adolescence with those who acquired cooking skills during adulthood to determine a significance at an alpha of .05. A two-independent Samples *t*-test compared diet quality scores of those adults who learned to cook during childhood in a public setting versus those who learned cooking skills in their homes using a confidence interval of 95%. Finally, a one-way ANOVA test compared cooking skills confidence of adults who learned the majority of their cooking skills during early childhood and adolescence to those who learned cooking skills as adults to determine a significance at an alpha of .05. Table 1 displays a summary of the hypotheses, variables and statistical tests conducted in the study.

**Table 1**  
**Summary of Hypotheses and Variables**

<b>Hypotheses</b>	<b>Types of Variables</b>	<b>Statistics</b>
Adults who developed cooking skills during early childhood and adolescence will show higher diet quality, as measured by the sHEI, than those who developed cooking skills during adulthood.	Age of Acquired Cooking Skills, Diet Quality score	One-Way ANOVA
Adults who developed cooking skills in a public setting during childhood will show higher diet quality, as measured by the sHEI, than adults who developed cooking skills in a household setting during childhood.	Public Sources, Home Sources, Diet Quality	Two independent Samples <i>t</i> -test
Adults who developed cooking skills during early childhood and adolescence will show higher cooking skills as measured by the Cooking Skills Confidence Scale, than those who developed cooking skills during adulthood.	Cooking Skills Confidence Score, Age of Acquired Cooking Skills,	One-Way ANOVA

## **Data Safety and Monitoring**

To attain minimal risk to the participants in the study, all data safety and monitoring measures was considered to ensure their protection. The consent process preceded the option to take the survey to ensure the participant is informed of their ability to voluntarily exit the survey at any time without penalty. The survey tool, Qualtrics, a secure online survey system, and the SPSS statistical software program preserved data integrity and subject privacy. All data was kept confidential and required password entry to obtain the data set. Subjects were unidentifiable, and results were discussed as a sample population.

## **Expected Findings**

The results of the study were expected to show a positive association between acquiring cooking skills during childhood and adolescent years and adults' diet quality. Furthermore, those who learned the majority of their cooking skills earlier in life were predicted to have better adults' diet quality than those who learned their cooking skills during adolescence. The research determined whether there was a positive association between learning cooking skills in a public setting such as a school will have a greater impact on adults' diet quality compared to those who learned their cooking skills in their homes. Ultimately, adults who had a higher level of cooking skills confidence have learned these skills before becoming an adult.

Some unexpected finding showed that gender played a role in the level of cooking skills, since previous research has shown that men and women have learned to cook from differing sources.<sup>8</sup> Another unexpected finding was an association between demographical characteristics,

diet quality, level of cooking skills confidence and when cooking skills were learned, which can lead to future implications for culinary and nutrition interventions.

### **Summary of Chapter Three**

In this cross-sectional study, adults between the ages of 20 and 40 years old will participate in a survey-based study to examine the impact of learning cooking skills during childhood on their adults' dietary behaviors. An online survey was administered via email invitation through Northern Illinois University to university students. Data was analyzed to determine the associations between adults' diet quality, the age of acquiring cooking skills, the source of learned cooking skills, and cooking skills level. As a result, the current research provided significant evidence of learning cooking skills during childhood and its impact on the diet quality of adults.

## **CHAPTER FOUR**

### **RESULTS**

The purpose of this research study was to determine whether the diet quality of Northern Illinois University college students was impacted by the timing of learning the majority of their cooking skills and a specific source such as parents or school. The study also examined the influence of study participants' level of cooking skills confidence on factors such as age of acquiring the majority of their cooking skills, as well as the source for learning these skills. The online survey link was distributed through a mass communication email to approximately 12,500 students who met the inclusion criteria to participate in the study. There were 546 responses from student participants. However, 59 responses were omitted based on significant missing data resulting in 487 total participants for this study. The Short Healthy Eating Index Diet Quality Scores included twelve more study subjects' scores than the Cooking Skills Confidence scores due to incompleteness of this portion of the survey.

#### **Demographic Characteristics**

Demographical characteristics of the sample population are shown in Table 2. Descriptive statistics were determined including frequencies, percentages, means and standard deviations for the relevant demographic characteristics. The age range of participants was 20 to 40 years old, and the mean age was  $24.95 \pm 5.07$  years old. The study population included 160 (32.9%) males, 320 (65.7%) females and 7 (1.4%) who preferred not to describe their gender.



Ethnicity of 479 (98.4%) study participants was reported, and the majority of the sample population reported themselves as White or Caucasian (69.4%). Results on marital status indicated most participants were single (82.9%). The majority of the study participants also reported their parents' marital status during their childhood as married (73.9%).

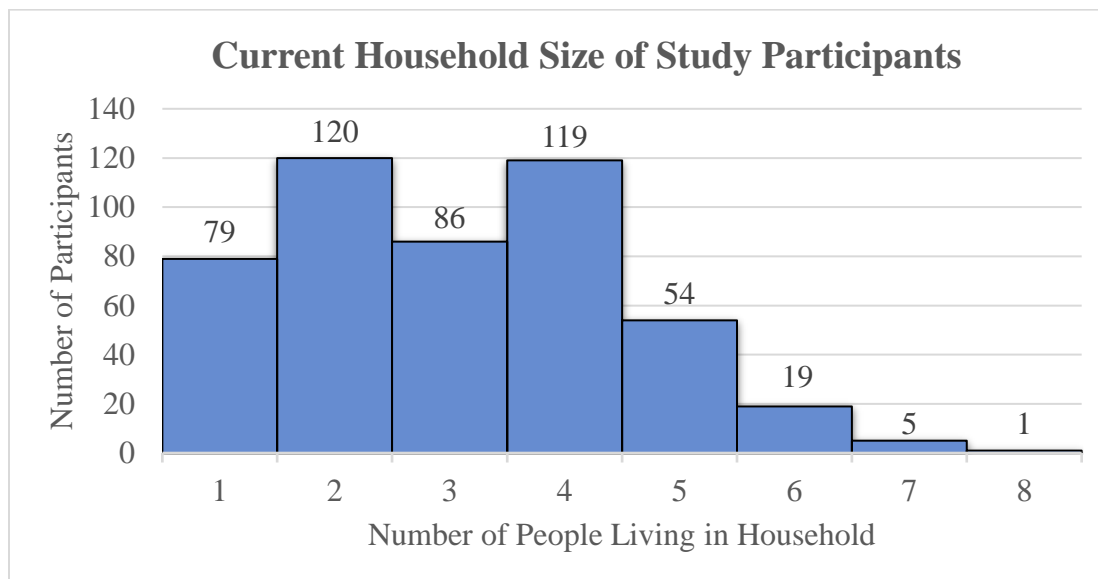
Education level at the time of participation in the study was reported by 486 (99.8%) of the sample population. The study population consisted of 41 (8.4%) College Sophomores, 129 (26.5%) College Juniors, 164 (33.7%) College Seniors and 152 (31.2%) Graduate students. Among participants who reported their major (92.6%), 144 (29.6%) were health majors and 307 (63.0%) were non-health majors. A health major included any participant majoring in audiology, biological sciences, communicative disorders, deafness, health sciences, human development and family sciences, hospitality and tourism management, fashion merchandising, marriage and family therapy, medical lab sciences, nursing, nutrition and dietetics, physical therapy, psychology, public health, rehabilitation and disability services, rehabilitation counseling, and speech language pathology.

The majority perceived their personal health status to be in good standing or better including "good" (40.5%), "very good" (35.5%) or "excellent" (11.7%). The highest number of participants reported their income level as greater than \$75,000 (n=165, 33.9%), followed by an income level of less than \$25,000 (n=143, 29.4%). The mean household size of the study participants was  $3.06 \pm 1.49$  people. Figure 1 displays the varied distribution of the study participants' current household size, measured in number of people per household, indicating that the majority of the participants (83.6%) live with at least one other person.

**Table 2**

**Demographic Distribution of Study Sample (n= 487)**

<b>Variables</b>	<b>n (%)</b>	<b>Mean ± SD</b>	<b>Variables</b>	<b>n (%)</b>	<b>Mean ± SD</b>
<b>Age</b>	<b>442 (90.80)</b>	<b>24.95 ±5.07</b>	<b>Gender</b>	<b>487 (100.0)</b>	<b>NA</b>
20-25 years old	278 (57.1)		Male	160 (32.9)	
26-30 years old	83 (17.0)		Female	320 (65.7)	
31-35 years old	43 (8.8)		Prefer not to Describe	7 (1.4)	
36-40 years old	38 (7.8)		<b>Income</b>	<b>477 (97.9)</b>	<b>NA</b>
<b>Ethnicity</b>	<b>479 (98.4)</b>	<b>NA</b>	Less than \$25,000	143 (29.4)	
African American	26 (5.3)		\$25,000-\$49,999	90 (18.5)	
Asian American	55 (11.3)		\$50,000-\$75,000	79 (16.2)	
Hispanic	60 (12.3)		>\$75,000	165 (33.9)	
White/Caucasian	338 (69.4)		<b>Major</b>	<b>451 (92.6)</b>	<b>NA</b>
<b>Marital Status</b>	<b>486 (99.8)</b>	<b>NA</b>	Health	144 (29.6)	
Married	73 (15.0)		Non-Health	307 (63.0)	
Separated	2 (0.4)		<b>Household size</b>	<b>483 (99.2)</b>	<b>3.06 ±1.49</b>
Single	403 (82.8)		1	79 (16.3)	
Divorced	8 (1.6)		2	120 (24.6)	
<b>Parents Marital Status</b>	<b>487 (100.0)</b>	<b>NA</b>	3	86 (17.7)	
Married	360 (73.9)		4	119 (24.4)	
Separated	12 (2.5)		5	54 (11.1)	
Widowed	7 (1.4)		6	19 (3.9)	
Divorced	76 (15.6)		7	5 (1.0)	
Never Married	31 (6.4)		8	1 (0.2)	
<b>Education Level</b>	<b>486 (99.8)</b>	<b>NA</b>	<b>Perceived Health</b>	<b>487 (100.0)</b>	<b>NA</b>
College Sophomore	41 (8.4)		Excellent	57 (11.7)	
College Junior	129 (26.5)		Very Good	173 (35.5)	
College Senior	164 (33.7)		Good	197 (40.5)	
Graduate School	152 (31.2)		Fair	55 (11.3)	
			Poor	5 (1.0)	

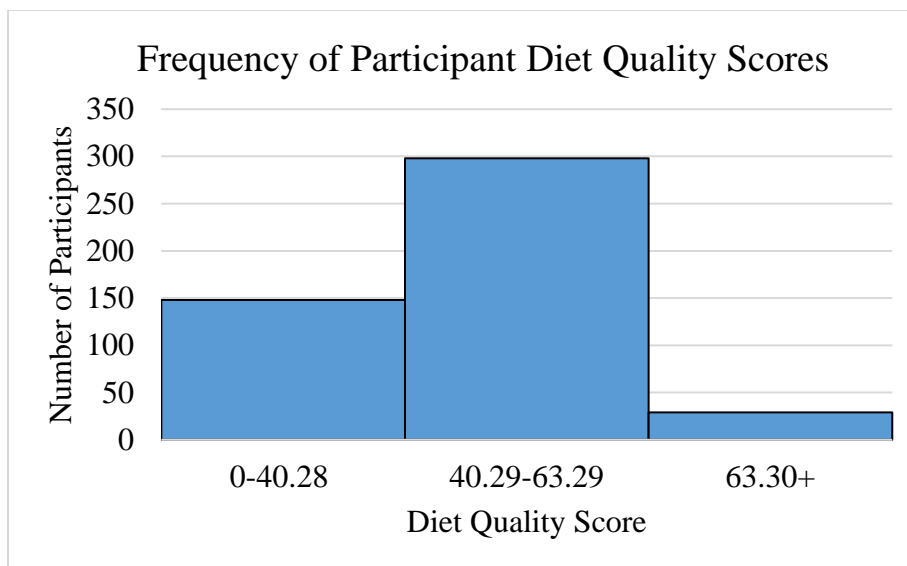


**Figure 1: Current Household Size of Study Participants**

### Diet Quality Scores

The adults' diet quality scores, using the Short Healthy Eating Index scale, of the study participants are shown in Figure 2. The lowest diet quality score was 13.42 and the highest diet quality score among the study participants was 73.55. The mean diet quality score was  $45.76 \pm 11.4$ . As mentioned previously in chapter three, a higher diet quality score indicates higher diet quality, whereas a lower diet quality score indicates low diet quality. The diet quality scores were also placed into categorical variables for further evaluation of the research questions. Diet quality scores that were lower than 0-40.28 (n=148) were categorized as "poor diet quality." Those scores within the range of 40.29-63.2 (n=298) were categorized as diet quality that "needs improvement," and a score of 63.3 or higher (n=29) indicated "good diet quality." The scoring categories of "poor," "needs improvement," and "excellent" were determined using the Healthy Eating Index outcome measures that were adjusted proportionately based on the Short Healthy

Eating Index total possible calculated score of 79. The adults' diet quality scores of the sample population suggest that the majority of participants have diet quality that needs improvement or is poor.



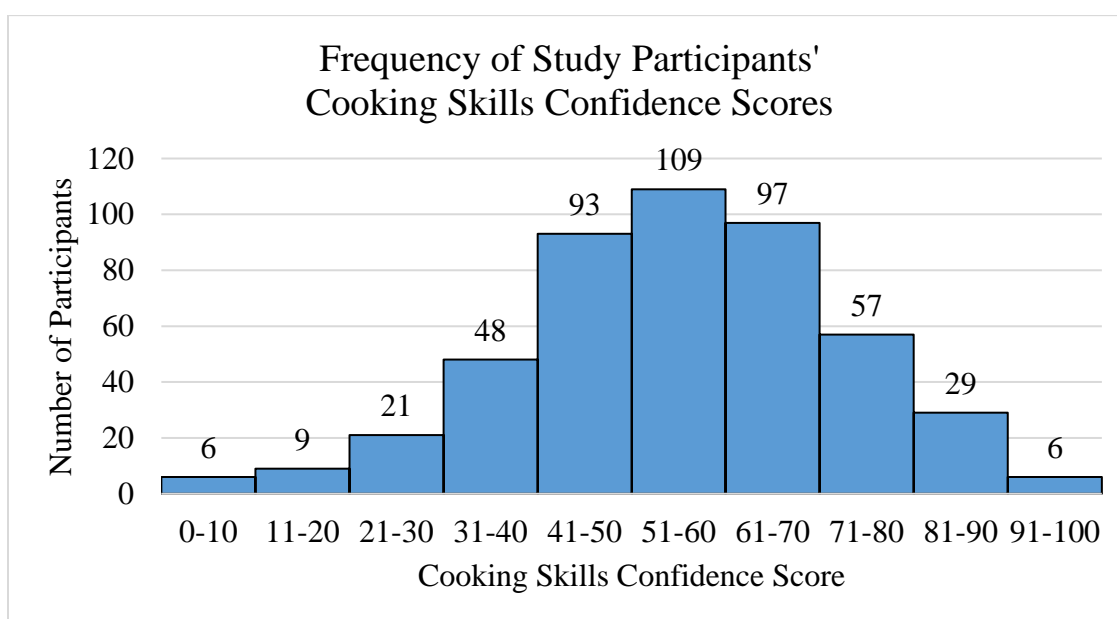
**Figure 2: Study Participant Diet Quality Scores**

Further analysis using a two-independent samples t-test compared the adults' diet quality scores and gender. The results showed that females ( $n=320$ ,  $M=47.13 \pm 11.46$ ) had higher mean scores than males ( $n=160$ ,  $M=43.45 \pm 10.60$ ). There was a statistical difference among the diet quality scores between genders ( $t(df)=-3.397$ ,  $p=0.001$ ).

### **Cooking Skills Confidence Scores**

The Cooking Skills Confidence scale was used to assess the cooking skills confidence level of the study participants. The minimum possible score was zero and the maximum possible

score was 98.<sup>24</sup> A higher score indicated the study participant perceived themselves to have more cooking confidence among the various cooking skills than those with lower scores.<sup>24</sup> A total of 475 participants completed this portion of the survey. The mean score was  $55.59 \pm 17.4$ , and 62.9% (299) of the study participants scored between 41 and 70. Figure 3 below shows a distribution of the study population's scores.



**Figure 3: Study Participant Cooking Skills Confidence Scores**

A one-way ANOVA analysis was conducted to determine whether a relationship existed between adults' diet quality scores and cooking skills confidence scores. The results show an increase in mean cooking skills confidence scores as adult diet quality scores increased. As Table 3 indicates, the diet quality scores were the independent variable and grouped into three categories: study participants who had a "poor" adults' diet quality score between 0-40.28 (n=148, M=  $50.45 \pm 19.02$ ), "needs improvement" adults' diet quality score between 40.29-63.29

( $n=298$ ,  $M=57.47 \pm 16.23$ ), and “good” adults’ diet quality score with 63.3 and higher ( $n=29$ ,  $M=62.69 \pm 14.74$ ). The one-way ANOVA determined a significant relationship between cooking skills confidence scores and level of adults’ diet quality ( $F(df1, df2) = 10.970$ ,  $p < 0.001$ ). With a significance level set at 95% confidence interval, a Post Hoc analyses determined significant mean differences in cooking skills confidence scores between those with “poor” diet quality and “needs improvement” diet quality ( $p < 0.001$ ). It also found a significant difference between those with “poor” adults’ diet scores and “good” adults’ diet quality scores ( $p < 0.001$ ). These results suggest that those with higher adults’ diet quality possess a higher level of cooking skills and cooking confidence than those who consume a poor-quality diet.

**Table 3**

**Comparison of Mean Cooking Skills Confidence Scores to Level of Adults’ Diet Quality**

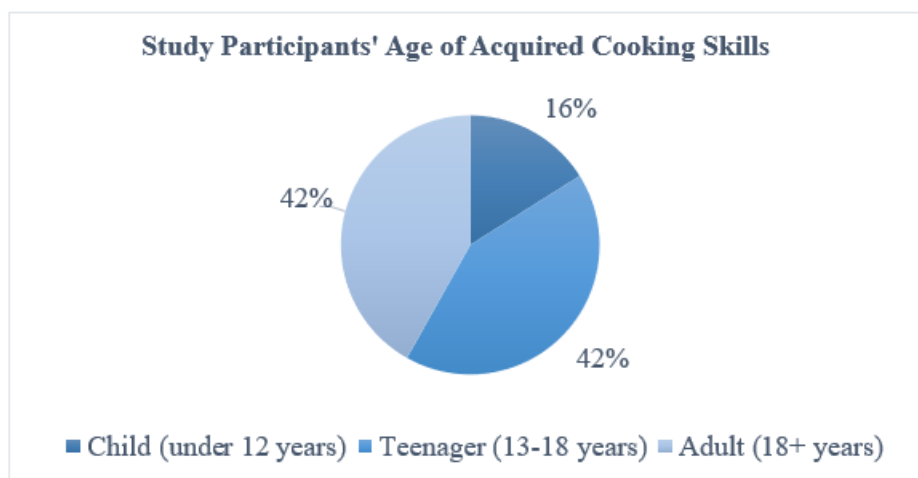
<b>Diet Quality Score</b>	<b>n (%)</b>	<b>Cooking Skills Confidence Score Mean <math>\pm</math> SD</b>	<b>F(df1, df2) value</b>	<b>p value</b>
Poor (0-40.28)	148 (31.2)	50.45 $\pm$ 19.02	10.970	<0.001*
Needs Improvement (40.29-63.2)	298 (62.7)	57.47 $\pm$ 16.23		
Good (63.3+)	29 (6.1)	62.59 $\pm$ 14.74		

\* $p < 0.05$

### **Research Questions**

Research Question One: To what extent does learning cooking skills at a particular age impact adults’ dietary behavior as measured by the Short Healthy Eating Index (sHEI)?

To determine whether there was a significant difference in adults' diet quality scores based on when they acquired the majority of their cooking skills, study participants were asked the age at which they learned the majority of their cooking skills. A total of 473 study participants completed this survey question. As shown in Figure 4, the smallest number of participants (n=76, 16%) learned the majority of their cooking skills in early childhood (under 12 years old). The number of participants who learned most of their cooking skills as a teenager (n=199, 42%) was almost the same as the number of participants who learned the majority of their cooking skills during adulthood (n=198, 42%).



**Figure 4: Study Participants' Age of Acquired Cooking Skills**

A one-way ANOVA was conducted to evaluate whether there was a difference in adults' diet quality scores based on the study participants' age for acquiring the majority of their cooking skills. The independent (categorical) variable, the age for acquiring the majority of the

participants' cooking skills, included three categories: childhood ( $M=48.11 \pm 1.28$ ,  $n=76$ ), teenager ( $n=199$ ,  $M=45.68 \pm 10.81$ ), and adult ( $n=198$ ,  $M=45.99 \pm 11.17$ ). The dependent (continuous) variable was the diet quality scores of the participants. Table 4 shows the comparisons of the mean diet quality scores to age for acquiring the majority of cooking skills. Although the mean diet quality score of early childhood was slightly higher than both teenagers and adults, the ANOVA was shown to be non-significant,  $F(df1, df2) = 1.404$ ,  $p=0.247$ . Therefore, the age for acquiring most cooking skills did not impact adults' diet quality.

**Table 4**

**Comparison of Mean Diet Quality Scores to Age for Acquiring Cooking Skills**

<b>Age of Acquired Cooking Skills</b>	<b>n (%)</b>	<b>Diet Quality Score Mean <math>\pm</math>SD</b>	<b>F (df1, df2) value</b>	<b>p value</b>
Childhood (under 12 years old)	76 (16.0)	48.11 $\pm$ 1.28	1.404	0.247*
Teenager (13-18 years old)	199 (42.1)	45.68 $\pm$ 10.81		
Adult (18+ years old)	198 (41.9)	45.99 $\pm$ 11.17		

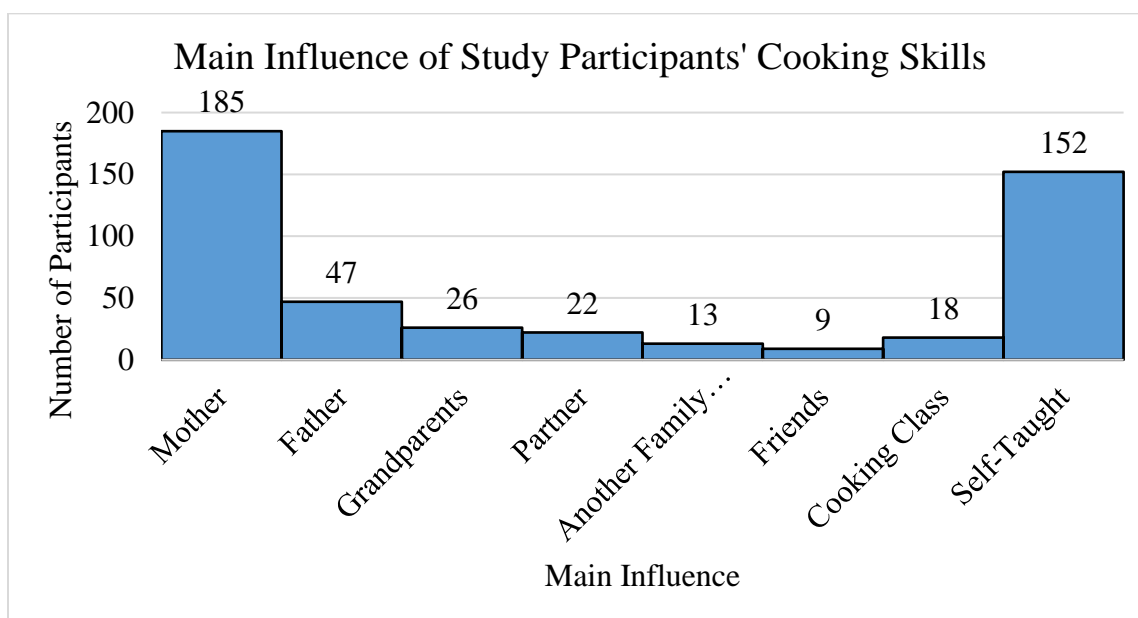
\* $p < 0.05$

Research Question Two: What is the effectiveness of learning cooking skills from a particular source have on adults' dietary behaviors as measured by the Short Healthy Eating Index (sHEI)?

To determine the impact of learning cooking skills from a particular source on adults' diet quality, study participants were asked which source was the most influential in the development of their cooking skills during childhood. As depicted in Figure 5, among 472 study participants, the most significant sources for learning cooking skills included the study



participants' mother and being self-taught. A total of 185 (38.0%) indicated that their mother was the main influence for the development of their cooking skills, and 152 (31.2%) study participants reported being self-taught through books, magazines, internet tutorials, videos, or applications.



**Figure 5: Main Influence of Study Participants' Cooking Skills**

A two-independent samples *t*-test was conducted to evaluate the null hypothesis that there was no difference in the study participants' main source for learning their cooking skills on their diet quality during adulthood. The categorical variables were home sources (including mother, father, grandparents, partner, another family member, friends or self-taught) and public source (cooking class). The numeric variable was their adults' diet quality score. Table 5 compares the means and standard deviations among the home sources ( $M=46.37 \pm 10.98$ ) and public source

( $M=42.37 \pm 11.88$ ). Although the home source mean was slightly higher, the independent samples t-test indicated there was no significant difference,  $t(df)= 1.510, p=0.132$ . Therefore, the data suggests that learning cooking skills from a home source verses a public source does not have a significant impact on adults' diet quality.

**Table 5**  
**Comparison of Mean Diet Quality Scores to Cooking Skills Source**

<b>Source of Acquired Cooking Skills</b>	<b>n (%)</b>	<b>Diet Quality Score Mean <math>\pm</math> SD</b>	<b>F (df1, df2) Value</b>	<b>p-Value</b>
Mother	185 (39.2)	47.02 $\pm$ 11.36	1.253	0.272*
Father	47 (10.0)	48.98 $\pm$ 11.15		
Grandparent	26 (5.5)	46.90 $\pm$ 11.96		
Partner/Spouse	22 (4.7)	44.61 $\pm$ 10.10		
Another Family Member	13 (2.8)	43.39 $\pm$ 5.13		
Friends/Acquaintances	9 (1.9)	44.96 $\pm$ 15.43		
Cooking Classes	18 (3.8)	42.37 $\pm$ 11.88		
Self-Taught	152 (32.2)	45.28 $\pm$ 11.02		
Home Sources	454 (96.2)	46.37 $\pm$ 10.98		0.132*
Public Source	18 (3.8)	42.37 $\pm$ 11.88		

\*  $p<0.05$

Further analysis was performed using a one-way ANOVA to determine whether learning from a particular source had an influence on adults' diet quality. The dependent continuous

variable was the adults' diet quality score. Table 5 also compares the mean adult diets' quality scores for each source. The independent variables include the mother ( $M=47.02 \pm 11.36$ ), father ( $M=48.98 \pm 11.15$ ), grandparents ( $M=46.90 \pm 11.96$ ), partner or spouse ( $M=44.61 \pm 5.13$ ), another family member ( $M=43.39 \pm 10.10$ ), friends or acquaintances ( $M=44.96 \pm 15.43$ ), cooking classes ( $M=42.37 \pm 11.88$ ) and self-taught ( $M=45.28 \pm 10.43$ ). The results showed there was no significance in mean adults' diet quality score based on the source of learning the majority of cooking skills,  $F(df1, df2) = 1.253$  and  $p=0.272$ . Therefore, the data suggests that the source for learning cooking skills does not show a significant impact on adults' diet quality.

Research Question Three: What is the effectiveness of acquiring cooking skills during childhood on cooking skills confidence as an adult, as measured by the Cooking Skills Scale (CSS)?

A one-way ANOVA test was performed to determine the significance of acquiring cooking skills during childhood on cooking skills confidence as an adult using the Cooking Skills Scale (CSS) score of study participants. The independent (categorical) variable, the age for acquiring the majority of the participants' cooking skills was compared to the dependent (continuous) variable, CSS score. Table 6 shows the mean scores of the age for acquiring cooking skills, including childhood ( $M=60.09 \pm 17.29$ ), teenager ( $M=56.72 \pm 17.41$ ), and adult ( $M=53.18 \pm 16.64$ ). Statistical significance was found in the age for acquiring cooking skills on cooking skills confidence as an adult with  $F(df1, df2) = 5.030$  and  $p=0.007$ . Those participants who acquired cooking skills during early childhood and teenage years scored higher on the CSS than those who acquired cooking skills during adulthood. After Post Hoc analysis, a significant difference was found between acquiring cooking skills as a child and as an adult,  $p=0.008$ . Thus,

the data suggests that learning cooking skills during early childhood can increase cooking skills confidence during adulthood compared to learning cooking skills during adulthood.

**Table 6**

**Comparison of Mean Cooking Skills Confidence Scores to Age of Acquired Cooking Skills**

<b>Age of Acquired Cooking Skills</b>	<b>n (%)</b>	<b>Cooking Skills Confidence Score Mean <math>\pm</math> SD</b>	<b>F (df1, df2) Value</b>	<b>p-Value</b>
Childhood (under 12 years old)	76 (16.1)	60.09 $\pm$ 17.29	5.030	0.007*
Teenager (13-18 years old)	199 (42.1)	56.72 $\pm$ 17.41		
Adulthood (18+ years)	198 (41.8)	53.18 $\pm$ 16.64		

\* $p < 0.05$

**Additional Findings**

Additional analyses were performed to determine any significant differences between diet quality scores and the study population's descriptive characteristics. A significant positive correlation was found when comparing adults' diet quality scores to participants' age ( $r=0.103$ ,  $p=0.030$ ) using Pearson's Correlation. Furthermore, a one-way ANOVA was conducted to determine whether there was a significant difference between adults' diet quality scores and descriptive statistics including income level, ethnicity, marital status, education level, and perceived health. As Table 7 indicates, statistical significance was found for education level ( $F(d1, d2) = 2.987$ ,  $p=0.031$ ) and perceived health ( $F(d1, d2) = 12.056$ ,  $p < 0.001$ ).

**Table 7****Comparison of Diet Quality Scores with Education Level and Perceived Health**

<b>Variable</b>	<b>n</b>	<b>Diet Quality Score Mean <math>\pm</math> SD</b>	<b>F (d1, d2) value</b>	<b>p-Value</b>
<b>Education Level</b>	<b>486</b>	<b>45.77 <math>\pm</math>11.43</b>	<b>2.987</b>	<b>0.031*</b>
College Sophomore	41	42.77 $\pm$ 12.32		
College Junior	129	44.43 $\pm$ 11.32		
College Senior	164	45.79 $\pm$ 11.48		
Graduate School	152	47.68 $\pm$ 10.99		
<b>Perceived Health</b>	<b>487</b>	<b>45.76 <math>\pm</math>11.42</b>	<b>12.056</b>	<b>&lt;0.001*</b>
Excellent	57	51.58 $\pm$ 11.21		
Very Good	173	48.06 $\pm$ 11.15		
Good	197	43.80 $\pm$ 11.02		
Fair	55	39.49 $\pm$ 9.57		
Poor	5	45.98 $\pm$ 10.06		

\* $p < 0.01$

Further analysis using a two-independent samples *t*-test was conducted to compare the adult diets' quality scores and cooking skills confidence scores between males and females. When comparing adults' diet quality scores amongst males and females, the results determined that females (n=320, M=47.13  $\pm$ 11.46) had higher mean scores than males (n=160, M=43.45  $\pm$ 10.60). There was a statistical difference among the diet quality scores between genders ( $t(df)=-3.397, p=0.001$ ). Additionally, a two-independent samples *t*-test found a significant

difference was also found between males ( $n=156$ ,  $M= 52.63 \pm 18.94$ ) and females ( $n=312$ ,  $M=57.10 \pm 16.48$ ) cooking skills confidence scores ( $t(df)= -2.632$ ,  $p=0.042$ ). The data suggests that females have significantly higher adult diet quality and are more confident in their cooking skills than males.

Cooking Skills Confidence scores were also further analyzed by examining the participants' education level. A One-way ANOVA analysis was conducted and determined a significant difference between Cooking Skills Confidence scores and education level ( $F(df1, df2) = 2.952$ ,  $p=0.032$ ). A Post Hoc test found a significant difference in mean cooking skills confidence scores between College Sophomores ( $n=40$ ,  $M=48.95 \pm 19.59$ ) and Graduate School students ( $n=147$ ,  $M=57.48 \pm 16.08$ ),  $p=0.031$ . This data shows that Graduate School students are significantly more confident and have more cooking skills than College Sophomores. Table 8 below displays the comparison of mean cooking skills confidence scores to the education level of participants.

**Table 8**

**Comparison of Mean Cooking Skills Confidence Scores to Education Level**

<b>Education Level</b>	<b>n (%)</b>	<b>Cooking Skills Confidence Score Mean <math>\pm</math> SD</b>	<b>F (df1, df2)</b>	<b>p-Value</b>
College Sophomore	40 (8.4)	48.95 $\pm$ 19.59	2.952	0.032*
College Junior	126 (26.6)	54.24 $\pm$ 18.74		
College Senior	161 (34)	56.53 $\pm$ 16.67		
Graduate School	147 (31)	57.48 $\pm$ 16.08		

\* $p < 0.05$

A one-way ANOVA test was also performed to determine whether a significant difference existed between perceived health status and Cooking Skills Confidence scores. As indicated in Table 9, participants reported how they perceived their own level of health including “excellent” (n=57, M=62.00 ±15.84), “very good” (n=169, M=58.35 ±18.09), “good” (n=191, M=53.49 ±16.78), “fair” (n=53, M=48.68 ±15.46), and “poor” (n=5, M=55.59 ±17.42). The results showed a significant difference between mean Cooking Skills Confidence Scores and perceived health status ( $F(df1, df2) = 6.712, p < 0.001$ ). A Post Hoc analysis further determined significant cooking skills confidence scores differences between “excellent” and “good” perceived health ( $p = 0.009$ ), “excellent” and “fair” perceived health ( $p < 0.001$ ), and “very good” and “fair” perceived health ( $p = 0.003$ ).

**Table 9**

**Comparison of Mean Cooking Skills Confidence Scores to Level of Perceived Health**

<b>Perceived Health Status</b>	<b>n (%)</b>	<b>Cooking Skills Confidence Score Mean ± SD</b>	<b>F (df1, df2) Value</b>	<b>p-Value</b>
Excellent	57 (16.1)	62.00 ±15.84	6.712	<0.001*
Very Good	169 (42.1)	58.35 ±18.09		
Good	191	53.49 ± 16.78		
Fair	53 (41.8)	48.68 ±15.46		
Poor	5	55.59 ±17.42		

\* $p < 0.05$

Continuous variables, including age and household size were analyzed using Pearson's correlation to determine whether they correlated with Cooking Skills Confidence Scores. Statistical significance was found between Cooking Skills Confidence scores and age ( $p=0.003$ ) at a 99% confidence interval. This data suggests that older participants had higher levels of cooking skills and cooking skills confidence than younger participants.

To determine whether a correlation existed between the study participants' diet quality scores and cooking skills confidence scores, a Pearson's Correlation was conducted. At an alpha of 0.01, results indicated a significant relationship between the scores, with  $r= 0.256$  and  $p<0.001$ . This shows that those with higher diet quality scores also had higher cooking skills confidence, based on their higher cooking skills confidence scores. This correlation suggests that those study participants who have a higher level of cooking confidence and cooking skills have better diet quality.

To explore whether a relationship exists between the source for learning cooking skills and cooking skills confidence scores, a one-way ANOVA was conducted. As depicted by Table 10, the highest mean scores were found in study participants who were self-taught ( $M=60.51\pm16.21$ ), by their father ( $M=54.98 \pm14.35$ ), or by their mother ( $M=54.26 \pm17.34$ ). A significant difference was found between the source of learned skills and cooking skills confidence scores,  $F(df1, df2) =3.048$  and  $p=0.004$ . A Post Hoc analysis determined a mean difference was significant between those who learned from their mother or were self-taught ( $p=0.019$ ).

Further analysis explored the impact of learning how to cook from multiple sources on cooking skills confidence and adults' diet quality. Study participants were able to report any group that



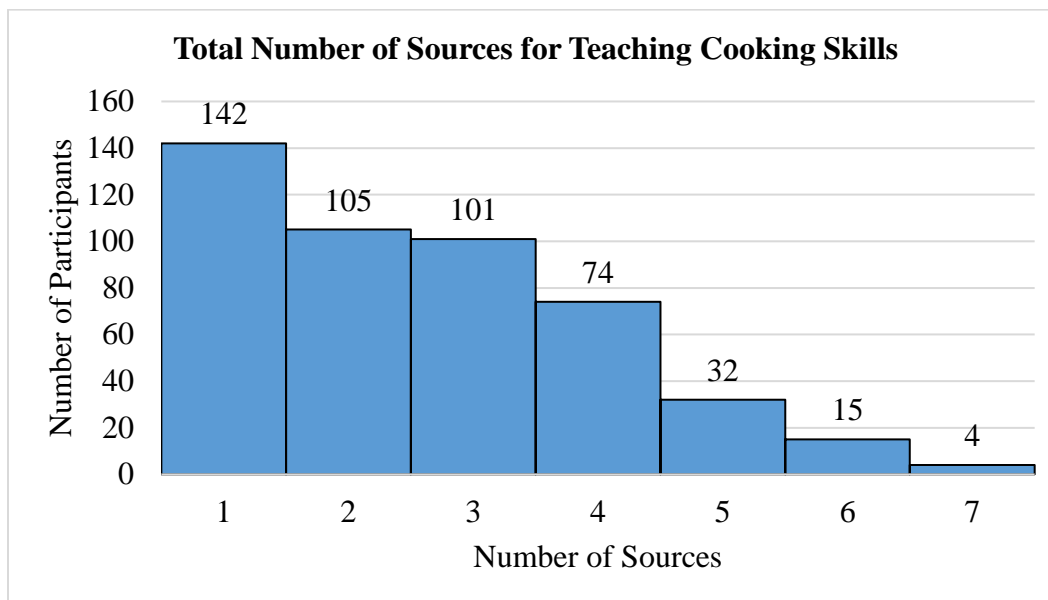
taught them cooking skills during their life. Figure 6 shows that the most study participants (n=142) indicated they only learned from one source. The mean number of sources for learning cooking skills was  $2.60 \pm 1.45$ . A Pearson's Correlation comparing the total number of sources to adults' diet quality scores found no significant relationship. In addition, findings from the same test to compare the total number of sources of learned cooking skills and cooking skills confidence scores determined no significance existed. From these results, it can be suggested that the number of people who have an influence on the development of cooking skills does not have a long-term impact on adults' diet quality or level of cooking skills.

**Table 10**

**Comparison of Mean Cooking Skills Confidence Scores to Source of Acquired Cooking Skills**

Source	n (%)	Cooking Skills Confidence Score Mean $\pm$ SD	F (df1, df2) Value	p-Value
Mother	185 (39.2)	54.26 $\pm$ 17.34	3.048	0.004*
Father	47 (10.0)	54.98 $\pm$ 14.35		
Grandparent	26 (5.5)	53.69 $\pm$ 20.57		
Partner/Spouse	22 (4.7)	48.82 $\pm$ 14.07		
Another Family Member	13 (2.8)	50.15 $\pm$ 22.01		
Friends/Acquaintances	9 (1.9)	48.22 $\pm$ 14.20		
Cooking Classes	18 (3.8)	52.50 $\pm$ 20.40		
Self-Taught	152 (32.2)	60.51 $\pm$ 16.21		

\* $p < 0.05$



**Figure 6: Total Number of Sources for Teaching Cooking Skills**

The age of acquiring cooking skills among participants was also further analyzed. A chi-square test was used to determine whether the age for acquiring cooking skills was significantly impacted by factors such as the participants' parents' marital status when they were children, frequency of cooking at home during adulthood, gender, and ethnicity. There was no statistically significant association between age of acquired cooking skills and ethnicity or age of acquired cooking skills and parents' marital status during childhood. However, there a significant association between the age of acquired cooking skills and frequency of cooking in the home ( $r=143.58$ ,  $p<0.001$ , Cramer's  $V=0.390$ ). Additionally, there was a significant association between age of acquired cooking skills and gender ( $r=12.457$ ,  $p=0.014$ , Cramer's  $V=0.115$ ).

## **Summary of Research Findings**

Overall, the data from the sample population of Northern Illinois University students show that the age for acquiring cooking skills does not significantly impact the quality of their diet. Most of the diet quality scores of the participants (94%), measured using the Short Healthy Eating Index, fell below a score of 63.2, indicating diet quality scores were in “needs improvement” or “poor” groups. In addition, only 16% of the population indicated they learned most of their cooking skills before the age of twelve years old.

Furthermore, the study participants’ main influence for learning cooking skills did not have a significant impact on diet quality in adulthood. Most of the participants learned how to cook from their mother, or they were self-taught through books, videos, or applications, and adults’ diet quality scores were not influenced by whether they learned in a public versus home setting. Further analyses also showed that gender, education level and perceived health of the participants impacted diet quality scores.

Statistical significance was found in determining whether cooking skills confidence scores were impacted by the age for acquiring cooking skills. Participants who learned how to cook before adulthood had higher cooking skills confidence scores than those who learned how to cook in adulthood. These results indicate that learning to cook at an earlier age increases cooking confidence as an adult. In addition, the main influence for developing cooking skills was predictive of cooking skills confidence scores, indicating that the source for learning cooking skills can increase cooking skills confidence. Finally, the study also found that age, gender, perceived health, and education level influenced cooking skills confidence scores.

## **CHAPTER FIVE**

### **IMPLICATIONS OF THE RESEARCH**

#### **Discussion**

The main purpose for this study was to investigate whether developing cooking skills at different times of life and from various sources would have a significant impact on diet quality and cooking skills confidence as an adult. Previous studies have emphasized the need for further research to determine long-term implications of cooking with children to help improve their future diet quality.<sup>6, 8, 10, 12, 14, 16</sup> The current study examined the diet quality, cooking skills confidence levels, and learning sources of adult college students from Northern Illinois University.

Previous studies have indicated that learning cooking skills earlier in life could influence diet quality during adulthood.<sup>10, 11, 16</sup> The current study aimed to determine whether adults who developed cooking skills during early childhood and adolescence would have higher adult diet quality, as measured by the Short Healthy Eating Index than those who developed cooking skills as an adult. However, the results determined that adults' diet quality was not significantly influenced by when the participants learned how to cook. This finding was different than previous research conducted by Utter and Laska who found that higher diet quality and healthier eating behaviors were found ten years later in participants who reported having adequate cooking skills in emerging adulthood (18-23 years).<sup>10, 16</sup> These results could be impacted by the

influences of college life where eating behaviors often change after transitioning to living outside of their childhood household.

Furthermore, the study hypothesized that adults who developed cooking skills during early childhood would have higher diet quality compared to those who developed cooking skills during adolescence. The results of this study determined that those participants who learned to cook before adulthood, the majority learned how to cook as a teenager. However, participant diet quality scores were not significantly impacted by the timing of when they developed cooking skills during childhood. These results were inconsistent with past research that indicated learning to cook at a younger age would improve diet quality.<sup>11</sup> While learning during childhood can provide more opportunities to build more cooking skills and increase cooking confidence, it does not ensure that healthy cooking practices and nutrition knowledge is being learned to improve diet quality long-term.<sup>11</sup>

Past studies have examined the influence of public settings such as home economics education to increase knowledge of cooking skills and nutrition.<sup>14, 28, 29</sup> This study predicted that adults who developed cooking skills in a public setting during childhood would have higher diet quality than participants who developed cooking skills in a household setting during childhood. The results of this study found only 84 (17.8%) participants from the sample population to have learned from a cooking class, and of these participants, 18 participants found cooking class to be most influential in teaching them these skills. The study ultimately determined that learning cooking skills from a public or home source did not have a significant impact on adults' diet quality. Like the findings from the current study, Wolfson found that few Americans learn these skills through formal instruction and instead learn from their parents or by teaching themselves.<sup>29</sup>

These results suggest that learning to cook in a public setting such as a school classroom is currently not successful in providing a significant long-term impact in developing these life skills to improve diet quality compared to learning in a household setting during childhood. Further research evidence is needed to explore ways to integrate evidence-based cooking education to include teaching cooking skills that promote eating a healthy diet in a public setting. As previously discussed in Chapter 2, barriers may exist in the ability to integrate teaching these life skills, such as competing academic priorities and a budget for equipment and facilities.<sup>29</sup>

According to this study, the most influential source for learning cooking skills was primarily from the mother, or self-teaching through cookbooks, television, or the internet. Further analysis compared whether there was a relationship between developing cooking skills from a particular source and level of cooking skills confidence. This study found that participants who taught themselves had significantly higher cooking skills confidence scores than those who were taught by their mother. These results demonstrate the impact of self-teaching to promote self-efficacy in cooking. Since these results are consistent with previous research, future interventions should explore effective means for disseminating evidence-based cooking instruction through outlets such as web-based platforms, since upcoming generations are becoming more accustomed to this type of technology.<sup>29</sup>

Using the Cooking Skills Scale, the current study hypothesized that adults who developed cooking skills during early childhood and adolescence would have higher cooking skills confidence than those who developed cooking skills during adulthood. The results determined that Cooking Skills Confidence scores were higher among those that acquired the majority of their cooking skills during childhood, compared to adulthood. These findings were consistent

with past research that learning to cook during childhood can influence cooking skills confidence during adulthood.<sup>6, 9, 16</sup> As other researchers have suggested, the current study also encourages future cooking skills interventions that target younger populations to result in higher levels of cooking ability and cooking confidence.<sup>11, 16</sup>

Garcia Gonzalez and Slater found a gender gap with cooking skills confidence, determining that males had fewer basic cooking skills and were less involved in acquiring cooking skills than females.<sup>9, 13</sup> The current study found that females were significantly more confident in their cooking skills and had significantly higher diet quality compared to male participants. These findings indicate a need to ensure all genders have adequate resources to gain cooking skills earlier in life. This ensures that all genders can build their cooking skills confidence to prepare healthier meals from fresher ingredients at home and as a result, improve their diet quality by relying less on processed foods and foods prepared outside the home.

In previous research, social, physical, and economic environment were shown to have influences on a person's ability to prepare meals during adulthood.<sup>6, 9</sup> The results from this study determined that income level and ethnicity were not significant when compared to cooking confidence scores. However, cooking confidence scores significantly increased with level of education and the age of the participant. Previous research found that socioeconomic status and demographics such as ethnicity and education level significantly influenced the person's level of cooking confidence, rather than their ability to cook meals at home.<sup>6, 9</sup> The current study suggests that regardless of income level and ethnicity, adults that gain cooking skills earlier in life will improve their self-efficacy as they grow older because they will have more learning opportunities.

## **Strengths and Limitations**

The current study had strengths including the sample size and data collection method. Online distribution of the survey tool was efficient for both the researcher and the participants. Through this data collection method, the study's sample size exceeded the number of participants needed for effectiveness. Study participants were emailed immediately after preparing for their finals, which may have allowed them to respond in a timely manner, since the majority of those who participated completed the survey within the first two weeks of email disbursement. Furthermore, this format allowed participants' responses to remain confidential by anonymous participation.

The current study had several limitations that could impact interpreting the results of the study. Findings from this study may not represent the entire population due to the nonrandom sample of the cross-sectional survey, and only generalizes the study population. Furthermore, the data from the survey was self-reported. These self-reported measures such as perceived health, dietary behaviors, level of cooking skills, and remembering the sources and time they learned cooking skills leave room for error since participants may not be providing adequate or truthful information.

Lastly, a limiting factor within this study is nutritional knowledge was not assessed for the study population. It was evident that those who failed to complete the entire survey stopped answering questions throughout the diet quality assessment portion of the survey. This could imply that the participants may have not been able to adequately recall their consumption of the food items listed. They may lack the knowledge to have understood the concept of serving sizes to answer the questions accurately.



## **Implications for Research and Dietetic Practice**

The results of this study can enhance the literature regarding strategies to improve quality of diet during adulthood by providing practical cooking skills knowledge during childhood. Limited research has been conducted to determine the most influential and impactful age to begin acquiring these cooking skills as a strategy to improve health nationwide.<sup>8</sup> The prevalence of chronic disease is apparent in adult populations, and obesity rates are increasing.<sup>1</sup> As seen by the diet quality scores in this study, most of the sample population are still not meeting the requirements for maintaining adequate intake of healthy foods. Therefore, it is imperative to address this problem earlier in life through public health interventions.

One of the largest barriers to preparing meals at home frequently and cooking from scratch is lack of cooking confidence.<sup>11</sup> The current study has determined that learning cooking skills before adulthood can increase cooking skills confidence during adulthood. These findings suggests that learning at a younger age provides more opportunities throughout life to build these skills. Acquiring cooking skills can contribute to consuming healthier food choices by improving self-efficacy in cooking, as found with the participants in this study.

Since it is known that there are circumstances where children may not be able to learn these skills in the home, the public setting may serve as an appropriate intervention for mandatory requirements to provide this opportunity to all children.<sup>11, 28</sup> Moreover, the incorporation of nutrition knowledge into cooking lessons may ensure that children are learning how to feed themselves to achieve higher diet quality throughout their lives. This research provided a basis of crucial information needed for introducing cooking skills during childhood through public health interventions or as a part of school curriculum to promote positive eating

behaviors and dietary outcomes into adulthood. Since the current study did not assess nutritional knowledge, future research is needed to evaluate whether a nutrition knowledge and gap exists between acquiring cooking skills at a younger age through various sources and adult diet quality.

When creating future interventions, it is important to consider the findings from this study that the majority of participants' main influence was their mother, or they were self-taught. As previous research has mentioned, the level of cooking skills required for many parents cooking at home has changed because many families rely on previously prepared foods or ultra-processed foods in meal preparation.<sup>19, 28</sup> In addition, the mother's ability to teach her child to cook can be limiting.<sup>11, 12</sup> Therefore, future research should focus on which cooking skills children are learning at home to better guide and direct public interventions that teach these skills.

In addition, the current findings that many people are teaching themselves how to cook should be explored further to help guide future interventions to improve diet quality. Further research is needed to identify and evaluate appropriate media outlets that are being used for individual cooking skills education to determine their effectiveness in improving overall diet quality. This may be an impactful source for delivering information of practical healthy cooking methods to adults and children to improve long term dietary outcomes and aid in chronic disease prevention.

## **Conclusion**

Cooking involves a multitude of complicated skills that can improve the diet quality of foods that are consumed due to less reliance on processed or previously prepared meals. This

study aimed to identify whether the age of acquiring these life skills had long term impacts on diet quality and cooking skills confidence. It has shown that diet quality among young adults needs improvement, and most cooking skills are not being learned until adolescence or adulthood.

Although children who acquire these skills have more opportunities for learning over time, the current data analysis determined that the development of cooking skills at an earlier age does not significantly increase the likelihood of having higher adult diet quality when comparing the Short Healthy Eating Index scores of early childhood, adolescent, and adult participants. Furthermore, adults' diet quality is not significantly impacted by whether participants learned cooking skills in a public or household setting. These findings suggest that other factors could be significantly contributing to young adults' diet quality such as time constraints and the method in which healthy cooking skills are taught.

The current study was consistent with past research that those with higher cooking skills confidence were significantly more likely to have higher diet quality.<sup>11, 16</sup> In addition, this study determined that those who learned how to cook prior to adulthood had developed more cooking skills and confidence by the time they were adults. These results suggest that learning cooking skills at an earlier age provides more experiences to build self-confidence over a longer period. Adults who learn how to cook at an earlier age are more equipped with knowledge and skills required to prepare meals at home from fresher ingredients.

The data from the present study provides a basis of information as to how the youngest adults have benefited from learning cooking skills at an earlier age. The acquisition of cooking skills can have a positive impact on future generations, but not all children have access to

resources that educate and prepare them to adequately cook healthy foods for themselves during adulthood. Further research is needed to explore which cooking skills are being taught in the home environment to determine how public interventions can expand on the learning of cooking skills to improve diet quality well into adulthood.

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**APPENDIX A**

**SURVEY QUESTIONNAIRE**



## QUALTRICS SURVEY TOOL FOR RESEARCH STUDY

1. Do you agree to participate in the study? (yes/no)

### Part 1: Demographic Information

2. What is your age?  
\_\_\_\_\_ years old
3. What is your gender?  
Male \_\_\_\_\_ Female \_\_\_\_\_ Prefer to self-describe \_\_\_\_\_
4. What is your ethnicity?  
African American \_\_\_\_\_ Asian American \_\_\_\_\_ Hispanic \_\_\_\_\_  
Native American \_\_\_\_\_ White/Caucasian \_\_\_\_\_ Other \_\_\_\_\_
5. Are you currently (check only one):  
Married \_\_\_\_\_ Separated \_\_\_\_\_ Widowed \_\_\_\_\_ Single \_\_\_\_\_ Divorced \_\_\_\_\_
6. What is your major? \_\_\_\_\_
7. Please check the highest level of school completed:  
College sophomore \_\_\_\_\_ College Junior \_\_\_\_\_ College Senior \_\_\_\_\_  
Graduate School \_\_\_\_\_
8. In general, would you say your health is (check only one):  
Excellent \_\_\_\_\_ Very Good \_\_\_\_\_ Good \_\_\_\_\_ Fair \_\_\_\_\_ Poor \_\_\_\_\_
9. What is your current household yearly income?  
Less than \$25,000 \_\_\_\_\_  
\$25,000-\$49,999 \_\_\_\_\_  
\$50,000-\$75,000 \_\_\_\_\_  
More than \$75,000 \_\_\_\_\_
10. How many people are currently living in your household? \_\_\_\_\_
11. What was the marital status of your parents during your childhood?  
Married \_\_\_\_\_ Separated \_\_\_\_\_ Widowed \_\_\_\_\_ Divorced \_\_\_\_\_

### Part 2: Current Dietary Behaviors

- 13.) On average, how many servings of fruit (not including juice) do eat per day?

Example: 1 serving fruit = 1/2 cup cut-up fruit, 1/2 a banana, or one small piece of whole fruit (apple, orange, pear, etc.) One small piece of whole fruit is the size of a baseball. 1/2 cup cut-up fruit is the size of a computer mouse.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer. (9) None at all

- 14.) On average, how many servings of 100% fruit juice do you drink per day?

NOTE: Do not include fruit flavored drinks such as Hi-C, Tang, Sunny-D, etc. Example: 1 serving juice = 1/2 cup 100% fruit juice (apple, grape, orange, etc.), 1 cup of juice = juice box.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer. (9) None at all

**15.)** Now, think about all of the vegetables you eat in a day. On average, how many servings of vegetables do you eat per day?

NOTE: Any vegetable or 100% vegetable juice counts as a member of the vegetable group.

Example: 1 serving = 1 cup raw vegetables, 1 cup of salad, 1/2 cup cooked vegetables, or 1/2 cup 100% vegetable juice. One cup raw vegetable is the size of a baseball. 1/2 cup cooked vegetables are the size of a computer mouse.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer (9) None at all

**16.)** Now, think about just the green vegetables you eat in a day like spinach, green beans, kale, broccoli, zucchini, or other mostly green vegetables. On average, how many servings of green vegetables do you eat per day?

NOTE: Do not include starchy vegetables like green peas.

Example: 1 serving = 1 cup raw vegetables or 1/2 cup cooked vegetables. 1 cup raw vegetables are the size of a baseball. 1/2 cup cooked vegetables are the size of a computer mouse.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer (9) None at all

**17.)** Now, think about just the starchy vegetables you eat in a day like corn, green peas, or potatoes. On average, how many servings of starchy vegetables do you eat per day?

Examples: 1 serving = 1 cup raw vegetable or 1/2 cup cook vegetables. 1 cup raw vegetables is the size of a computer mouse.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer (9) None at all

**18.)** On average, how many servings of grains do you eat per day?

Examples: 1 serving = 1 slice of bread; 1/2 cup grits, 1 cup of ready-to-eat cereal, 1/2 cup oatmeal, 1 small tortilla, 1/2 cup cooked rice, or 1/2 cup pasta. 1 cup ready-to-eat cereal is the size of a baseball.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer (9) None at all

**19.)** If “Less Than 1” is Selected for **question 6** on average, how often do you eat grains?

Examples: 1 serving = 1 slice of bread; 1/2 cup grits, 1 cup of ready-to-eat cereal, 1/2 cup oatmeal, 1 small tortilla, 1/2 cup cooked rice, or 1/2 cup pasta.

- (1) A couple times per week (2) A couple times per month (3) A couple times per year (4) Almost never (5) Never (6) Choose not to answer

**20.)** Now, just think about whole grains you eat like whole wheat bread, whole grain crackers, brown rice, or oatmeal. On average, how many servings of whole grains do you eat per day?

Examples: 1 serving = 1 slice whole wheat bread, 5–6 whole grain crackers, 3 cups popcorn, 1/2 cup cooked brown rice, or 1/2 cup oatmeal.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer (9) None at all

**21.)** If “Less Than 1” is Selected for **question 8** on average, how often do you eat whole grains?  
Examples: 1 serving = 1 slice whole wheat bread, 5–6 whole grain crackers, 3 cups popcorn, 1/2 cup cooked brown rice, or 1/2 cup oatmeal.

- (1) A couple times per week (2) A couple times per month (3) A couple times per year  
(4) Almost never (5) Never (6) Choose not to answer

**22.)** On average, how many servings of milk do you eat or drink per day?

Examples: 1 serving = 1 cup of milk, 1 cup of yogurt, 1.5 ounces of natural cheese, or 2 ounces of processed cheese. 1 cup of milk is the size of a carton of milk. 1 serving of cheese is the size of your index finger.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer  
(9) None at all

**23.)** If “Less Than 1” is Selected for **question 10** on average, how often do you drink or eat milk products?

Examples: 1 serving = 1 cup of milk, 1 cup of yogurt, 1.5 ounces of natural cheese, or 2 ounces of processed cheese.

- (1) A couple times per week (2) A couple times per month (3) A couple times per year  
(4) Almost Never (5) Never (6) Choose not to answer

**24.)** Now, just think about the milk products you eat per day. On average, how many servings of low-fat milk products do you eat per day?

Examples: 1 serving = 1 cup of skim milk, 1 cup of low-fat yogurt, or 1.5 ounces of low-fat cheese. 1 cup of milk is the size of a milk carton. 1 serving of cheese is the size of your index finger.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer  
(9) None at all

**25.)** If “Less Than 1” is Selected for **question 12** on average, how often do you drink or eat low-fat milk products? Examples: 1 serving = 1 cup of skim milk, 1 cup of low-fat yogurt, or 1.5 ounces of low-fat cheese.

- (1) A couple times per week (2) A couple times per month (3) A couple times per year  
(4) Almost never (5) Never (6) Choose not to answer

**26.)** On average, how many servings of beans (legumes) do you eat per day?

NOTE: all foods made from dry beans, canned beans, peas, and lentils are considered part of this group. Examples: 1 serving= 1/2 cup cooked beans. 1/2 cup cooked beans is the size of a computer mouse.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer  
(9) None at all

**27.)** On average, how many servings of nuts or seeds do you eat per day?

NOTE: 1 serving = 1 tbsp of peanut butter; 1/2 ounces of nuts or seeds. 1 tbsp of peanut butter is the size of the tip of your thumb.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer  
(9) None at all

**28.)** On average, how many servings of seafood do you eat per day?

NOTE: All foods made of fish, shrimp, crab, and shellfish are considered part of this group.

Examples: 1 serving = 3 ounces of fish. 3 ounces of fish is the size of a deck of cards.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer  
(9) None at all

**29.)** If “Less Than 1” is Selected for **question 16** on average, how often do you eat seafood?

NOTE: All foods made of fish, shrimp, crab, and shellfish are considered part of this group.

Examples: 1 serving = 3 ounce of fish.

- (1) A couple times per week (2) A couple times per month (3) A couple times per year  
(4) Almost never (5) Never (6) Choose not to answer

**30.)** On average, how many sugar-sweetened beverages do you drink per day?

Examples: 12 oz of soft drinks/soda, fruit flavored drinks, sweetened coffee, and sweet tea. Do not include milk or 100% fruit juice. 12 oz of soda is the size of one can.

- (1) Less than 1 (2) 1 (3) 2 (4) 3 (5) 4 (6) 5 (7) 6 or more (8) Choose not to answer  
(9) None at all

**31.)** If “Less Than 1” is Selected for **question 18** on average, how often do you drink sugar-sweetened beverages?

Examples: 12 oz of soft drinks/soda, fruit flavored drinks, sweetened coffee, and sweet tea. Do not include milk or 100% fruit juice.

- (1) A couple times per week (2) A couple times per month (3) A couple times per year  
(4) Almost never (5) Never (6) Choose not to answer

**32.)** On average, how much added sugars do you consume per day?

NOTE: Added sugars are often in foods such as breads, cakes, candy, sweet tea, jam, ice cream, or sugar added to food at the table. Do not include naturally occurring sugars such as lactose in milk or fructose in fruits. Examples: white sugar, brown sugar, raw sugar, corn syrup, corn-syrup solids, high-fructose corn syrup, malt syrup, maple syrup, pancake syrup, fructose sweetener, liquid fructose, honey, molasses, and dextrose.

- (1) None/almost none (2) Some (3) A lot (4) Choose not to answer

**33.)** How many servings of saturated fat do you consume on average per day? NOTE: Saturated fats for these purposes should be considered to be solid fats. Solid fats are fats that are solid at room temperature. Examples: butter, cakes, cookies, Crisco, coconut oil, beef fat (tallow, suet), chicken fat (lard), stick margarine, and shortening.

- (1) None/almost none (2) Some (3) A lot (4) Choose not to answer

**34.)** On average, how much water do you drink per day?

(1) None at all (2) Less than 2 cups (3) 2 cups-8 cups (4) 15 or more cups (5) Choose not to answer.

### **Part 3: Cooking Skills Confidence**

Please tell us which of the following you do (or use):

On a scale of 1 to 7 where 1 means very poor and 7 means very good, please say how good you are at the following: (“Never/rarely do it” option given for each) (Likert Scale options 1-very poor, 2- poor, 3- fair, 4- good, 5- very good, 6- excellent, 7- exceptional)

#### ***Cooking Method:***

**35.)** Chop, mix, and stir foods, for example chopping vegetables, dicing an onion, cubing meat, and stirring food together in a pot/bowl.

(1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

**36.)** Blend foods to make them smooth, like soups or sauces (using a whisk/blender/food processor, etc.)

(1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

**37.)** Steam food (where the food doesn’t touch the water but gets cooked by steam.)

(1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

**38.)** Boil or simmer food (cooking it in a pan of hot, boiling/bubbling water).

(1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

**39.)** Stew food (cooking it for a long time (usually more than an hour) in a liquid or sauce at a medium heat, not boiling) e.g., beef stew.

(1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

**40.)** Roast food in the oven, for example raw meat/chicken, fish, vegetables, etc.

(1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

**41.)** Fry/stir fry food in a frying pan/wok with oil or fat using the hob/gas rings/hot plates.

(1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

**42.)** Microwave food (not drinks/liquid) including heating ready-meals.

(1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

#### ***Food Preparation Techniques:***

**43.)** Bake goods such as cakes, buns, cupcakes, scones, bread, etc., using basic/raw ingredients or mixes.

(1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

- 44.) Peel and chop vegetables (including potatoes, carrots, onions, broccoli).  
 (1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional
- 45.) Prepare and cook raw meat/poultry.  
 (1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional
- 46.) Make sauces and gravy from scratch (no ready-made jars, pastes or granules).  
 (1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional
- 47.) Use herbs and spices to flavor dishes.  
 (1) very poor (2) poor (3) fair (4) good (5) very good (6) excellent (7) exceptional

#### Part 4: Acquisition of Cooking Skills

- 48.) At what age did you learn most of your cooking skills?  
 As a child (under 12 years) \_\_\_\_  
 As a teenager (13-18 years) \_\_\_\_  
 As an adult (18+ years) \_\_\_\_
- 49.) Where did you learn to cook? (You may choose as many as you need)  
 Mother \_\_\_\_ Father \_\_\_\_ Grandparents \_\_\_\_ Partner/spouse \_\_\_\_  
 Another family member \_\_\_\_ Friends and acquaintances \_\_\_\_  
 Cooking class at school \_\_\_\_  
 Self-taught through books, magazines, internet tutorials, videos, or apps \_\_\_\_
- 50.) Of those chosen in the previous question, who was the most influential in learning cooking skills?  
 Mother \_\_\_\_ Father \_\_\_\_ Grandparents \_\_\_\_ Partner/spouse \_\_\_\_  
 Another family member \_\_\_\_ Friends and acquaintances \_\_\_\_  
 Cooking class at school \_\_\_\_  
 Self-taught through books, magazines, internet tutorials, videos, or apps \_\_\_\_
- 51.) Please indicate how frequently you were involved in cooking activities at home during your childhood/adolescence.  
 Daily \_\_\_\_ 4-6 times/week \_\_\_\_ 1-3 times/week \_\_\_\_ 1-3 times/month \_\_\_\_  
 Several times/year \_\_\_\_ Never \_\_\_\_
- 52.) Who (in your current household) usually prepares the main meals?  
 Me \_\_\_\_ My Partner \_\_\_\_ Both (My partner and I) \_\_\_\_ Another Person \_\_\_\_

**APPENDIX B**

**IRB EXEMPTION NOTICE**

**IRB EXEMPTION NOTICE****Exempt Determination**

18-Mar-2021

Suzanne Check (01787556)  
School of Health Studies

RE: Protocol # **HS21-0322 "SCheck Protocol"**

Dear Suzanne Check,

Your application for institutional review of research involving human subjects was reviewed by the Office of Research Compliance, Integrity, and Safety on **18-Mar-2021** and it was determined that it meets the criteria for exemption 2.

Although this research is exempt, you have responsibilities for the ethical conduct of the research and must comply with the following:

Amendments: You are responsible for reporting any amendments or changes to your research protocol that may affect the determination of exemption and/or the specific category. This may result in your research no longer being eligible for the exemption that has been granted.

Record Keeping: You are responsible for maintaining a copy of all research related records in a secure location, in the event future verification is necessary. At a minimum these documents include: the research protocol, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to participants, all correspondence to or from the IRB, and any other pertinent documents.

Please include the **protocol number** (**HS21-0322**) on any documents or correspondence sent to the IRB about this study.

If you have questions or need additional information, please contact the Office of Research Compliance, Integrity, and Safety at 815-753-8588.

**Please see the RIPS website for guidance on the impact of COVID-19 on research(including face-to-face data collection) <https://www.niu.edu/divresearch/covid/index.shtml>**

Patty Wallace

Compliance Coordinator  
Office of Research Compliance & Integrity  
Northern Illinois University



**APPENDIX C**

**REQUEST FOR STUDENT DATA FORM**

**REQUEST FOR STUDENT DATA FORM****Northern Illinois University Division of Academic Affairs Registration and Records**Requestor's Account Information:

Name: Suzanne Check

NIU Email Address: Z1787556@students.niu.edu

Description of Request:

Request for student emails ages 20 to 40 years old

Preferred Date Needed: To Be Determined\*

Describe how the data will be used:

Student emails will be used for a mass email communication in an effort to complete a graduate thesis project survey investigating adults' dietary quality of college students ages 20 to 40 years old. The purpose of this research is to determine the impact of the development of cooking skills on adults' dietary behaviors including the age at which cooking skills were learned, as well as the source for learning the majority of cooking skills. The research study uses the Short Healthy Eating Index and a Cooking Skills Confidence Scale. The results of the study will allow for appropriate public health interventions aimed at improving long term overall health and diet quality in both children and adults through the incorporation of cooking skills development. Suzanne Check, the researcher of this thesis project, is a graduate student in the Nutrition and Dietetics program at Northern Illinois University.

Approximate number of students you expect to receive information about: 12,500

Student Population and Information Needed:

Undergraduate, Graduate and Law Student Campus Email Address information is needed of those students ages 20 to 40 years old.

Requested By: Suzanne Check

Advisor: Dr. Sheila Barrett

Department of Nutrition & Dietetics

\*Date determined pending IRB approval.

**APPENIDIX D**

**CONSENT FOR PILOT STUDY**

## CONSENT FOR PILOT STUDY

Dear Participant,

My name is Suzy Check, and I am a Nutrition and Dietetics graduate student at Northern Illinois University. I am conducting a thesis study investigation on the impact learning cooking skills during childhood has on adults' dietary quality. I am inviting you to part take in my pilot study. The purpose of the pilot study is to determine any need for changes in clarity or grammar. You will first answer the questions by clicking on the link below. The final question will be a text box to input any information relating to readability, grammar, and clarity. Also include how long the survey took to complete (in minutes).

If you have any questions, please contact:

Suzy Check at Z1787556@students.niu.edu

Thank you for your participation.

Please click the link below to begin.

[Survey Link](#)

Sincerely,

Suzanne Check

M.S. Nutrition and Dietetics Candidate

Northern Illinois University

**APPENDIX E**

**NORTHERN ILLINOIS UNIVERSITY CLEARINGHOUSE REVIEW  
AND MASS EMAIL REQUEST FORM**

**NORTHERN ILLINOIS UNIVERSITY CLEARINGHOUSE REVIEW**  
**AND MASS EMAIL REQUEST FORM**

**To: Division of Enrollment Management, Marketing and Communications**

Requester's Contact Information:

Name: Suzanne Check

Department: Nutrition and Dietetics

College/Division: Other

NIU Email Address: Z1787556@students.niu.edu

I am submitting materials for: distribution to an internal audience (faculty, staff, current students)

I need assistance: sending an email to a custom (targeted) mailing list

Preferred Date of Distribution: May 11, 2021

Who are the recipients of this email message? Current Students

Subject Line: Volunteers Needed for Research Study

Message Body:

Dear NIU Student,

You are invited to participate in graduate thesis research project. This is a voluntary anonymous survey that will take approximately 10 to 15 minutes to complete. You have the right to refuse to answer any question or leave the survey at any time. There are no known risks to completing this survey.

The purpose of this research is to determine the impact of the development of cooking skills on adults' dietary behaviors. Your participation will help contribute to research to help direct where to place future interventions to help improve the health and diet quality of future generations.

If you agree to participate in this study, you will be asked to complete a series of questions using Qualtrics, an online survey system. First, you will be asked about basic social and demographical information. The rest of the survey will include questions about various cooking skills and personal eating habits. Private information will not be collected with the survey response to help maintain confidentiality.

Upon completion of the survey, you will have the option to enter a drawing for one of four \$50 Amazon gift cards. If you are interested in participating in the drawing, follow the link at the end of the survey to enter your email information.

**You must certify that you're 20 years or older, and that you are volunteering to take the survey in order to participate.**

*Survey Link*

Thank you for your time and contributions,

Suzanne Check

M.S. Nutrition and Dietetics Candidate

Northern Illinois University

Z1787556@students.niu.edu

Additional information that is helpful in the fulfillment of this request.

This mass email communication is needed in an effort to complete a graduate thesis project investigating adults' dietary quality of college students ages 20 to 40 years old. The purpose of this research is to determine the impact of the development of cooking skills on adults' dietary behaviors including the age at which cooking skills were learned, as well as the source for learning the majority of cooking skills. The research study uses the Short Healthy Eating Index and a Cooking Skills Confidence Scale. The results of the study will allow for appropriate public health interventions aimed at improving long term overall health and diet quality in both children and adults through the incorporation of cooking skills development.

Suzanne Check, the researcher of this thesis project, is a graduate student in the Nutrition and Dietetics program at Northern Illinois University.

**APPENDIX F**

**PERMISSION TO USE SHEI SCALE**



**PERMISSION TO USE sHEI SCALE**

Hello Dr. Colby,

I am a graduate student and dietetic intern at Northern Illinois University working towards a Master of Science Degree in nutrition and dietetics. For my thesis, I will be investigating the impact of learning to cook during childhood on adults' dietary behaviors. I am preparing to propose my thesis and am requesting to use your short Healthy Eating Index survey in your research project "*Development and Validation of the Short Healthy Eating Index Survey with a College Population to Assess Dietary Quality and Intake.*"

Thank you for your consideration.

Suzanne Check

M.S. Nutrition and Dietetics Candidate

Northern Illinois University

Hello Suzanne,

Yes, the tool is free to use. Please let us know if you have any questions as you use the tool in your research.

Take care,

Sarah

Sarah Colby, PhD, RD

Associate Professor

University of Tennessee

Nutrition Department

230 Jessie Harris Bldg.

scolby1@utk.edu

828-226-5116

**APPENDIX G**

**PERMISSION TO USE COOKING SKILLS SCALE**

**PERMISSION TO USE COOKING SKILLS SCALE**

Hello Dr. Lavelle,

I am a graduate student and dietetic intern at Northern Illinois University working towards a Master of Science Degree in nutrition and dietetics. For my thesis, I will be investigating the impact of learning to cook during childhood on adults' dietary behaviors. I am preparing to propose my thesis and am requesting to use your cooking skills scale from your research project "*Learning Cooking Skills at Different Ages: A Cross Sectional Study.*"

Thank you for your consideration.

Suzanne Check

M.S. Nutrition and Dietetics Candidate

Northern Illinois University

Dear Suzanne,

Thank you for getting in touch with me. Of course you can have permission, please find attached the measure and the validation paper for it.

Best of luck with your research and masters, I hope it all goes well for you.

Kind Regards,

Fiona

Dr Fiona Lavelle

Research Fellow

Queen's University Belfast

Institute for Global Food Security

19 Chlorine Gardens

Belfast, BT9 5DL

## **APPENDIX H**

### **SHEI TOTAL DIETARY QUALITY SCORE INSTRUCTIONS**

## SHEI TOTAL DIETARY QUALITY SCORE INSTRUCTIONS

The following scoring instructions were developed and validated by Colby, et al<sup>25</sup> for the Short Healthy Eating Index survey tool.

To score the HEI component scores and the total, we need the following 17 items: Q1 (fruit), Q2 (fruitjuice), Q4 (greenvege), Q5 (starchy), Q6 (grains), Q8 (wholegrains), Q10 (milk), Q11 (milk2), Q12 (lowfatmilk), Q13 (lowfatmilk2), Q14 (beans), Q15 (nutseeds), Q16 (seafood), Q17 (seafood2), Q18 (ssb), Q20 (addedsugars), Q21 (satfat), Q22 (water), and Gender.

### ***Total Fruits Component (total\_fruits), 0–5***

IF Q1 (fruit) = 1 THEN total\_fruits\_Q1 = 0;  
 IF Q1 (fruit) = 2 THEN total\_fruits\_Q1 = 2;  
 IF Q1 (fruit) = 3 THEN total\_fruits\_Q1 = 3.5;  
 IF Q1 (fruit) = 4,5,6,7 THEN total\_fruits\_Q1 = 5.

IF Q2 (fruitjuice) = 1 THEN total\_fruits\_Q2 = 0;  
 IF Q2 (fruitjuice) = 2 THEN total\_fruits\_Q2 = 2;  
 IF Q2 (fruitjuice) = 3 THEN total\_fruits\_Q2 = 3.5;  
 IF Q2 (fruitjuice) = 4,5,6,7 THEN total\_fruits\_Q2 = 5.  
 total\_fruits = total\_fruits\_Q1 + total\_fruits\_Q2.  
 IF total\_fruits > 5 THEN total\_fruits = 5.

### ***Whole Fruits Component (whole\_fruits), 0–5***

IF Q1 (fruit) = 1 THEN whole\_fruits = 0;  
 IF Q1 (fruit) = 2 THEN whole\_fruits = 2.5;  
 IF Q1 (fruit) = 3,4,5,6,7 THEN whole\_fruits = 5.

### ***Total Vegetables Component (tot\_veg), 0–5***

IF Q4 (greenvege) = 1 THEN tot\_veg = 1.60;  
 IF Q5 (startchy) = 2,3,4,5,6,7 AND Q4 (greenvege) = 2 THEN tot\_veg = 2.46;  
 IF Q5 (startchy) = 2,3,4,5,6,7 AND Q4 (greenvege) = 3,4,5,6,7 THEN tot\_veg = 3.24;  
 IF Q5 (startchy) = 1 AND Q4 (greenvege) = 2,3,4,5,6,7 THEN tot\_veg = 3.56.

### ***Greens and Beans Component (greens\_beans), 0–5***

IF Q4 (greenvege) = 1 THEN greens\_beans\_Q7 = 0;  
 IF Q4 (greenvege) = 2,3,4,5,6,7 THEN greens\_beans\_Q7 = 5.

IF Q14 (beans) = 1 THEN greens\_beans\_Q14 = 0;  
 IF Q14 (beans) = 2,3,4,5,6,7 THEN greens\_beans\_Q14 = 5.  
 greens\_beans = greens\_beans\_Q4 + greens\_beans\_Q14.  
 IF greens\_beans > 5 THEN greens\_beans = 5.

### ***Whole Grains Component (whole\_grains), 0–10***

IF Q8 (wholegrains) = 1 THEN whole\_grains = 0.51;  
 IF Gender = M AND Q8 (wholegrains) = 2,3,4,5,6,7 THEN whole\_grains = 2.97;  
 IF Gender = F AND Q8 (wholegrains) = 2,3 THEN whole\_grains = 5.20;  
 IF Gender = F AND Q8 (wholegrains) = 4,5,6,7 THEN whole\_grains = 6.94.

***Dairy Component (Dairy), 0–10***

IF Gender = M AND Q10 (milk) = 1,2,3 THEN dairy = 3.22;  
 IF Gender = F AND Q10 (milk) = 1,2,3 AND Q12 (lowfatmilk) = 1 THEN dairy = 3.32;  
 IF Gender = F AND Q10 (milk) = 1,2,3 AND Q12 (lowfatmilk) = 2,3,4,5,6,7 THEN dairy = 4.81;  
 IF Q10 (milk) = 4,5,6,7 THEN dairy = 6.51.

***Total Protein Foods Component (tot\_proteins), 0–5***

IF Gender = M AND Q16\_17 (seafood\_combo) = 1,2,3,4 THEN tot\_proteins = 4.11;  
 IF Gender = M AND Q16\_17 (seafood\_combo) = 5,6,7,8,9,10,11 THEN tot\_proteins = 4.98;  
 IF Gender = F THEN tot\_proteins = 4.97.

***Seafood and Plant Protein Component (Seafood\_Plant), 0–5***

IF Gender = M AND Q15 (nutseeds) = 1,2 THEN seafood\_plant = 0.49;  
 IF Gender = F AND Q15 (nutseeds) = 1,2 THEN seafood\_plant = 1.50;  
 IF Q15 (nutseeds) = 3,4,5,6,7 THEN seafood\_plant = 4.20.

***Fatty Acid Ratio Component (Fatty\_Acid), 0–10***

IF Q10 (milk) = 4,5,6,7 THEN fatty\_acid = 2.56;

IF Q21 (satfat) = 2,3 AND Q10\_11 (milk\_combo) = 1,2,3,4,5,6,7  
 AND Q12–13 (lowfatmilk\_combo) = 1,2 THEN fatty\_acid = 2.63;

IF Q21 (satfat) = 2,3 AND Q10\_11 (milk\_combo) = 1,2,3,4,5,6,7  
 AND Q12\_13 (lowfatmilk\_combo) = 3,4,5,6,7,8,9,10,11 THEN fatty\_acid = 4.54;

IF Q21 (satfat) = 1 AND Q10\_11 (milk\_combo) = 1,2,3,4,5,6,7 THEN fatty\_acid = 5.93.

***Refined Grains Component (Refined Grains), 0–10***

IF Q4 (greenvege) = 1 THEN refined grains = 2.13;

IF Q6 (grains) = 3,4,5,6,7 AND Q16 (seafood) = 2,3,4,5,6,7  
 AND Q4 (greenvege) = 2,3,4,5,6,7 THEN refined grains = 2.27;

IF Q6 (grains) = 3,4,5,6,7 AND Q15 (nutseeds) = 1,2  
 AND Q16 (seafood) = 1 AND Q4 (greenvege) = 2,3,4,5,6,7  
 THEN refined grains = 4.73;

IF Q6 (grains) = 3,4,5,6,7 AND Q15 (nutseeds) = 3,4,5,6,7  
 AND Q16 (seafood) = 1 AND Q4 (greenvege) = 2,3,4,5,6,7

THEN refined grains = 8.45;

IF Q6 (grains) = 1,2 AND Q4 (greenvege) = 2,3,4,5,6,7 THEN refined grains = 9.25.

***Sodium Component (Sodium), 0–10***

IF Q1 (fruit) = 1,2 AND Q6 (grains) = 3,4,5,6,7 AND Q22 (water) = 3  
THEN sodium = 0.70;

IF Q1 (fruit) = 3,4,5,6,7 AND Q6 (grains) = 3,4,5,6,7 AND Q22 (water) = 3  
THEN sodium = 2.30;

IF Q6 (grains) = 3,4,5,6,7 AND Q22 (water) = 1,2 THEN sodium = 4.94;

IF Q6 (grains) = 1,2 THEN sodium = 6.07.

***Added Sugars Component (Added\_Sugars), 0–10***

IF Q18 (ssb) = 1 THEN sugar\_calories\_Q18 = 0;

IF Q18 (ssb) = 2 THEN sugar\_calories\_Q18 = 156;

IF Q18 (ssb) = 3 THEN sugar\_calories\_Q18 = 312;

IF Q18 (ssb) = 4 THEN sugar\_calories\_Q18 = 468;

IF Q18 (ssb) = 5 THEN sugar\_calories\_Q18 = 624;

IF Q18 (ssb) = 6 THEN sugar\_calories\_Q18 = 780;

IF Q18 (ssb) = 7 THEN sugar\_calories\_Q18 = 936.

IF Q20 (addedsugars) = 1 THEN sugar\_calories\_Q20 = 130;

IF Q20 (addedsugars) = 2 THEN sugar\_calories\_Q20 = 260;

IF Q20 (addedsugars) = 3 THEN sugar\_calories\_Q20 = 520.

IF sugar\_calories = sugar\_calories\_Q18 + sugar\_calories\_Q20.

IF sugar\_calories <=130 THEN added\_sugars = 10;

IF sugar\_calories > 130 AND sugar\_calories < 520 THEN added\_sugars = 5;

IF sugar\_calories >=520 THEN added\_sugars = 0.

***Saturated Fats Component (sat\_fat), 0–10***

IF Q18 (ssb) = 3,4,5,6,7 THEN sat\_fat = 1.82;

IF Q6 (grains) = 1,2 AND Q18 (ssb) = 1,2 THEN sat\_fat = 3.20;

IF Q6 (grains) = 3,4,5,6,7 AND Q15 (nutseeds) = 1,2 AND Q18 (ssb) = 1,2  
THEN sat\_fat = 4.64;

IF Q6 (grains) = 3,4,5,6,7 AND Q15 (nutseeds) = 3,4,5,6,7 AND  
Q18 (ssb) = 1,2 THEN sat\_fat = 6.56.

***Total DQ Score (0–100)***

Total score = total\_fruits + whole\_fruits + tot\_veg + greens\_beans + whole\_grains + dairy +  
tot\_proteins + seafood\_plant + fatty\_acid + refined\_grains + sodium + added\_sugars + sat\_fat

## **APPENDIX I**

### **RESEARCH TIMELINE**



### Research Timeline

Time frame							
Proposed activities	Jan 2021	Feb- March 2021	April- May 2021	June- July 2021	Aug 2021	Sept 2021	Oct 2021
Revise Research Proposal							
Prepare and submit IRB application							
Form Thesis Committee							
Defend Research Proposal							
Perform Pilot Test of Initial Questionnaire							
Recruitment and consent of study subjects.							
Set up computer data files							
Refine Initial Questionnaire from Pilot Test results							
Distribute Survey to participants							
Data entry and analysis							
Submit request for Oral Thesis Defense							Oct. 5 Deadline
Write Thesis							
Submit Results from Oral Defense							Oct. 26 Deadline
Submit Post Defense Edited Thesis to Graduate School							Oct. 29 Deadline

**APPENDIX J**

**BUDGET**

**Budget**

<b>Item Needed</b>	<b>Price</b>
Use of SPSS Software	<b>Free</b>
4 Amazon Gift Cards (\$25.00 each raffle prize)	\$200.00
Estimated Total Needed for Study	\$200.00