DEVELOPMENT AND EVALUATION OF A HANDS-ON CULINARY EDUCATION PROGRAM FOR YOUTH

BY

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DISSERTATION

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Abstract

The vast majority of American youth consume unhealthy diets and do not meet national nutrition recommendations. Participation in cooking and food preparation is associated with healthy dietary behaviors for individuals of all ages, likely because home cooked foods tend to be healthier than pre-prepared alternatives. Societal level declines in cooking behaviors and skills in recent decades have made decreased the likelihood that children will learn how to cook at home or in school. In response to these findings, many researchers advocate for the increased provision of hands-on cooking programs with youth audiences. The Illinois Junior Chefs (IJC) Program was developed to address concerns of minimal cooking skills and unhealthy dietary intake among low-resource youth. Principles from Social Cognitive Theory and Implementation Science informed both the development of the program and the evaluation methodology. Pre- and post-intervention data were collected through IJC surveys (which measured participants’ cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors). A novel observational protocol was also developed to allow for observational assessment of hands-on assessment of participants’ cooking skills (mixing skills, measuring skills, using a peeler, using a grater, and cracking eggs) pre- and post-intervention. The full analytic sample included 591 participants aged 8-13, and the skills testing assessment was performed with a subgroup of 37 participants. Study findings showed that participants experienced significant improvements in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors, with males experiencing slightly stronger program outcomes than females. All hands-on cooking skills also improved significantly from pre- to post-intervention. Investigation of implementation effects revealed that programs delivered over consecutive days were generally more effective than non-consecutive lessons, teen teachers did not have an effect on program outcomes, and additional hours of programming beyond the minimum of 10 hours had a negative impact on program outcomes. This study demonstrated that participation in the IJC Program results in significant improvements in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and hands-on cooking skills. These findings support the notion that hands-on culinary education can have a strong positive influence on psychosocial predictors of dietary behaviors in youth.
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Chapter One: Introduction

Recent findings suggest that American youth of all ages fall far short of meeting national nutrition recommendations. Of children aged 9-18, over 95% exceed the daily recommended intake for added sugars and solid fats, 83% do not consume the recommended servings of fruits, 97% do not consume the recommended servings of vegetables, and over 99% do not consume the recommended servings of whole grains (Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010). Unhealthy diets among American children and adolescents are especially concerning because they are associated with increased risk for chronic diseases and unhealthy growth trajectories (American Dietetic Association, 2008; Bellisle, 2008; Uauy, Kain, Mericq, Rojas, & Corvalán, 2008). Dietary patterns in youth are also of particular consequence because they can become solidified as lifelong consumption habits.

Cooking and involvement in food preparation are important modifiable behaviors that are associated with dietary attitudes and behaviors. Over the past several decades, Americans’ consumption of away-from-home convenience foods has increased as we spend less time cooking (Hamrick, Andrews, Guthrie, Hopkins, & McClelland, 2011; Poti & Popkin, 2011; Smith, Ng, & Popkin, 2013). Ample evidence supports the notion that home-cooked foods tend to be healthier than away-from-home foods (Condrasky & Hegler, 2010; Guthrie, Lin, & Frazao, 2002). Children who participate in food preparation tend to have stronger preferences for fruits and vegetables, greater self-efficacy for eating and selecting healthy foods, and healthier diets overall (Chu et al., 2012; Chu, Storey, & Veugelers, 2014; Metcalfe, Fiese, & STRONG Kids Team, 2018; Quelly, 2018). These trends continue in adolescence and adulthood, when the association between cooking behaviors and healthier dietary behaviors continues (Larson, Perry, Story, & Neumark-Sztainer, 2006; Utter, Larson, Laska, Winkler, & Neumark-Sztainer, 2018). In light of these findings about the association between cooking and healthy diets, many experts advocate for the development of hands-on cooking interventions for children and adolescents.

Interventions targeting changes in health behaviors are more effective when they utilize a strong theoretical framework that is applicable to the behavior and intervention at hand (Glanz & Bishop, 2010). Social Cognitive Theory (SCT) is commonly cited as a theoretical framework used in culinary and nutrition interventions, but is often only applied partially or inconsistently (Michaud, Condrasky, & Griffin, 2007). Principles from SCT suggest that hands-on culinary education programs should be more effective than demonstration-based culinary education. This dissertation seeks to review the ways in which SCT supports the implementation of hands-on culinary education programs, and fully utilize this theoretical framework in the development and evaluation of the Illinois Junior Chefs Program (IJC), a statewide hands-on culinary education program. The following chapter will review the background literature and rationale for this study.
Chapter Two: Literature Review

Unhealthy Dietary Habits in Children and Adolescents

The vast majority of American children and adolescents do not meet federal dietary recommendations for daily servings of fruits, vegetables, or whole grains, and exceed recommendations for fat and sugar intake (Kim et al., 2014; Krebs-Smith et al., 2010). Of children aged 9-18, over 95% exceed the daily recommended intake for added sugars and solid fats, 83% do not eat the recommended servings of fruits, 97% do not eat the recommended servings of vegetables, and over 99% do not eat the recommended servings of whole grains (Krebs-Smith et al., 2010). The 2010 Dietary Guidelines Advisory Committee (DGAC) Report notes an alarming trend even amongst school aged children with the healthiest dietary habits. Children with the lowest (5th percentile) intakes of solid fats and added sugars still did not meet the dietary guidelines and exceeded the recommended daily allowance for these foods. Additionally, children with the highest (95th percentile) intakes of fruits, vegetables, and whole grains still fell short of consuming the daily recommended servings for these foods (Dietary Guidelines Advisory Committee, 2010). These findings are especially concerning because they suggest that even children with the healthiest diets (compared to their peers) do not meet the daily dietary requirements set by experts.

Unhealthy dietary intake in children is associated with increased risk for a number of negative health outcomes later in life, including risk for the development of obesity, cancer, type 2 diabetes, and other chronic diseases (Nicklas & Hayes, 2008). Inadequate nutrition among youth creates unhealthy growth trajectories and sets the stage for a number of potential growth and metabolic issues later in life (Bellisle, 2008; Uauy, Kain, Mericq, Rojas, & Corvalán, 2008). Given that children need to consume adequate nutrients to grow and develop optimally (Nicklas & Hayes, 2008), research into influences on and consequences of children’s diets is crucial.

Children’s nutritional habits are particularly consequential because dietary patterns set in childhood often develop into lifelong health habits (Lake, Mathers, Rugg-Gunn, & Adamson, 2006; Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011; Nicklaus & Remy, 2013; Patrick & Nicklas, 2005). Given that dietary patterns in childhood are predictive of nutritional health in adulthood, efforts to better understand modifiable factors that influence dietary intake among youth should be an important priority for child development researchers and public health practitioners. Cooking behaviors and skills are key factors that have been associated with dietary habits in recent research (Chu et al., 2014; Larson, Perry, et al., 2006). These findings warrant further investigation into the relationship between cooking and diet, and the ability of cooking interventions to produce positive outcomes related to diet and healthy eating.

Societal Trends in Cooking Behaviors and Skills

Recent trends towards unhealthy dietary intake have coincided with a decrease in cooking behaviors and skills at a societal level. This “de-skilling” has occurred as today’s food environment has transitioned to one in which preparing food for consumption requires minimal culinary skills (Lang & Caraher, 2001; Short, 2003). Our current food environment allows consumers the option of consuming all of the calories they need without ever cooking from scratch (Begley, 2016). The last several decades have seen precipitous declines in the amount of time Americans spend cooking and preparing food (Zick & Stevens, 2010), and as a result, hands-on cooking skills are not being passed from one generation to the next (Fordyce-Voorham, 2011). Some even go as far as to claim that “cooking skills are an anachronism and relic of a past age,” implying that the ability to cook is not relevant or necessary in today’s society (Lang & Caraher, 2001, p. 7). Declines in the amount of time Americans spend cooking over the last forty years can be traced to several factors, including increased prevalence and decreased price of convenience foods and away-from-home meals, increases in maternal employment outside of the home, and technological advances in cooking appliances (French, Story, & Jeffery, 2001; Lyon, Colquhoun, & Alexander, 2003; Metcalfe & Leonard, 2018).

Overwhelmingly, women tend to bear the burden of food preparation and have throughout history (French et al., 2001; Ramey, 2009). Even women however, as the main meal preparers, have drastically decreased the amount of time they spend cooking in the last several decades. This is in large part due to women’s ever-increasing involvement in the workforce, a societal trend that began in World War II and was furthered by the women’s liberation movement of the 1960s (Lang & Caraher, 2001). According to data from the American Time Use Survey, women spent an average of 141 minutes per day on food preparation in 1965 (Ramey, 2009), but only spent 37 minutes per day on food preparation in 2014 (Bureau of Labor Statistics, 2016), indicating that the amount of time women spend preparing food has decreased by over 70% since the 1960’s. Though women, as the main meal preparers, have experienced greater decreases in the time they spend cooking than men, study results suggest that societal trends of decreased cooking behaviors can be seen across all genders and socioeconomic statuses (Smith et al., 2013). In fact, Americans today cook less than residents of any other country (Hoffinger, 2016).

Recent studies report that the decline in cooking at a societal level has coincided with an increase in production and acceptability of prepared and convenience foods (Cunningham-Sabo & Simons, 2012; Engler-Stringer, 2010). Convenience foods can be defined as: “any fully or partially prepared foods in which significant preparation time, culinary skills, or energy inputs have been transferred from the home kitchen to the food processor and distributor” (Candel, 2001, p. 15). These convenience foods tend to be less expensive (per calorie) than less processed, healthier alternatives like raw foods that require cooking to be edible (Darmon & Drewnowski, 2015). Perceived lack of time is one of the main barriers cited by
individuals who do not cook frequently (Jabs & Devine, 2006; Pelletier & Laska, 2012; Wolfson, Bleich, Smith, & Frattaroli, 2016). Partially prepared convenience foods address this concern and allow parents to quickly feed their families with foods that are less expensive than home-cooked alternatives.

Technological advancements in kitchen appliances – including the invention of microwaves, crockpots, food processors, and automatic dishwashers have also contributed to the reduction in the amount of time individuals spend preparing food (Cunningham-Sabo & Simons, 2012). Meals that used to require hours of cooking from scratch can now be prepared with the press of a few buttons. Increases in the prevalence of convenience foods and “smart” appliances have also influenced children’s perceptions of cooking – many children today think of cooking skills as the ability to follow instructions on a box as opposed to cooking meals from scratch (Lang & Caraher, 2001).

Individuals who have no cooking experience or skills have limited choices and control when it comes to food selection, and might be more likely to purchase easy to cook convenience foods that don’t require involved preparation (Lang & Caraher, 2001). Given this, it is not surprising that decreases in the amount of time Americans spend cooking have been related to increases in consumption of fast food and convenience foods.

**Americans’ Consumption of Away-From-Home Foods**

Increases in caloric intake by children between the 1970s and 2000s was associated with a 10.5% increase in the amount of food eaten away from home (Poti & Popkin, 2011). In 2007, the USDA found that on average, Americans were spending 49% of their food budgets and consuming 32% of their calories through away-from-home foods (Clauson & Leibtag, 2008). As of 2014, Americans now spend more than half of their food budgets on non-grocery items that are eaten away from home (USDA Economic Research Service, 2015). This is problematic because away-from-home foods tend to have more sodium, calories, and calories from fat, and less iron, fiber, and calcium than home-cooked foods (Condrasky & Hegler, 2010; Guthrie et al., 2002). Recent findings indicate that consumption of away-from-home foods is associated with decreased intake of vegetables, whole grains, and dairy, and increases in consumption of saturated fat and added sugar (Todd, Mancino, & Lin, 2010). Eating outside of the home is also associated with increased consumption of sugar, desserts, and soft drinks (Naska et al., 2015). Given that the societal decline in cooking skills and involvement has coincided with increases in consumption of unhealthy convenience and away-from-home foods, the next section will examine associations between cooking skills and behaviors and dietary intake patterns.

**Associations between Cooking Behaviors and Dietary Intake**

Involvement in food preparation, grocery shopping, and meal planning is related to healthier dietary intake starting in the preschool years (Metcalfe, Fiese, & STRONG Kids 1 Research Team, 2018). As children get older, their behavioral and motor capabilities mature, providing them with the skills
required to increase their involvement in cooking and food preparation. School aged children who participate in food preparation have stronger preferences for fruits and vegetables, greater self-efficacy for selecting healthy foods, and overall better diet quality than children who do not participate in food preparation (Chu et al., 2012, Chu et al., 2014; Quelly, 2018).

Similar associations have been found with adolescents, who also seem to benefit from involvement in cooking. In this age group, frequency of cooking behaviors is associated with increased likelihood of meeting Healthy People 2010 dietary objectives, lower intake of fat, and higher intake of fruits, vegetables, fiber, folate, and vitamin A, and better overall diet quality (Larson, Perry, et al. 2006; Quelly, 2018). Self-reported cooking skills are related to adherence to dietary guidelines as well as psychological wellbeing (Larson, Story, Eisenberg, & Neumark-Sztainer, 2006; Utter, Denny, Lucassen, & Dyson, 2016). Self-perceived cooking skills in young adulthood have also been found to predict healthier dietary intake and behaviors 10 years later in adulthood (Utter et al., 2016).

In addition to the benefits cooking appears to have for physical health, recent findings suggest that for adolescents, cooking skills are related to better mental health and stronger family relationships and connections (Utter et al., 2016). Recent study results indicate that food preparation behaviors tend to remain consistent as adolescents age and become young adults (Laska, Larson, Neumark-Sztainer, & Story, 2012), indicating that developing healthy cooking skills and habits in childhood can lead to increased involvement in food preparation and healthier outcomes in adulthood.

The healthier habits of individuals who frequently engage in cooking may even be related to improved long-term health and life expectancy – one study in Taiwan found that individuals who reported cooking frequently in fact lived longer than their counterparts who did not engage in frequent food preparation (Chen, Lee, Chang, & Wahlqvist, 2012). In conclusion, involvement in food preparation is related to positive outcomes – specifically healthier dietary intake – in both youth and adult populations. The next section will review potential mechanisms that explain why cooking behaviors are likely related to healthier dietary behaviors.

**Mechanisms Underlying Associations between Cooking and Healthy Dietary Intake**

In addition to the fact that home-cooked foods tend to be healthier, there are other mechanisms that can help explain the relationship between cooking behaviors and healthier dietary intake. The act of cooking in and of itself appears to promote intake of the foods cooked. In adults, preparing food has been linked to increases in both preferences for and intake of the food prepared (Dohle, Rall, & Siegrist, 2014). Recent study results also suggest that children will eat more of foods they have cooked themselves compared to the same food that someone else has cooked for them (DeJesus, Gelman, Herold, & Lumeng, 2018; van der Horst, Ferrage, & Rytz, 2014). These findings can be explained in part by a phenomenon called the IKEA effect – a broad notion in the field of behavioral economics that claims “labor alone can
be sufficient to induce greater liking for the fruits of one’s labor” (Norton, Mochon, & Ariely, 2011, p. 453). The IKEA effect purports that we prefer items that we have made ourselves over similar items made for us by others.

While this information provides some insight as to why children and adolescents would be more willing to consume foods they’ve cooked themselves during a culinary intervention, the IKEA effect can have both positive and negative effects on diet depending on which kinds of foods (healthy or unhealthy) children help cook. The findings outlined above support the idea that children should be encouraged to be involved in the preparation of healthy foods (that we would like them to increase their consumption of), while minimizing their culinary experiences with unhealthy foods. While the IKEA effect can be leveraged in hands-on cooking activities and intervention programs to encourage children to accept and consume healthy foods, it is not without its limitations. Though this notion suggests that hands-on cooking could have a strong influence on food preferences and consumption, it is not a comprehensive theory of behavior change and on its own does not provide an adequate theoretical framework for developing and evaluating culinary interventions.

The Importance of Hands-On Culinary Education

Children today are less likely to learn how to cook at home or at school than they were fifty years ago. Along with decreases in the time Americans spend cooking and the likelihood that children will learn cooking skills at home, recent years have also seen a precipitous decline in mandatory culinary education in the United States (Begley, 2016; Cunningham-Sabo & Simons, 2012; Lichtenstein & Ludwig, 2010). In the 1960’s, most home economics courses in public school were compulsory, at least for female students, and provided opportunities for adolescents to learn and practice hands-on cooking skills (Cunningham-Sabo & Simons, 2012). Today, this is no longer the case, and culinary education in public schools is often optional if it is provided at all.

When individuals learn the skills required to select, handle, and prepare healthy foods, a healthy diet becomes much more accessible and attainable (Lichtenstein & Ludwig, 2010; Metcalfe & Leonard, 2018). As adolescents get older and prepare to enter young adulthood, those who did not learn cooking skills in their youth will encounter greater challenges in attempting to follow a healthy diet because they will not have the skills required to prepare healthy meals (Fordyce-Voorham, 2011). Given that today, children and adolescents are less likely to learn cooking skills at home or in school, implementation of community-based hands-on cooking programs is warranted.

While culinary education programs do exist in the US, programs that provide opportunities for youth to engage in and practice hands-on cooking skills are less common. Many “culinary” or “cooking” education programs do not provide opportunities for participants to engage in hands-on cooking activities, and instead include *demonstrations* designed to teach individuals how to cook (Muzaffar, Metcalfe, &
Cooking is a behavior that must be learned, and usually can’t be executed based on pure knowledge without any experience, especially in the case of children who have a harder time applying abstract concepts without concrete experiences (Hoffinger, 2016). In addition to this practical rationale indicating that demonstration-only culinary education should be a less effective way to teach culinary skills, principles from Social Cognitive Theory also support the use of hands-on culinary education.

**Theoretical Rationale: Social Cognitive Theory**

Social Cognitive Theory (SCT; Bandura, 1986, 1989) is a widely used theory with a substantial evidence base whose principles suggest that hands-on culinary education should be an effective way to encourage healthy eating and increases in cooking behaviors in children and adolescents. SCT has been used extensively in the field of health promotion and education, and there is substantial evidence that constructs within this theory are associated with changes in health behaviors such as physical activity, smoking, and dietary intake (Armitage & Conner, 2000; Luszczynska & Schwarzer, 2005).

The central component in SCT is the notion of triadic reciprocal determinism. This concept, sometimes called the “model of causation” of SCT, outlines relationships between personal factors, behavioral factors, and environmental factors (Bandura, 1989). The constructs within Bandura’s model of triadic reciprocal determinism are represented by the following symbols: $P$ represents personal factors, $B$ represents behavioral factors, and $E$ represents environmental factors. Bandura’s (1986) model of causation incorporates reciprocal relationships between each construct, with bidirectional influences between $P \leftrightarrow B$, $E \leftrightarrow P$, and $B \leftrightarrow E$. Each component from this model of causation can be addressed and influenced by participation in hands-on culinary education programs (see Figure 1 for theoretical model).

**Figure 1. Theoretical Model – Social Cognitive Theory**
**Behavioral factors.** Behavioral factors include behavioral capacities (intellectual and physical skills), perceptions about behavioral capacities (self-efficacy), and behavior itself (Schunk & Usher, 2012). Hands-on culinary interventions have the potential to positively influence each of these components.

**Self-efficacy.** Self-efficacy is one of the most common constructs assessed by nutrition and health education programs, and evidence indicates that it is the strongest SCT predictor of dietary behavior change (Armitage & Conner, 2000; Contento, Randell, & Basch, 2002). The notion of self-efficacy describes an individual’s confidence in their ability to carry out a specific behavior (Armitage & Conner, 2000; Bandura, 2004). SCT suggest that hands-on cooking programs have the potential to result in greater increases in cooking self-efficacy than demonstration-based cooking programs because they allow participants to engage in mastery experiences.

**Vicarious and mastery experiences.** SCT outlines several types of experiences that can positively influence self-efficacy. Of particular relevance to hands-on cooking programs are mastery experiences, which allow individuals to actually practice behaviors (McAlister, Perry, & Parcel, 2008). These differ from vicarious experiences, which are instances of observational learning (McAlister et al., 2008) that are more common in traditional demonstration-based nutrition education. Many claim that mastery experiences have a stronger positive influence on self-efficacy because they provide an individual with concrete evidence of their personal competence and ability to succeed (Bandura, 1997; Luszczynska & Schwarzer, 2005). These notions from SCT provide theoretical support for the unique opportunities that exist in hands-on cooking programs for participants to engage in mastery experiences that are not included in traditional demonstration-based nutrition education.

**Skills.** Another behavioral factor that is highly relevant in hands-on culinary education are culinary skills themselves. Skills refer to the behavioral and intellectual capabilities of an individual (Luszczynska & Schwarzer, 2005). SCT posits that skills are particularly relevant to complex health behaviors like cooking that cannot be executed based on knowledge alone (McAlister et al., 2008). While the preparation of unhealthy convenience foods often does not require cooking skills, broadening individuals’ repertoire of cooking abilities can result in increases in cooking behaviors and healthier diets (Caraher & Lang, 1999).

Some claim a limitation of SCT is that skills, and the relationships between knowledge, goals, and behavior, are largely underemphasized. While SCT includes skills as behavioral factors within its model of causation, applications of the theory often overemphasize self-efficacy and fail to attend to the development of behavioral capacities themselves (Armitage & Conner, 2000). When it comes to health behaviors that required learned skills (like cooking), self-efficacy is not enough to translate knowledge into action. Knowledge and self-efficacy alone will not result in successful cooking because learning
cooking skills themselves is a prerequisite for engaging in cooking as a behavior. In developing theoretically sound interventions based on SCT, it is crucial to attend to both behavioral capacities like skills and motivational factors like self-efficacy.

**Personal factors.** Personal factors include an individual’s cognitions, beliefs, and emotions, as well as any personal biological or genetic influences (McAlister et al., 2008). Among the personal factors outlined by Bandura’s theory, individual attitudes and preferences are of particular importance in hands-on cooking programs.

**Attitudes.** Attitudes refer to an individuals’ tendency to think and respond positively or negatively towards specific objects, ideas, experiences, and people. Attitudes have a strong influence on individuals’ willingness to learn about or engage in a behavior (like cooking) in the first place (Luszczynska & Schwarzer, 2005). Attitudes about cooking have been associated with other predictors that are commonly used in evaluation of nutrition programs like self-efficacy and preferences (Contento, 2007). Children’s preconceived notions and positive or negative attitudes towards cooking can have a strong influence on their willingness to participate in culinary interventions in the first place. Attitudes also influence how receptive participants are to experiences that can teach them new cooking skills and increase their self-efficacy. Like attitudes, preferences are another personal factor within Bandura’s model that have particular relevance to hands-on cooking programs.

**Preferences.** Preferences describe individuals’ tendencies to favor, choose, or value certain objects, people, or experiences compared to alternatives (Bandura, 1989). Food preferences specifically play a strong role in both dietary behaviors (Patrick & Nicklas, 2005) and motivation to learn to cook certain foods and recipes (that are and are not preferred) (Holsten, Deatrick, Kumanyika, Pinto-Martin, & Compher, 2012). Past culinary and nutrition education programs have had some success in positively altering participants’ food preferences, but few programs assess preferences as part of a larger theoretical framework or in conjunction with other key SCT constructs (Contento et al., 2002).

**Environmental factors.** Environmental factors in Bandura’s model include contextual influences like social norms, access (to things like healthy foods), social support, and other circumstantial facilitators and barriers to behavior change (Bandura, 1986). SCT posits that all of these environmental factors can help or hinder individual behavior change, and suggests that intervention programs attend carefully to the context in which they take place (Luszczynska & Schwarzer, 2005). In this way, SCT supports the notion that interventions should be tailored to attend to the social and physical environment that participants exist and behave in.

These social and physical contexts in which people live can include a vast number of factors that influence individual health behaviors. Examples of environmental factors relevant to cooking and dietary behaviors include access to healthy foods, affordability of healthy foods, access to cooking equipment,
and social and cultural norms about cooking and eating. Social norms can be especially influential when it comes to gender, as most societies discourage cooking in boys and encourage cooking in girls (Inness, 2001a).

While some researchers criticize SCT by claiming that it does not attend to contextual factors, the problem is more likely in the way that SCT is interpreted and applied. Since SCT can be broad in its definition of concepts and overambitious in its goal of predicting virtually all human behavior, it can be difficult for researchers to apply the theory in full (McAlister et al., 2008). The broad nature of SCT can create challenges in the areas of program design and program delivery for researchers seeking to utilize the theory to understand the influence of environmental factors. Despite the challenges researchers have encountered in attempting to address environmental influences in SCT-based interventions, attending to these contextual factors is crucial for those programs that seek to intervene in a way that accounts for environmental facilitators and barriers to behavior change.

**Applicability of SCT with youth audiences.** While SCT is a commonly used and cited theory of health behavior change, scant literature exists that specifically evaluates the applicability of SCT in youth audiences. Given the lack of theoretical literature assessing the relevance of SCT constructs in youth, empirical articles that utilize SCT with children and adolescents must be evaluated. Examples of studies with youth that have developed or used valid and reliable scales for SCT constructs like self-efficacy, outcome expectations, social support, and preferences indicate that these constructs can be relevant, measurable, and reliable even with younger audiences (Branscum & Sharma, 2011; Lohse, Cunningham-Sabo, Walters, & Stacey, 2011; Ramirez, Kulinna, & Cothran, 2012). Studies that have examined SCT constructs have also found that they are in fact predictive of nutritional behaviors and intervention effects, indicating that the model of causation in SCT is not invalid in youth audiences (Branscum & Sharma, 2011; Cunningham-Sabo & Lohse, 2013). The existence of studies with measures of SCT constructs that are valid and reliable for youth, and predictive of health behaviors and program outcomes does not however mean that all instances in which SCT is used with children and adolescents are implemented using age-appropriate methods.

Though it seems clear that constructs like self-efficacy and preferences do in fact exist in children and adolescents, this does not mean that they can be measured in the same way they would with adults. The techniques used to assess SCT constructs are key in determining whether study methods are developmentally appropriate. Though the literature suggests that the main constructs included in SCT are valid in children and adolescents, careful attention needs to be paid to the developmental level of participants when evaluation methods are developed. These issues are of particular relevance with survey-based research, which is very common in nutrition education programs with youth (Contento et al., 2002). Surveys developed to assess SCT constructs in youth audiences must carefully attend to the reading and
cognitive skills of participants, as well as children’s shorter attention spans (Bell, 2007). Careful consideration must be given to question length and wording, the number and order of response options, and the overall complexity of the language and instructions (Bell, 2007). The current study and evaluation methods were designed to be appropriate for the developmental level of participants, and were pilot tested with youth that were the same age as program participants.

In conclusion, SCT provides a strong theoretical framework for use in the development and evaluation of culinary interventions. Principles from SCT suggest that hands-on cooking programs have their effect through increasing self-efficacy, positive attitudes, skill building, and preferences for healthy foods. To assess the utility of SCT as a theoretical basis for culinary interventions, it is necessary to design evaluations that assess SCT components and relationships between these factors. In designing culinary interventions theoretically based in SCT, it is crucial to attend to these potential drivers of behavior change (self-efficacy, skills, attitudes, and preferences) both in curriculum development and evaluation methods. The next section will review current evidence regarding the importance of implementing, scaling up, and evaluating interventions that demonstrate efficacy in more controlled settings.

**Implementation Science and Scaling Up Interventions**

Whereas evaluations of most hands-on culinary programs have been limited by not fully applying strong theoretical frameworks, they have also been limited by focusing on small scale single site evaluations. While a small number of rigorously conducted evaluations of culinary programs do exist (for an example see Liquori, Koch, Contento, & Castle, 1998), they are usually conducted with small samples in tightly controlled research settings. Though understanding the outcomes of strictly implemented randomized controlled trials is valuable, assessing whether nutrition education programs are effective when they are widely disseminated in real world settings provides important information about the broader impact of these scaled-up programs. Nutrition and culinary education programs that are implemented on a small scale are unlikely to have a positive impact on public health if they are only effective in narrow, controlled research environments (Klingner, Boardman, & McMaster, 2013). In order to have long term and large-scale impact it is important to examine how theoretically informed principles can be applied to hands-on culinary education in a wide variety of real-world settings.

Literature from the field of implementation science provides strong support for efforts to scale up, disseminate, and implement evidence-based interventions on a large scale (Fixsen, Blase, Metz, & Van Dyke, 2013; Glasgow et al., 2012; Gottfredson et al., 2015; Klingner et al., 2013; Norton, McCannon, Schall, & Mittman, 2012). Intervention programs are most impactful when they “produce benefits to individuals on a socially meaningful scale” (Fixsen et al., 2013, p. 213). When interventions fail to scale up and disseminate programs that have proven efficacy, this results in inconsistencies between research
and practice (Klingner et al., 2013). These inconsistencies can have harmful effects for individuals who do not receive the best possible interventions because they have not been scaled up and implemented widely. Many experts also claim that the potential return on investment for dissemination and implementation studies far outstrips the return on investment for new programs because the development of new programs from scratch requires much more time and resources and reaches much smaller audiences (Glasgow et al., 2012).

Along with the importance of scaling-up evidence based interventions, it is also crucial to evaluate them to ensure that programs which are implemented and disseminated widely are still effective in varied settings across multiple samples (Klingner et al., 2013). Assessing the effectiveness of hands-on culinary programs is especially important, since these experiential programs demand more time and resources than traditional lecture-based nutrition education. Given the intense competition for limited amounts of federal funding for nutrition education programs, evaluating the effectiveness of scaled up programs is especially crucial to ensure that outreach funding is being used to its maximum potential.

While comprehensive evaluations of scaled up interventions are rare, the use of these methods with theoretically grounded interventions is even less common. To truly assess the efficacy of hands-on culinary education as a means to improve children’s diets, it is necessary to evaluate interventions with the greatest potential for positive impact. Ultimately, we must assess programs that have been scaled up, implemented, disseminated, and rigorously evaluated across a variety of settings and samples and have a solid theoretical framework. Well-designed interventions that incorporate all of these characteristics are uncommon, but this proposal will attempt to address this limitation in the literature by scaling-up, disseminating, and rigorously evaluating a program with a strong theoretical grounding in SCT. The next section will review limitations in current research evaluating youth cooking programs.

**Limitations of Current Research Evaluating Youth Cooking Programs**

Though youth cooking programs have been implemented throughout the United States (Hersch, Perdue, Ambroz, & Boucher, 2014; Michaud et al., 2007; Muzaffar et al., 2018), there are some key limitations in the current research and literature about hands-on culinary programs for youth that will be addressed by the study outlined in this proposal.

**Failure to use theoretical frameworks to inform interventions.** Abundant evidence indicates that interventions with explicit theoretical foundations are more effective than those not grounded in theory (Glanz & Bishop, 2010). By targeting causal determinants of behavior (and behavior change), interventionists are able to leverage theory to make their programs more effective (Michie, Fixsen, Grimshaw, & Eccles, 2009).

In one comprehensive review of the use of theory in dissemination and implementation of interventions, researchers found that only 22.5% of studies claimed to be informed by a theoretical
framework (Davies, Walker, & Grimshaw, 2010). Of those studies, 74% used theory in a way that the authors claimed had “some conceptual bias,” meaning that only 6% of the 235 studies reviewed fully utilized a theoretical framework (Davies et al., 2010). Most hands-on culinary interventions are not theoretically based – and many that claim to be in fact do not fully incorporate theoretical constructs or do so inaccurately (Muzaffar et al., 2018).

Even in scenarios in which interventions claim a theoretical basis, many researchers lament that these programs often do not utilize behavior change theories in the full form, and lack theoretical fidelity (Michaud et al., 2007). When theoretical constructs are misinterpreted by researchers during program development, resulting techniques to measure these constructs are likely to have poor construct and content validity (Luszczynska & Schwarzer, 2005). Additionally, when theoretical constructs are not accurately translated into intervention components and measurement techniques, evaluations of the efficacy of the theory become invalid (Armitage & Conner, 2000).

Often, theoretical frameworks are used to inform one component of an intervention, but not others (i.e., theory is used to inform the program evaluation but not the curriculum). Davies and colleagues (2010) found that theory was most frequently used during the intervention design phase (74% of “theory-based” interventions), while theories were used to inform program evaluation (10.6%) and analyses and explain results (16.6%) much less frequently. The research outlined in this proposal seeks to address this common issue in hands-on culinary education by accurately incorporating Social Cognitive Theory (SCT) constructs in both curriculum development and evaluation methods.

**Failure to evaluate cooking skills.** Culinary and nutrition researchers acknowledge that the unique contribution of hands-on cooking programs is that they allow participants to learn tangible cooking skills, as well as improve their knowledge, attitudes, and self-efficacy about healthy cooking and eating (Hoffinger, 2016). According to principles from SCT, the development of cooking skills during hands-on culinary interventions could be the mechanism that helps participants translate knowledge about healthy eating into action, and incorporate healthy cooking and eating into their lives post-intervention. Though knowledge about dietary intake is helpful in guiding individuals to make healthy choices, information about which foods are healthy is not enough to induce dietary behavior change (Armitage & Conner, 2000).

Rimal (2000) refers to the knowledge-behavior gap in interventions, claiming that motivational factors (like self-efficacy) are necessary to motivate individuals to use new knowledge to change their health behaviors. When it comes to health behaviors that require learned skills (like cooking) however, improvements in self-efficacy do not directly translate knowledge about healthy cooking into action, since having actual cooking skills is necessary to engage in cooking as a behavior. Though self-efficacy is key to whether a person attempts a behavior change, skills exert a strong influence on a person’s actual ability.
to engage in certain actions and behaviors. The predictive utility of a theory is a key criterion for
evaluation, and without explicit incorporation (and measurement of) skills, it will not be possible to
accurately predict an individual’s success in adopting healthy cooking and dietary behaviors.

Unfortunately, no culinary or nutrition interventions to date have accurately assessed changes in hands-on
cooking skills – the key mechanism by which hands-on cooking programs likely confer benefits.

The assessment of skills presents a difficult challenge for developers of hands-on culinary
education programs – it seems clear that skills may be the missing link between motivational constructs
and behavior – but they cannot be accurately measured without practical hands-on tests that assess
participants’ cooking abilities. Quizzing students on aspects of cooking techniques will assess their
knowledge of cooking skills, not their ability to physically perform them. Survey questions about whether
students believe they can perform certain skills measure self-efficacy, not ability.

Several recent studies claimed to measure skills through questionnaire-based methods, but instead
measured participants’ perceptions of their skills (Caraher, Seeley, Wu, & Lloyd, 2013; Fulkerson et al.,
2010; Thomas & Irwin, 2011; Thonney & Bisogni, 2006), indicating that this common method used to
assess skills that has strong limitations. This use of self-report surveys to assess cooking skills in many
intervention evaluations are particularly problematic in programs with youth, since children and
adolescents are more likely to over-estimate their abilities than adults (Schneider, 1998).

**Failure to attend to demographic influences.** SCT posits that environmental factors interact
with personal and behavioral factors to influence an individual’s choices and actions (Bandura, 1986).
SCT has been criticized for not placing enough emphasis on contextual factors that influence behavior,
largely because the concept of environmental influences is broadly defined in this theory and therefore
difficult to apply. When researchers develop interventions based on SCT, they should attend to
demographic and contextual influences and acknowledge that these programs exist within a broader
environmental context.

Demographic factors, specifically socioeconomic status (SES) and gender, are known to have
strong influences on cooking and dietary behaviors. Most culinary education programs fail to attend to the
influence of gender and SES, both in their curriculum design and their evaluation methods.

**Socioeconomic status (SES).** Socioeconomic status is associated with cooking and dietary
behaviors, as those individuals with the lowest incomes also tend to have the least healthy diets
(Kirkpatrick, Dodd, Reedy, & Krebs-Smith, 2012). This may be in part because individuals of low-SES
have seen greater declines in time spent cooking in recent decades than any other economic class (Smith
et al., 2013). Lower-SES families experience even greater barriers to home cooking than their wealthier
counterparts, as they are more likely to work multiple jobs and have less flexibility in their work
schedules, leaving less time for cooking at home (Begley, 2016). Recent study results indicate that individuals who work longer hours spend less time cooking and eating (Hamrick et al., 2011).

In addition, low-SES families encounter challenges in accessing healthy foods, which are definitively more expensive than less healthy, calorie-dense convenience foods (Darmon & Drewnowski, 2015). Recent study findings even suggest that food budgets in low-SES households generally are not adequate to allow these families to purchase the foods required for a healthy diet (Darmon & Drewnowski, 2015). Furthermore, more advantaged families are also more likely to own kitchen gadgets and appliances (like pressure cookers or other “smart” appliances) that make cooking easier or less time consuming, “allowing those with minimal cooking skills to prepare dishes or entire meals with the push of a button” (Lichtenstein & Ludwig, 2010, p. 1857). Many large-scale nutrition education interventions are implemented with low-income audiences, but many of these programs do not account for the specific challenges and barriers encountered by individuals of low-SES (Lang, Caraher, Dixon, & Carr-Hill, 1999).

While children belonging to lower-SES families may be particularly vulnerable to unhealthy dietary intake, and therefore could experience greater benefits from participating in hands-on cooking programs, it is crucial to tailor interventions appropriately when targeting these populations. It is also important for curriculum developers to take into account cultural influences on diet that may vary across different low-income communities. Interventions that are developed without attention to context and motivating factors run the risk of placing individuals at a further disadvantage by teaching cooking skills or recipes that are not practically or culturally appropriate for low-resource audiences (Lang & Caraher, 2001). Effectively adapted cooking programs should use readily available and inexpensive ingredients, avoid the use of expensive cooking appliances and gadgets, ensure that recipes and ingredients used are culturally appropriate, and provide participants with tips for cooking with limited time and resources.

**Gender.** Gender also has a well-documented influence on cooking behaviors, attitudes, and skills. Though Bandura acknowledges the importance of gender and the influence that social norms and expectations have on boys and girls (Bussey & Bandura, 1999), few interventions grounded in SCT attend to this key demographic factor. Gender differences in regard to cooking are well documented (Inness, 2001b), and can be traced back to environmental influences and social pressures. It should be noted that gender differences in cooking skills and behaviors are likely not caused by gender itself, but instead due to gender differences in the ways that boys and girls are socialized when it comes to cooking, and the frequency with which each gender is exposed to cooking experiences that help them learn culinary skills. Females are not inherently better at cooking than males are, but social norms encourage girls to spend more time cooking and have more cooking experiences, leading to increased cooking behaviors, skills, and confidence compared to boys.
In younger audiences, boys are more likely than girls to have low levels of involvement with food and cooking (Metcalfe et al., 2018). Societal expectations and gender norms have a strong influence on the cooking behaviors and attitudes of children, who learn at a young age that they are expected to be good at cooking (for girls) or that they are not (for boys) (Inness, 2001a, 2001b). As a result of these gender norms, boys generally grow up with less exposure to and experiences with cooking than girls, and as a result, have decreased interest and confidence when it comes to cooking (Inness, 2001b). As they get older, women continue to cook more frequently than men and have greater confidence in their cooking abilities (Lang et al., 1999).

While gender differences in program outcomes have been documented (Cunningham-Sabo & Lohse, 2014), most evaluations of culinary education programs do not attend to potential gender effects in their analyses. Evaluations of culinary interventions can either control for gender in the analyses to ensure that program outcomes persist above and beyond gender effects, or assess differences in program outcomes for boys and girls. Neither of these evaluation approaches are common, indicating that gender effects may be confounding reported results of culinary program evaluations.

**Issues in study design.** Though cooking programs for children and adolescents are not uncommon (Brooks & Begley, 2014; Hersch et al., 2014; Michaud et al., 2007), study design varies greatly between programs (Contento et al., 2002; Muzaffar et al., 2018). Some culinary programs do not evaluate outcomes or program impacts at all, and for those that do conduct evaluations, this research is often not very rigorous and has several common limitations in study design (Muzaffar et al., 2018).

**Sampling bias.** One common limitation of culinary program evaluations is the use of non-representative subsamples of intervention populations to assess program outcomes. Though a few large-scale hands-on cooking interventions exist (i.e., iCook, Cooking with Kids), they often report and publish outcome evaluation data for a small subset of intervention participants (Cunningham-Sabo & Lohse, 2013; Miller et al., 2016). When researchers choose a small or non-representative subset of participants or sites to collect data from (or publish data on), these selections introduce bias as they are often impacted by factors like accessibility, relationships with site partners, logistics, and geography. Though data collection with small subsets of an intervention population may be warranted when testing the feasibility of new evaluation methods, when using established evaluation methods like pre- and post-intervention surveys, efforts should be made to assess outcomes in a large, representative sample when possible.

**Pre-post design issues.** Though experts agree that measures that assess targeted intervention outcomes both before (pre-intervention) and after (post-intervention) an intervention takes place yield the strongest evidence about program outcomes, many culinary education programs assess program outcomes by only collecting data post-intervention (i.e., Aumann et al., 1999; Clark & Foote, 2004; Walters & Stacey, 2009). For these programs that only measure behaviors and attitudes at post-test, it is impossible
to assess changes that occur as a result of program participation, and therefore difficult to attribute any positive findings about dietary attitudes and behaviors to intervention effects. To truly assess whether hands-on culinary programs are resulting in changes in participants’ cooking skills, behaviors, and attitudes, it is crucial to employ more rigorous pre- and post-intervention study designs.

In conclusion, though many researchers agree that culinary education programs are an important way to combat unhealthy dietary intake in children, several limitations remain in the culinary interventions literature. The majority of hands-on cooking programs have not been developed based on explicit theoretical frameworks, fail to assess cooking skills, do not attend to demographic influences, and have limitations in study design. This dissertation project aimed to address these limitations in the literature on culinary programs by developing and rigorously evaluating a statewide hands-on culinary education program for youth by applying a theoretically based lens to the learning of cooking skills.
Chapter Three: The Illinois Junior Chefs Program

The Illinois Junior Chefs (IJC) program was developed to address issues of unhealthy dietary intake and lack of cooking skills and behaviors in youth. IJC is a five-lesson, hands-on culinary education program for children and adolescents aged 8-13 delivered through the University of Illinois Office of Extension and Outreach. This program has existed in some form since 2013, and continues to expand its reach and dissemination every year. During the summer of 2016, the first version of the IJC survey was used for data collection with the program, and findings from the 2016 implementation of IJC were used to inform this dissertation (2017 implementation of IJC). Findings from 2016 which are relevant to the current study are discussed below.

Findings from 2016 implementation. The IJC Program was evaluated during the summer of 2016 through pre- and post-intervention surveys. These findings from the IJC 2016 implementation were used to inform 2017 curriculum modifications, research questions, and data collection, but will not be included as part of the data analyses for this dissertation project.

Overall program impact. Analyses to assess the outcomes and impact of the 2016 IJC Program were conducted using paired samples t-tests. These analyses indicated that in 2016, IJC participants experienced significant increases in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors (see Table 1; Metcalfe, Emberton, Liu, Fiese, & McCaffrey, 2017; Metcalfe, Fiese, Liu, Emberton & McCaffrey, 2017; Metcalfe & McCaffrey, 2016). Participants did not experience significant changes in their healthy eating behaviors, which is not surprising given the short duration of the program (5 lessons). Changes in eating behaviors are a longer-term outcome and should not be expected to change during this program (typically delivered over the course of one week).

Table 1. Paired T-Tests for 2016 IJC Pre- and Post-Test Survey Scores

<table>
<thead>
<tr>
<th></th>
<th>Mean Survey Score</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Test</td>
<td>Post-Test</td>
<td>t</td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>Cooking Self-Efficacy</td>
<td>3.50</td>
<td>3.70</td>
<td>16.33</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Cooking Attitudes</td>
<td>3.65</td>
<td>3.76</td>
<td>9.13</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>3.28</td>
<td>3.33</td>
<td>3.91</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Cooking Behaviors</td>
<td>2.35</td>
<td>2.44</td>
<td>4.48</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Healthy Eating Behaviors</td>
<td>2.87</td>
<td>2.85</td>
<td>-0.90</td>
<td>.369</td>
<td></td>
</tr>
</tbody>
</table>

18
These findings indicated that participants had high average scores on IJC survey subscales, which may reflect a ceiling effect. These high baseline scores make it challenging for some participants to make large improvements from pre- to post-intervention. High scores at baseline could indicate that participants may have already had high confidence and positive attitudes regarding a lot of the specific cooking skills included in the 2016 IJC Program. These high confidence levels and positive attitudes informed curriculum changes in 2017, which included the introduction of new skills into the IJC curriculum with the hopes of giving participants more room to learn and improve as a result of the program. These new skills (e.g., using a peeler, using a grater) were designed to be more challenging, and were introduced with the intent of incorporating more cooking skills that participants would be less likely to have experience with at baseline. By incorporating additional more challenging cooking skills, the curriculum was refined to give participants (even those with prior cooking experience) increased opportunities to demonstrate significant program effects.

**Survey refinement.** The 2016 IJC survey included subscales for cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors (Metcalfe, Fiese et al., 2017; see Table 2 for subscale descriptions). Before 2017 program implementation, the IJC research team made several changes to refine the IJC survey (Metcalfe, Fiese & McCaffrey, 2017). Factor analyses were conducted to identify survey subscale questions that were not loading well with other questions in that subscale. Questions with factor loadings less than .40 were targeted for deletion. An expert panel (including specialists in public health, nutrition, human development, and program evaluation) also assessed the 2016 survey using content analyses to identify survey questions that were no longer relevant given the changes made to the 2017 IJC curriculum. The expert panel also developed several new questions for the 2017 survey based on the new skills and activities that were added to the program for this year’s implementation (e.g., using a peeler, cooking with spices). The IJC survey development and refinement process is not part of this dissertation study, and therefore will not be discussed further.
### Table 2. Illinois Junior Chefs 2016 Survey Subscales

<table>
<thead>
<tr>
<th>Survey Subscale</th>
<th>Description</th>
<th>Number of Items</th>
<th>Internal Consistency (Cronbach’s α 2016)</th>
<th>Answer Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cooking Self-Efficacy</strong></td>
<td>Questions ask if students think they are able to make healthy meals and snacks and perform certain cooking skills.</td>
<td>17</td>
<td>PRE α = .789 1 = “NO! Not at all” 2 = “No, maybe not” 3 = “Yes, maybe” 4 = “YES! For sure”</td>
<td>POST α = .857</td>
</tr>
<tr>
<td><strong>Cooking Attitudes</strong></td>
<td>Questions ask about students’ attitudes towards certain cooking activities, and cooking with friends and family.</td>
<td>6</td>
<td>PRE α = .753 1 = “I really don’t like to do this” 2 = “I don’t like to do this” 3 = “I kind of like to do this” 4 = “I really like to do this”</td>
<td>POST α = .780</td>
</tr>
<tr>
<td><strong>Fruit &amp; Vegetable Preferences</strong></td>
<td>Questions ask about students’ preferences for six fruits and vegetables that are used in most IJC lesson recipes.</td>
<td>6</td>
<td>PRE α = .532 1 = “I really don’t like this food” 2 = “I don’t like this food” 3 = “I kind of like this food” 4 = “I really like this food”</td>
<td>POST α = .603</td>
</tr>
<tr>
<td><strong>Cooking Behaviors</strong></td>
<td>Questions ask how often students engage in cooking behaviors in a typical week.</td>
<td>3</td>
<td>PRE α = .604 1 = “Never or almost never (0 days a week)” 2 = “Some days (1-3 days a week)” 3 = “Most days (4-6 days a week)” 4 = “Every day (7 days a week)”</td>
<td>POST α = .686</td>
</tr>
<tr>
<td><strong>Healthy Eating Behaviors</strong></td>
<td>Questions ask how often students eat healthy foods in a typical week.</td>
<td>4</td>
<td>PRE α = .662 1 = “Never or almost never (0 days a week)” 2 = “Some days (1-3 days a week)” 3 = “Most days (4-6 days a week)” 4 = “Every day (7 days a week)”</td>
<td>POST α = .733</td>
</tr>
</tbody>
</table>

**Gender differences.** Analyses of 2016 IJC survey data also assessed gender differences between male and female participants. Independent samples t-tests were used to assess gender differences among baseline, post-intervention, and pre- to post-intervention changes in survey scores. At baseline, female participants had higher scores on all survey subscales, with significantly higher scores than male participants in cooking self-efficacy, cooking attitudes, and cooking behaviors (see Table 3). Immediately post-intervention, there were no longer significant differences between males and females in fruit and vegetable preferences (see Table 3). Though female participants still had significantly higher scores than males on cooking self-efficacy, cooking attitudes, healthy eating behaviors, and cooking behaviors, the magnitude of the differences between males and females decreased from baseline to post-intervention (see Table 3).
Independent samples t-tests were also used to determine whether pre- to post-intervention changes in IJC survey scores were greater for male or female participants. These analyses indicated that male participants experienced greater improvements from baseline to post-intervention on all survey subscales, with significantly greater improvements than females in cooking attitudes (see Table 3).

Table 3. Independent Samples T-Tests Assessing Gender Differences in 2016 IJC Survey

<table>
<thead>
<tr>
<th></th>
<th>Mean Survey Score</th>
<th></th>
<th></th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pre-Intervention Survey Scores</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooking Self-Efficacy</td>
<td>3.58</td>
<td>3.39</td>
<td>6.17</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>3.30</td>
<td>3.27</td>
<td>0.81</td>
<td>.417</td>
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<tr>
<td>Cooking Attitudes</td>
<td>3.74</td>
<td>3.51</td>
<td>7.59</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Cooking Behaviors</td>
<td>2.46</td>
<td>2.16</td>
<td>6.52</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Healthy Eating Behaviors</td>
<td>2.93</td>
<td>2.76</td>
<td>4.01</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td><strong>Post-Intervention Survey Scores</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooking Self-Efficacy</td>
<td>3.76</td>
<td>3.61</td>
<td>5.48</td>
<td>&lt; .001</td>
<td></td>
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<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>3.34</td>
<td>3.33</td>
<td>0.20</td>
<td>.842</td>
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<td>Cooking Attitudes</td>
<td>3.83</td>
<td>3.66</td>
<td>6.22</td>
<td>&lt; .001</td>
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<tr>
<td>Cooking Behaviors</td>
<td>2.92</td>
<td>2.76</td>
<td>5.26</td>
<td>&lt; .001</td>
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<tr>
<td>Healthy Eating Behaviors</td>
<td>2.55</td>
<td>2.29</td>
<td>3.50</td>
<td>&lt; .001</td>
<td></td>
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<tr>
<td><strong>Pre- to Post-Test Changes</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Cooking Self-Efficacy</td>
<td>0.18</td>
<td>0.23</td>
<td>1.76</td>
<td>.079</td>
<td></td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>0.04</td>
<td>0.06</td>
<td>0.82</td>
<td>.432</td>
<td></td>
</tr>
<tr>
<td>Cooking Attitudes</td>
<td>0.09</td>
<td>0.15</td>
<td>2.06</td>
<td>.039</td>
<td></td>
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<tr>
<td>Cooking Behaviors</td>
<td>0.08</td>
<td>0.12</td>
<td>0.77</td>
<td>.444</td>
<td></td>
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<tr>
<td>Healthy Eating Behaviors</td>
<td>-0.02</td>
<td>-0.02</td>
<td>-0.09</td>
<td>.931</td>
<td></td>
</tr>
</tbody>
</table>

**Implementation.** Program implementation was examined through the collection of data from instructors about program delivery and implementation. Instructors self-reported the structure of classes (5 consecutive days vs. non-consecutive days), whether they were assisted by teen teachers, number of hours of programming delivered, and the activities that they were and were not able to complete for each lesson. After performing exploratory analyses with 2016 data (Liu, Metcalfe, Emberton, Fiese, & McCaffrey, 2017), the following implementation variables of interest were selected for further analyses in 2017 data: lesson structure (consecutive vs. non-consecutive classes), use of teen teachers, and hours of IJC programming delivered. These implementation variables were selected because they vary widely between different IJC sites and could be related to program outcomes. The next section will review the current study (which occurred during 2017 IJC implementation) and research objectives.
Chapter Four: The Current Study and Research Objectives

This dissertation study sought to address concerns about unhealthy dietary intake among American children by designing, implementing, and evaluating a hands-on cooking program for children and adolescents. The Illinois Junior Chefs (IJC) program is a statewide hands-on culinary education program delivered by the University of Illinois Office of Extension and Outreach. This program has been implemented and refined yearly since 2013, and has been evaluated using a variety of methods (Jarick, Muzaffar, & McCaffrey, 2015; Metcalfe, Fiese, Liu, Emberton, & McCaffrey, 2018; Metcalfe & McCaffrey, 2016). The curriculum development and evaluation methods outlined below attempted to address the aforementioned limitations in current literature on hands-on culinary education programs for children and adolescents by collecting survey data from a large representative sample IJC participants, fully incorporating SCT concepts, accounting for expected gender differences in outcome evaluation data analysis, and assessing skills through a hands-on testing protocol.

The current study assessed the effectiveness of the Illinois Junior Chefs Program through pre- and post-intervention surveys and an observational assessment of hands-on cooking skills. The influence of gender, program structure, assistance from teen teachers, and hours of programming were also investigated. The objectives of this study were to investigate program outcomes through surveys and observational assessments, investigate gender effects on program outcomes, and investigate implementation effects on program outcomes. Three main research questions were developed to address these study objectives.

**Research Question 1A.** Do participants in IJC experience 1) significant positive changes from pre- to post-intervention in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors as measured by the IJC survey, and 2) do these program outcomes differ by gender?

**Hypothesis 1A.** It was hypothesized that participants’ cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors would increase significantly between baseline and immediately post-intervention, as measured by the IJC survey. Healthy eating behaviors were not expected to increase significantly (data from 2016 supports this hypothesis; Metcalfe et al., 2017), given that changes in eating behaviors are long-term outcomes that were not expected to change significantly during this short, five-lesson program. Additionally, it was hypothesized that male participants would have stronger program outcomes (pre- to post-test changes in IJC survey scores) than female participants. Time (pre to post) by gender interactions were not expected to be significant.

**Research Question 1B.** Do female participants and male participants (analyzed separately) both experience significant positive changes from pre- to post-intervention in cooking self-efficacy, cooking
attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors as measured by the IJC survey?

**Hypothesis 1B.** It was hypothesized that female and male participants would both experience significant improvements in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors, from pre-test to post-test, as measured by the IJC survey.

**Research Question 2A.** Is it feasible to measure youth IJC participants’ cooking skills (measuring ingredients, using different mixing techniques, using a grater, using a peeler, and cracking eggs) through a pre- and post-intervention hands-on skills testing protocol?

**Hypothesis 2A.** It was hypothesized that implementing a hands-on skills testing protocol would be a feasible way to assess participants’ hands-on cooking skills.

**Research Question 2B.** Does participation in the Illinois Junior Chefs Program result in significant positive changes in the following hands-on cooking skills: measuring (water, sugar, flour), using different mixing techniques (stir, beat, fold), using a grater, using a peeler, and cracking eggs (as measured by the IJC hands-on skills testing protocol)?

**Hypothesis 2B.** It was hypothesized that that participants’ ability to measure ingredients (water, sugar, flour), use different mixing techniques (stir, beat, fold), use a grater, use a peeler, and crack eggs would increase between pre-intervention skills testing and post-intervention skills testing.

**Research Question 3A.** Is program structure (consecutive vs. non-consecutive lessons) related to the magnitude of pre- to post-intervention changes in program outcomes (changes in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors) as measured by the IJC survey? Because Research Question 3A was an exploratory analysis, no a priori hypotheses were made.

**Research Question 3B.** Is the use of teen teachers related to the magnitude of pre- to post-intervention changes in program outcomes (changes in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors) as measured by the IJC survey? Because Research Question 3B was an exploratory analysis, no a priori hypotheses were made.

**Research Question 3C.** Are the hours of IJC programming delivered (10 hours vs. more than 10 hours) related to the magnitude of pre- to post-intervention changes in program outcomes (changes in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors) as measured by the IJC survey? Because Research Question 3C was an exploratory analysis, no a priori hypotheses were made.
Chapter Five: Methods

Participants

IJC targeted participants between the ages of 8 and 13 years old. Due to the nature of the implementation of IJC in community settings and in partnership with already existing sites and programs, participants outside of the 8-13 age range occasionally participated in the program. The analytic sample for this dissertation did not include those IJC participants who were younger than 8 ($n = 45$) or older than 13 ($n = 12$). Younger children would not have been expected to provide reliable data through the IJC survey because it was above their reading level. Additionally, the program was not designed for older teenagers, who might have found the activities to be too simple and not age appropriate. For these reasons, data from participants outside of the target age range were not analyzed to ensure an accurate assessment of the efficacy of the program.

There were an average of 12.3 participants in each IJC class. Approximately 26.6% of youth had participated in IJC in the past. This can occur because IJC is an annual program that is frequently implemented through the same partner sites or programs year after year. There are no restrictions on allowing youth to participate in IJC multiple times, and therefore some students participate in the program more than once over multiple years of implementation. Often partnerships between Extension and IJC sites endure from year to year, and youth who frequent these sites (e.g., Boys and Girls Club) may be in attendance for multiple years of IJC programming.

All program participants were offered the opportunity to take the IJC survey if they assented to do so, resulting in a total of 591 survey participants in the final analytic sample. A subset of participants ($n = 385$) had instructors who provided valid lesson-level data and were included in analyses related to implementation effects (Research Questions 3A-C), for more details see Implementation Effects section below. A selected subset of participants were offered the opportunity to take part in IJC hands-on skills testing (if they assented to do so), resulting in a total of 37 participants in the skills testing subsample. Participant demographic characteristics are reported in Table 4. All participants who completed the skills testing also completed IJC surveys, meaning that the demographics presented in Table 4 below represent the entire sample for this dissertation study. Participant demographics for the skills testing subsample are presented in Table 5. The skills testing subsample was not comparable to or representative of the overall study sample in that they had a more equal gender distribution, were more likely to be African American, and more likely to have participated in IJC in the past.
### Table 4. Characteristics of IJC Survey Sample (n = 592)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>Mean (SD) or %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>576</td>
<td>9.84 (1.40)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>204</td>
<td>34.8%</td>
</tr>
<tr>
<td>Female</td>
<td>382</td>
<td>65.2%</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>357</td>
<td>61.5%</td>
</tr>
<tr>
<td>Black</td>
<td>87</td>
<td>15.1%</td>
</tr>
<tr>
<td>Asian</td>
<td>3</td>
<td>0.5%</td>
</tr>
<tr>
<td>Native American or Alaskan Native</td>
<td>3</td>
<td>0.5%</td>
</tr>
<tr>
<td>Native Hawaiian or Pacific Islander</td>
<td>3</td>
<td>0.5%</td>
</tr>
<tr>
<td>Biracial/Multiracial</td>
<td>63</td>
<td>10.8%</td>
</tr>
<tr>
<td>Other</td>
<td>64</td>
<td>11.0%</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>107</td>
<td>19.4%</td>
</tr>
<tr>
<td>No</td>
<td>444</td>
<td>80.6%</td>
</tr>
<tr>
<td>Past Participation in IJC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>152</td>
<td>26.6%</td>
</tr>
<tr>
<td>No</td>
<td>419</td>
<td>73.4%</td>
</tr>
</tbody>
</table>

### Table 5. Characteristics of IJC Hands-On Cooking Skills Assessment Sample (n = 37)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>Mean (SD) or %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>37</td>
<td>10.05 (1.45)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
<td>43.2%</td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>56.7%</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>4</td>
<td>10.8%</td>
</tr>
<tr>
<td>Black</td>
<td>22</td>
<td>59.5%</td>
</tr>
<tr>
<td>Asian</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Native American or Alaskan Native</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Native Hawaiian or Pacific Islander</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Biracial/Multiracial</td>
<td>5</td>
<td>13.5%</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>16.2%</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>21.6%</td>
</tr>
<tr>
<td>No</td>
<td>29</td>
<td>78.4%</td>
</tr>
<tr>
<td>Past Participation in IJC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18</td>
<td>51.3%</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
<td>48.7%</td>
</tr>
</tbody>
</table>
Recruitment. Since IJC usually took place as one component of a larger program or camp, participants were typically recruited at the site level instead of individually. Extension nutrition educators oversaw recruitment for the individual classes they taught. For scenarios in which participants were recruited individually (when partnerships with local camps and programs could not be established), nutrition educators used approved recruitment flyers designed by IJC’s media specialist (see Appendix A for English version and Appendix B for Spanish version).

IJC targeted SNAP-Ed (Supplemental Nutrition Assistance Program Education) eligible youth audiences who are from low-income households. In order to be considered SNAP-Ed eligible, individuals must belong to households who are using or eligible for the Supplemental Nutrition Assistance Program. Households with monthly income levels at or below 130% of the federal poverty level are eligible for SNAP. Since IJC participants are usually recruited at the site level, the program specifically targeted sites in low-income neighborhoods and communities (identified by Extension), instead of restricting individual participation by SNAP eligibility.

Sites and Community Partners

The final analytic sample was drawn from 48 sites throughout Illinois. The types of sites where the program was implemented include summer camps (both indoor and outdoor), Boys and Girls Clubs, community centers, local libraries and churches, and Extension Offices. Though the resources available at each site varied, all sites were required to have access to running water and electricity. Most frequently, IJC was implemented as one component of a larger program like a summer camp. Sites were intentionally selected to vary in regard to participant and community demographics, as well as geography (rural vs. suburban vs. urban).

Curriculum Overview

Illinois Junior Chefs (IJC) is a hands-on culinary education program for youth that was delivered by the University of Illinois Office of Extension and Outreach. This program (which runs annually) is primarily funded and implemented through the Supplemental Nutrition Assistance Program Education (SNAP-Ed), the Illinois Nutrition Education Program (INEP), the Expanded Food and Nutrition Education Program (EFNEP), and the 4-H organization. The program was provided at no cost to participants. IJC was implemented statewide across Illinois during the summer (June, July, and August) of 2017, and was often incorporated as one component within a larger summer camp or community program.

IJC was typically taught as five two-hour lessons, each focused on a different food group (grains, dairy, vegetables, fruits, or protein). Most IJC programs were implemented over the course of one week (with one lesson per day for five consecutive days), but some programs were conducted once per week for five weeks (additional details about the breakdown of consecutive vs. non-consecutive classes can be
found in the Implementation Effects section). After the completion of the program, each student received a copy of the IJC cookbook to bring home, which includes copies of all of the handouts from IJC lessons, and a large selection of healthy recipes made from common, inexpensive ingredients. This cookbook helps students incorporate the skills they have learned in class at home with their families.

**Lesson content.** Each of the five IJC lessons was designed to be delivered over two hours and includes a food group theme, demonstrations and opportunities for practice with hands-on cooking skills, and recipe preparations that incorporate the food group theme and skills taught during that specific class. All IJC activities outlined in the curriculum are required, but nutrition educators were allowed to select recipes for each lesson from a list of several options. See Table 6 for details about lesson themes, skills taught, lesson activities, and recipe options. As is also outlined in Table 6, all lessons included activities that target improvements in cooking self-efficacy, cooking attitudes, food preferences, and cooking skills (theoretically relevant SCT concepts).
<table>
<thead>
<tr>
<th>Food Group</th>
<th>Skill(s) Taught</th>
<th>Lesson Activities</th>
<th>Recipe Options</th>
<th>SCT Construct(s) Targeted in Lesson</th>
</tr>
</thead>
</table>
| Lesson #1 Grains | Measuring wet and dry ingredients | - Hand Washing Review  
- Kitchen Safety Rules Review  
- Measuring Ingredients Demonstration  
- Measuring Ingredients Activity  
- MyPlate Overview  
- Grains Overview | - Tic-Tac-Taco Mix  
- Pumpkin Pancakes  
- Banana Oatmeal  
- Bean Salad with Rice  
- Snowman Sandwich | - Cooking Self-Efficacy  
- Cooking Attitudes  
- Food Preferences  
- Cooking Skills |
| Lesson #2 Dairy | Mixing techniques (folding, beating, etc.), using spices | - Dairy Overview  
- Mixing Techniques Demonstration  
- Mixing Food Activity  
- Using Spices/Herbs Activity | - Creamy Vegetable Dip  
- Pumpkin Pudding  
- Breakfast Parfait  
- Fruit Kabobs  
- Cheesy Chili Tostado | - Cooking Self-Efficacy  
- Cooking Attitudes  
- Food Preferences  
- Cooking Skills |
| Lesson #3 Vegetables | Using a peeler, using a grater, knife skills | - Vegetables Overview  
- Peeler Activity  
- Grater Activity  
- Knife Types Review  
- Cutting Techniques Demonstration | - Colorful Coleslaw  
- Easy Pasta Salad  
- Sweet and Dilly Carrots  
- Veggie Chow Mein  
- Veggie Quesadillas  
- Veggie Stuffed Pitas | - Cooking Self-Efficacy  
- Cooking Attitudes  
- Food Preferences  
- Cooking Skills |
| Lesson #4 Fruits | Juicing citrus fruits, knife skills | - Fruits Overview  
- Name That Fruit Activity  
- Juicing Citrus Fruits Activity  
- Oxidative Browning Activity  
- Knife Types Review  
- Cutting Techniques Review | - Fruit Salsa  
- Tortilla Fruit Pizza  
- Apple Carrot Salad  
- Apple Crisp  
- Magic Fruit Salad  
- Melon Berry Pita  
- Banana Fruit Salad | - Cooking Self-Efficacy  
- Cooking Attitudes  
- Food Preferences  
- Cooking Skills |
| Lesson #5 Protein | Cracking eggs | - Protein Overview  
- Types of Protein Foods Overview  
- Cooking with Protein Foods Overview  
- Cracking Eggs Demonstration  
- Cracking Eggs Activity | - Pita Pocket Veggie Breakfast  
- Huevos Rancheros  
- Eggs Ole  
- Ham and Pineapple Sandwich  
- Summer Chili  
- Layered Bean Dip  
- Easy Chicken & Veggie Chowder | - Cooking Self-Efficacy  
- Cooking Attitudes  
- Food Preferences  
- Cooking Skills |
Lesson content was informed by principles from Social Cognitive Theory (SCT). In light of past evidence supporting the use and impact of SCT concepts in health behavior change interventions (Luszczynska & Schwarzer, 2005), lesson content incorporated opportunities for goal setting, observational learning, and mastery experiences, which should increase self-efficacy, skills, food preferences, and positive attitudes related to cooking (Bandura, 1998). Lessons were also designed with a focus on what Bandura called environmental facilitators and barriers (Bandura, 2004). Lesson content attempted to address many common barriers to cooking in our low-resource sample, including access to ingredients and cooking equipment. For example, in the section on juicing citrus fruits, nutrition educators taught students how to juice citrus fruits using a fork, which all families generally have at home, instead of using citrus juicers or reamers which our participants might not have access to at home.

**Intervention components tailored to participants’ SES.** The IJC curricula and lessons were designed to tailor the program to be most relevant and useful to our low-resource audience. Recipes avoided the use of expensive or specialized kitchen equipment, and provided strategies to help participants learn to cook with minimal resources. Recipes also used inexpensive, readily available, and culturally relevant ingredients (i.e., recipes with canned vegetables and beans).

**Instructors and training.** During the summer of 2017, IJC was taught by 37 Extension nutrition educators who had received specialized training regarding implementation of nutrition education programs and working with youth audiences. Nutrition educators were also required to attend a yearly IJC-specific webinar before the program was implemented each summer. The IJC webinar provides training to nutrition educators that outlines curriculum modifications and survey data collection procedures.

In addition to Extension nutrition educators, some sites also utilized the assistance of “teen teachers” who had also been trained to deliver the IJC Program (additional details about teen teachers can be found in the Implementation Effects section). Though all teen teachers who assisted with IJC were required to undergo training, the intensity and content of the training delivered varied across different sites.

**Procedures**

**Survey procedures.** The IJC survey was administered immediately pre- and post-intervention (at the beginning of the first lesson and end of the last lesson) to allow for assessment of changes in survey scores after the conclusion of the program. The pre- and post-intervention survey are identical (see Appendix C).

The IJC survey data were collected by nutrition educators, who administered the survey in their classes and then mailed them back to the IJC research coordinator (myself). Nutrition educators received training about how to administer the survey, and were given a packet that includes survey instructions and
materials (for survey instructions, see Appendix D). Nutrition educators were also given a script to read to students before collecting survey data (see Appendix E). On the first day of the program, nutrition educators sent a Parent Information Letter home with students (see Appendix F for English version and Appendix G for Spanish version). This letter informed parents about the survey, and provided contact information that allowed parents to redact their child’s data if they chose to do so.

**Skills testing procedures.** A hands-on skills testing protocol was developed and implemented at a subset of sites to assess the feasibility of using a hands-on protocol to measure skills and to observationally assess changes in tangible cooking skills resulting from program participation. Data collection for skills testing occurred at two sites in an urban city in Central Illinois (Peoria).

Hands-on skills testing took place at the beginning of the first lesson and at the end of the last lesson, and took approximately 30 minutes for all students to complete testing at 2-3 testing stations. The skills testing protocol was presented as a sort of game or “skill-a-thon”, in which trained IJC researchers guided participants through a test recipe (see Appendix H) and assessed participants’ abilities to execute specific cooking skills taught during the IJC Program. IJC researchers read aloud from the skills testing script (see Appendix I) to prompt participants to complete each step of the test recipe (IJC skill) to the best of their ability.

**Protocol development and pilot testing.** A team of experts, including a professionally trained chef, an expert in assessment of culinary programs, and a registered dietitian worked together to develop the hands-on skills testing protocol and coding procedures. The protocol was pilot-tested with 22 youth aged 8-13 who had not participated in IJC. Each participant was video recorded attempting each culinary skill during pilot testing, and these videos were used during coding training to ensure that research assistants were coding skills consistently and reliably. Video recording was only used for training purposes during pilot testing, as skills were coded live during data collection for the hands-on cooking skills assessment.

**Measures**

**Illinois Junior Chefs Survey.** The IJC survey was developed in 2016 to assess attitudes and behaviors related to cooking and healthy eating. This survey was based largely based on the 4-H Food Smart Families Survey and the Cooking with Kids Survey (Lohse et al., 2011). The final 2017 IJC survey included 37 questions and five survey subscales, as well as several questions about demographics (see Appendix C). Each answer option had smiley faces associated with the text to make answer options clearer for youth participants. The survey subscales included cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors. These subscales are described in more detail below in Table 7. Scores for each IJC subscale are created by averaging all the questions in each subscale. Survey scores had a possible range of 1 to 4 (see Table 7 for answer options).
The IJC survey also includes questions about demographic information and asks if students have participated in a cooking program (or IJC specifically) in the past. Specific demographic information collected includes: age, gender, race, and ethnicity.
<table>
<thead>
<tr>
<th>Survey Subscale</th>
<th>Description</th>
<th>Number of Items</th>
<th>α (ICC)</th>
<th>Answer Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cooking Self-Efficacy</strong></td>
<td>Questions ask if students think they are able to make healthy meals and snacks and perform certain cooking skills.</td>
<td>18</td>
<td>Pre = .949, Post = .927</td>
<td>1 = “NO! Not at all”&lt;br&gt;2 = “No, maybe not”&lt;br&gt;3 = “Yes, maybe”&lt;br&gt;4 = “YES! For sure”</td>
</tr>
<tr>
<td><strong>Cooking Attitudes</strong></td>
<td>Questions ask about students’ attitudes towards certain cooking activities, and cooking with friends and family.</td>
<td>6</td>
<td>Pre = .714, Post = .810</td>
<td>1 = “I really don’t like to do this”&lt;br&gt;2 = “I don’t like to do this”&lt;br&gt;3 = “I kind of like to do this”&lt;br&gt;4 = “I really like to do this”</td>
</tr>
<tr>
<td><strong>Fruit &amp; Vegetable Preferences</strong></td>
<td>Questions ask about students’ preferences for six fruits and vegetables that are used in most IJC lesson recipes.</td>
<td>6</td>
<td>Pre = .609, Post = .618</td>
<td>1 = “I really don’t like this food”&lt;br&gt;2 = “I don’t like this food”&lt;br&gt;3 = “I kind of like this food”&lt;br&gt;4 = “I really like this food”</td>
</tr>
<tr>
<td><strong>Cooking Behaviors</strong></td>
<td>Questions ask how often students engage in cooking behaviors in a typical week.</td>
<td>3</td>
<td>Pre = .695, Post = .771</td>
<td>1 = “Never or almost never (0 days a week)”&lt;br&gt;2 = “Some days (1-3 days a week)”&lt;br&gt;3 = “Most days (4-6 days a week)”&lt;br&gt;4 = “Every day (7 days a week)”</td>
</tr>
<tr>
<td><strong>Healthy Eating Behaviors</strong></td>
<td>Questions ask how often students eat healthy foods in a typical week.</td>
<td>4</td>
<td>Pre = .714, Post = .750</td>
<td>1 = “Never or almost never (0 days a week)”&lt;br&gt;2 = “Some days (1-3 days a week)”&lt;br&gt;3 = “Most days (4-6 days a week)”&lt;br&gt;4 = “Every day (7 days a week)”</td>
</tr>
</tbody>
</table>
**Hands-on skills testing.** The hands-on skills testing protocol collected data on participants’ abilities to execute each of the following cooking skills: measuring ingredients (water, sugar, flour), using different mixing techniques (stirring, beating, and folding), using a grater, using a peeler, and cracking eggs. Students visited each station individually to reduce any possible peer effects that could occur if students were tested in groups.

**Coding procedures.** After pilot testing was complete, videos recorded during this phase were used to train research assistants to code and ensure reliability and consistency in coding between researchers. All researchers (two undergraduate research assistants and myself) coded videos from all 22 pilot test participants. Any discrepancies in coding were discussed to clarify criteria and allow researchers to come to agreement. Results from practice coding of pilot test data demonstrated a high level of inter-rater reliability ($r = .967$), validating the coding scheme for use in live coding and data collection.

Students’ mastery of each cooking skill was coded live by trained researchers during the administration of the skills testing. The researcher that administered each skills assessment also assesses and coded participants’ proficiency for that skill. Live coding involved assessing participants on a set of dichotomized criteria for proficiency in each cooking skill. Each skill had a different number of criteria ranging from 2-7. All criteria were designed to be objective so that research assistants could code live quickly and without much deliberation. For a sample data collection worksheet with cooking skills criteria, please see Appendix J. The dichotomized coding scheme outlined requirements for students to be considered proficient for each criterion. Students received one point for each criterion where they demonstrated proficiency, and zero points if they did not demonstrate proficiency. For each skill, the number of points (criteria met) a student received was divided by the total possible points to create a proportion score for each skill. Proportion scores for the cooking skills assessment ranged from 0 to 1.

If participants did not know how to do a skill or did not know what the word describing the skill meant (e.g., folding), the researcher would help the participant with the skill or complete this recipe step for them. Researchers only helped participants when they were completely unsure how to do a skill and did not have the ability or knowledge to perform any part of the cooking skill on their own. Students received zero points (and a proportion score of zero) for any skill that they received help with, or when they did not know what a skill was or how to perform it.

During the data collection phase, the skills testing assessment for every tenth participant was double coded (by myself) to ensure skills were being coded consistently. Inter-rater reliability for these double coded cases was very high ($r = .997$) and indicated that the coding scheme was being applied uniformly across researchers.

**Implementation effects.** Data related to program implementation were provided by IJC instructors through self-report (see Appendix K for Lesson Checklist), resulting in a subsample of 385
participants who had at least some valid implementation level data. IJC instructors provided lesson-level data on implementation variables (consecutive vs. non-consecutive classes, assistance of teen teachers, and hours of programming delivered) through self-report. Descriptive statistics and frequencies for implementation variables can be found below in Table 8 and descriptions of each implementation variable can be found below.

Table 8. Characteristics of Implementation Effects Subsample (n = 385)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>Mean (SD) or %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consecutive Classes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>303</td>
<td>78.5%</td>
</tr>
<tr>
<td>No</td>
<td>83</td>
<td>21.5%</td>
</tr>
<tr>
<td>Teen Teachers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>59</td>
<td>18.6%</td>
</tr>
<tr>
<td>No</td>
<td>259</td>
<td>81.4%</td>
</tr>
<tr>
<td>Hours of Programming Delivered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ten Hours (Recommended)</td>
<td>385</td>
<td>10.9 (1.8)</td>
</tr>
<tr>
<td>More Than Ten Hours (Exceeded Recommended)</td>
<td>95</td>
<td>24.7%</td>
</tr>
</tbody>
</table>

Lesson structure. Lesson structure was assessed to determine whether students participated in consecutive or non-consecutive IJC classes. Classes were considered consecutive if lessons were delivered successively over the course of five consecutive days. Classes were deemed non-consecutive if they occurred over non-consecutive days (most frequently once per week for five weeks). Consecutive classes occurred at approximately 79% of sites, and the impact of this variable was assessed to determine the influence of lesson structure on implementation and program outcomes. Consecutive classes were coded as 1 and non-consecutive classes were coded as 0 for this variable.

Teen teachers. Self-reported data from IJC Extension instructors indicated whether they were assisted by teen teachers while delivering the program. It should be noted that the teen teachers variable was expected to have increased rates of missing data. Many of the instructors at sites who do not utilize the assistance of teen teachers are not familiar with this phrase and leave the question blank because they do not know what it means. Teen teachers were utilized at approximately 19% of sites, and the impact of this variable was assessed to determine teen teachers’ influence on implementation and program outcomes. Classes with teen teachers were coded as 1 and classes without teen teachers were coded as 0 for this variable.

Hours of programming. The hours of programming delivered at each site were derived by adding up the length of each IJC class (based on instructors’ self-reported start and end time) to calculate a total number of hours over which the program was delivered. While IJC teachers were instructed that the program should be taught over a minimum of 10 hours, unforeseen factors sometimes required teachers to
deliver less than the required 10 hours of programming. In accordance with best practices for implementation evaluation (Bauman & Nutbeam, 2013), participants \( n = 72 \) from 8 sites where the program was delivered over less than the minimum of 10 hours were not included in the analytic sample. All sites with less than 10 hours of programming either skipped at least one of the five IJC lessons, or condensed some lessons by 50% or more to fit into a shorter timeframe. Students at these sites received significantly fewer hours of programming \( t (456) = 19.65, p < .001 \), and significantly shorter lessons \( t (456) = 15.82, p < .001 \) than participants at sites that adhered to the recommended 10 hour minimum.

Given the substantial changes to program content that seemed to occur in most sites with less than 10 hours of programming, these sites were not included in the analytic sample to ensure that analyses evaluated IJC when it was delivered with reasonable fidelity. Excluding participants who did not receive IJC as it was intended to be delivered allowed for more accurate assessment of the efficacy of the program. Hours of programming for the analytic sample ranged from 10 to 17.5 hours.

**Ethical Considerations**

This evaluation of the IJC Program IRB was approved the University of Illinois Institutional Review Board (IRB Protocol Number 14913). Data collection details for this study were submitted as the fourth amendment to this IRB application (since several rounds of IJC data collection had already taken place). IRB Approval Letter can be found in Appendix L. This study qualified for a waiver of documentation of informed consent. Parent information letters were sent home which explained the study and allowed parents the opportunity to remove their child’s data from the study if necessary.

There were minimal risks associated with participation in this study. Since participants in this research study would have received the IJC Program regardless of whether evaluation data were collected, the data collection for this research introduced minimal risks above what students would have already encountered as participants in the program. Though the hands-on cooking skills assessment does ask participants to use kitchen tools which can be dangerous if used improperly, the use of these kitchen tools is already included as part of the IJC Program, so participants would encounter this risk regardless of whether they participated in data collection for cooking skills. During both data collection and program implementation, standard measures (e.g., supervision, demonstration of safe use of kitchen tools) were taken to ensure the safety of youth participants in the hands-on cooking program.

**Data Entry and Analysis**

All IJC data were entered by trained undergraduate research assistants, who entered data by copying paper survey data into an electronic version of the IJC survey in Qualtrics. Data were then transferred to SPSS 24 (IBM Corp., 2016) for analyses. Survey and skills testing data were de-identified (names removed) before data were entered. Participants, instructors, and site ID numbers were tracked through an ID number database in Microsoft Excel, which was stored separately from survey and skills
data to protect identifying information. To ensure that data were being entered accurately and reliably, 10% of surveys were double entered and analyzed for consistency ($r = .998$).

Data from the 2016 IJC implementation were used to inform power analyses for survey data. Power analyses, based on the magnitude of pre- to post-intervention changes that occurred in 2016, indicated that approximately 413 participants would be required to detect significant pre- to post-intervention changes in survey subscales (Murphy, Myors, & Wolach, 2014). This power analysis indicated that this study was designed with sufficient power to answer its main research question. The data analysis approach used for each research question is described below.

**RQ 1A. Do participants in IJC experience 1) significant positive changes from pre- to post-intervention in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors as measured by the IJC survey, and 2) do these program outcomes differ by gender?**

Research Question 1A assessed whether participants experienced significant improvements in IJC survey subscales from pre- to post-test. This question also sought to determine whether there was a main effect for gender (such that female and male participants experienced different program outcomes). This research question was addressed using a two-factor repeated measures analyses of covariance (ANCOVA) for each survey subscale to assess mean differences by time (pre- to post-test) and gender. Preliminary analyses were conducted to test for potential covariates and ensure that assumptions for ANCOVA were not violated. Past participation in IJC was used as a covariate in all analyses for Research Question 1A due to results of preliminary analyses.

**RQ 1B. Do female participants and male participants (analyzed separately) both experience significant positive changes from pre- to post-intervention in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors as measured by the IJC survey?**

Research Question 1B included subgroup analyses with each gender to determine whether female and male participants each experienced significant improvements in overall program outcomes (pre- to post-test changes in IJC survey subscales). This research question was addressed using repeated measures analyses of covariance (ANCOVA) for each survey subscale to assess mean differences from pre- to post-intervention. These analyses were repeated separately with the subsample of female participants ($n = 392$) and male participants ($n = 204$). Preliminary analyses were conducted to test for potential covariates and ensure that assumptions for ANCOVA were not violated. Past participation in IJC was used as a covariate in all analyses for Research Question 1B due to results of preliminary analyses.
RQ 2A. Is it feasible to measure youth IJC participants’ cooking skills (measuring ingredients, using different mixing techniques, using a grater, using a peeler, and cracking eggs) through a pre- and post-intervention hands-on skills testing protocol?

Research Question 2A assessed whether the skills testing protocol was a feasible way to measure hands-on cooking skills in youth. Analyses for this research question were mainly descriptive. Prior to skills testing data collection, it was determined that the protocol would be deemed feasible if we were able to obtain complete data on all skills for at least 80% of participants.

RQ 2B. Does participation in the Illinois Junior Chefs Program result in significant positive changes in the following hands-on cooking skills: measuring (water, sugar, flour), using different mixing techniques (stir, beat, fold), using a grater, using a peeler, and cracking eggs (as measured by the IJC hands-on skills testing protocol)?

Research Question 2B assessed whether participants experienced improvements in hands-on cooking skills from pre- to post-test. This research question was addressed using paired (repeated measures) t-tests for each cooking skill. T-tests were used instead of ANCOVA because no covariates were included (which necessitated the use of ANCOVA analyses in Research Questions 1A-B and 3A-C). Preliminary analyses were conducted to test for potential covariates and ensure that assumptions for paired t-tests were not violated. No variables were used as covariates in the analyses for Research Question 2B due to results of preliminary analyses.

RQ 3A. Are program delivery methods (consecutive vs. non-consecutive lessons) related to the magnitude of pre- to post-intervention changes in program outcomes (changes in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors) as measured by the IJC survey?

Research Question 3A analyzed whether there were differences in program outcomes (pre- to post-test changes in IJC survey subscales) between participants who participated in consecutive and non-consecutive classes. This research question was addressed using analyses of covariance (ANCOVA) for each survey subscale, which compared the magnitude of change in survey scores between consecutive and non-consecutive participants. Preliminary analyses were conducted to test for potential covariates and ensure that assumptions for ANCOVA were not violated. Gender and past participation in IJC were used as covariates in all analyses for research question 3A due to results of preliminary analyses.

RQ 3B. Is the use of teen teachers related to the magnitude of pre- to post-intervention changes in program outcomes (changes in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors) as measured by the IJC survey?

Research Question 3B analyzed whether there were differences in program outcomes (pre- to post-test changes in IJC survey subscales) between participants who did and did not have teen teachers.
This research question was addressed using analyses of covariance (ANCOVA) for each survey subscale, which compared the magnitude of change in survey scores between participants with and without teen teachers. Preliminary analyses were conducted to test for potential covariates and ensure that assumptions for ANCOVA were not violated. Gender and past participation in IJC were used as covariates in all analyses for research question 3B due to results of preliminary analyses.

**RQ 3C. Are the hours of IJC programming delivered (10 hours vs. more than 10 hours) related to the magnitude of pre- to post-intervention changes in program outcomes (changes in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors) as measured by the IJC survey?**

Research Question 3C analyzed whether there were differences in program outcomes (pre- to post-test changes in IJC survey subscales) between participants who received the recommended 10 hours of IJC programming and those who received more than 10 hours of programming. This research question was addressed using analyses of covariance (ANCOVA) for each survey subscale, which compared the magnitude of change in survey scores between participants who received 10 or more than 10 hours of programming. Preliminary analyses were conducted to test for potential covariates and ensure that assumptions for ANCOVA were not violated. Gender and past participation in IJC were used as covariates in all analyses for Research Question 3C due to results of preliminary analyses.

**Missing data.** All variables were assessed for missing data during initial preliminary analyses. Missing data on outcome variables (survey scores and cooking skills scores) ranged from 0-8%. Cooking skills assessments had no missing data (0%) on outcome variables (skill proportion scores) and therefore, missing data analyses were only conducted with survey data. Results from missing value analyses and Little’s MCAR test indicated that survey data were missing completely at random ($p = .978$).

Multiple imputation methods were used to create imputed values for missing survey data (Johnson & Young, 2011). In accordance with best practices, values were only imputed for missing outcome variables (survey question scores), and not for demographic or implementation variables. Missing data were imputed using the Fully Conditional Specification (FCS) method. The FCS method imputes missing values by iteratively fitting a set of regression equations in which each variable is successively treated as the outcome variable and regressed on all other variables in the model. Missing data were imputed in 10 datasets, imputed values were aggregated, and pooled estimates (aggregated imputed values) were created to fill in missing values on outcome measures in the original dataset.

Analyses for all research questions were conducted with both original and imputed datasets. Given that the results obtained with imputed data did not differ from results obtained from the raw data, the imputed dataset was used for all analyses with survey data.
**Covariates.** Preliminary analyses investigated all individual demographic variables for inclusion as potential covariates. The influence of demographic variables on outcome scores (surveys and skills assessments) was assessed through independent t-tests for dichotomous variables (e.g., gender), one-way ANOVA for categorical variables with three or more categories (e.g., race), and correlational analyses for continuous variables (e.g., age). Due to results from preliminary analyses, gender and past participation in IJC were selected as covariates for all survey analyses. The only analyses that did not use both of these covariates were Research Questions 1A-B, which only used past participation in IJC as a covariate since the research questions were already focused on assessing the effect of gender. Using demographic variables that are associated with program outcomes as covariates helped to ensure that analyses truly captured the impact of the IJC Program, instead of non-intervention demographic variables.
Chapter Six: Results

Participant Demographics

Participants \( (n = 591) \) included in this study constitute a representative sample of IJC youth participants (see Table 4, shown previously). Recruitment, program delivery, and data collection with these participants (for both survey and skill data) occurred in summer (June, July, and August) of 2017. Inclusion criteria for this study required participants to be between the ages of 8-13, and required participants to have received a minimum of 10 hours of IJC programming. Approximately 87 participants were excluded from the analytic sample due to age, and approximately 73 participants were excluded because they received less than 10 hours of IJC programming.

Participants in the full analytic sample were an average of 9.84 years old and more likely to be female (65.2%) than male (34.8%). Most participants in the full analytic sample were Caucasian (61.5%), with some representation from African American, Multiracial, and “other” race participants, and minimal representation from Asian, Native American or Alaska Native, Native Hawaiian or Pacific Islander participants. Approximately 20% of participants considered themselves to be Hispanic or Latino. The majority of participants had not participated in IJC previously (73.4%).

The hands-on cooking skills assessment subsample included 37 participants (see Table 5, shown previously). The average age in the skills subsample was 10.05 years old. Most participants in the cooking skills subsample were African American (59.5%) with some representation from Caucasian, Multiracial, and “other” race participants. Approximately 21% of participants considered themselves Hispanic or Latino. In contrast with the full analytic sample, 51% of participants in the cooking skills assessments had already participated in IJC in the past.

Preliminary Analyses

Preliminary analyses were performed before individual research questions were analyzed. First, patterns of missing data were assessed, and missing values were imputed using pooled estimates from multiple imputation methods (described in detail in Missing Data section above). Next, descriptive statistics were calculated for all outcome variables (survey and cooking skills scores). Finally, all demographic variables were analyzed for potential inclusion as covariates.

After subscale averages were calculated, survey scores had a possible range of one to four. After proportion scores were calculated, scores for the hands-on cooking skills assessment ranged from zero to one. Descriptive statistics (means and standard deviations) are presented along with associated analyses in the tables below. Results from preliminary descriptive analyses indicated that one cooking skill – stirring – had zero variability since all skills testing participants received a perfect score for this skill (1 or 100%) at both pre-test and post-test. Since all participants were fully proficient with stirring at both time points
and no changes occurred with this variable from pre- to post-test, the data collected on stirring were not included in cooking skills analyses or research questions.

All individual demographic variables were considered for inclusion as covariates. Covariate analyses included independent t-tests for dichotomous variables (e.g., gender), one-way ANOVA for categorical variables with three or more categories (e.g., race), and correlational analyses for continuous variables (e.g., age). Analysis details for the two variables selected as covariates (gender and past participation in IJC) for survey data analyses are presented below. All demographic variables not mentioned below (race, ethnicity, and age) were not significantly related to survey scores or cooking skills scores, and therefore were not included as covariates in any analyses.

Findings from independent t-tests indicated that female participants had significantly higher average survey scores than male participants for the following subscales at baseline: cooking self-efficacy \((t(584) = 4.96, p < .001)\), cooking attitudes \((t(584) = 5.40, p < .001)\), cooking behaviors \((t(584) = 4.53, p < .001)\), and healthy eating behaviors \((t(584) = 2.03, p = .042)\). Given gender differences in baseline data, gender was used as a covariate in Research Question 3 (A-C). The influence of gender was also investigated in Research Question 1, but as a main effect instead of a covariate. In this way, all survey data analyses accounted for or investigated the influence of gender. The influence of gender on hands-on cooking skills scores was not consistent or significant, and therefore gender was not used as a covariate in cooking skills analyses.

Findings from independent t-tests indicated that youth who had participated in IJC in the past had significantly higher average survey scores than those who had not participated in the past for the following subscales at baseline: cooking self-efficacy \((t(569) = 6.98, p < .001)\), cooking attitudes \((t(569) = 4.40, p < .001)\), fruit and vegetable preferences \((t(569) = 2.05, p = .042)\), and cooking behaviors \((t(569) = 2.31, p = .021)\). Given differences in baseline data between youth who had participated in IJC in the past and those who had not, past participation in IJC was included as a covariate in all analyses with survey data. The influence of past participation in IJC on hands-on cooking skills scores was not consistent or significant, and therefore this variable was not used as a covariate in cooking skills analyses.

Due to findings from preliminary covariate analyses, gender and past participation in IJC were included in all analyses with survey data (Research Questions 1 and 3). No covariates were used in analyses of cooking skills data (Research Question 2).

**Program Outcomes: IJC Surveys**

**RQ 1A.** Do participants in IJC experience 1) significant positive changes from pre- to post-intervention in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors as measured by the IJC survey, and 2) do these program outcomes differ by gender?
Research Question 1A assessed whether participants experienced significant improvements in IJC survey subscales after participating in IJC, and whether these program outcomes differed by gender. This research question was addressed using a two-factor repeated measures analyses of covariance (ANCOVA) for each survey subscale (cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors) to assess mean differences by time (pre- to post-test) and gender, controlling for past participation in IJC. Preliminary analyses were conducted to ensure the assumptions for these statistical tests were not violated. Descriptive analyses showed that 27% of males and 25% of females had already participated in an IJC Program in the past. Descriptive statistics for pre- and post-test survey subscale scores by gender and results of ANCOVA analyses with each survey subscale are displayed in Table 9.

It was found that participants experienced significant improvements from pre- to post-intervention in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors, with non-significant improvements in healthy eating behaviors (see Table 9). Additionally, findings indicated that male participants experienced significantly larger improvements from pre- to post-intervention than female participants in cooking self-efficacy, with a trend \(p = .058\) towards significantly larger gains in fruit and vegetable preferences (see Table 9). Time by gender interactions were not significant (or trending towards significance) for any IJC subscale (and therefore are not included in Table 9), such that both boys and girls experienced changes in the same direction (improvements) from pre- to post-intervention. Findings from Research Question 1A revealed a significant main effect for time on cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors, and a significant main effect for gender on cooking self-efficacy (with trends \(p = .058\) towards significance for fruit and vegetable preferences).
<table>
<thead>
<tr>
<th></th>
<th>Pre-Test Mean (SD)</th>
<th>Post-Test Mean (SD)</th>
<th>Time (Pre-Post)</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>Cooking Self-Efficacy</td>
<td>3.48 (0.43)</td>
<td>3.26 (0.54)</td>
<td>3.78 (0.29)</td>
<td>3.62 (0.43)</td>
</tr>
<tr>
<td>Cooking Attitudes</td>
<td>3.76 (0.28)</td>
<td>3.54 (0.48)</td>
<td>3.86 (0.24)</td>
<td>3.66 (0.52)</td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>3.28 (0.48)</td>
<td>3.23 (0.50)</td>
<td>3.35 (0.50)</td>
<td>3.33 (0.56)</td>
</tr>
<tr>
<td>Cooking Behaviors</td>
<td>2.44 (0.83)</td>
<td>2.14 (0.74)</td>
<td>2.57 (0.86)</td>
<td>2.20 (0.78)</td>
</tr>
<tr>
<td>Healthy Eating Behaviors</td>
<td>2.86 (0.67)</td>
<td>2.73 (0.66)</td>
<td>2.90 (0.73)</td>
<td>2.74 (0.74)</td>
</tr>
</tbody>
</table>

Note. Estimated marginal means (accounting for covariate influence) are displayed. No Time x Gender interactions were significant. Females were coded as 0 and males were coded as 1. Youth who participated in IJC in the past were coded as 1, those who hadn’t were coded as 0. The influence (p-value) past participation in IJC as a covariate on each subscale is listed below.

Cooking Self Efficacy: $p < .001$
Cooking Attitudes: $p = .022$
Fruit & Vegetable Preferences: $p = .503$
Cooking Behaviors: $p = .059$
Healthy Eating Behaviors: $p = .573$
RQ 1B. Do female participants and male participants (analyzed separately) both experience positive changes from pre- to post-intervention in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors as measured by the IJC survey?

After examining gender differences in program outcomes in Research Question 1A, Research Question 1B sought to determine whether female and male participants (when analyzed as separate subgroups) both experienced significant improvements in IJC survey subscales as a result of the program. Research question 1B involved subgroup analyses with females only and males only and sought to test whether each group experienced significant improvements in program outcomes from pre- to post- test, controlling for past participation in IJC. This research question was addressed using repeated measures analyses of covariance (ANCOVA) for each survey subscale (cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors), controlling for past participation in IJC. Preliminary analyses were conducted to ensure that the assumptions for these statistical tests were not violated.

Descriptive statistics for female participants’ pre- and post-test survey subscale scores and results of ANCOVA analyses with each survey subscale are displayed in Table 10. Female participants experienced significant improvements in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors, with non-significant improvements in healthy eating behaviors. These findings in subgroup analyses with female participants were not significantly different from the findings discussed in Research Question 1A for the sample as a whole.
Table 10. Repeated Measures ANCOVA Pre- and Post-Test IJC Survey Scores with Female Participants Only (n = 392)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD) Survey Score</th>
<th>F</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Test</td>
<td>Post-Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooking Self-Efficacy</td>
<td>3.48 (0.43)</td>
<td>3.78 (0.29)</td>
<td>234.01</td>
<td>1, 366</td>
</tr>
<tr>
<td>Cooking Attitudes</td>
<td>3.76 (0.28)</td>
<td>3.86 (0.24)</td>
<td>58.10</td>
<td>1, 366</td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>3.28 (0.48)</td>
<td>3.35 (0.50)</td>
<td>18.25</td>
<td>1, 366</td>
</tr>
<tr>
<td>Cooking Behaviors</td>
<td>2.44 (0.83)</td>
<td>2.57 (0.86)</td>
<td>15.50</td>
<td>1, 366</td>
</tr>
<tr>
<td>Healthy Eating Behaviors</td>
<td>2.86 (0.67)</td>
<td>2.90 (0.73)</td>
<td>2.68</td>
<td>1, 366</td>
</tr>
</tbody>
</table>

Note. Estimated marginal means (accounting for covariate influence) are displayed. Youth who participated in IJC in the past were coded as 1, those who hadn’t were coded as 0. The influence (p-value) of past participation in IJC (covariate) on each subscale is listed below.
Cooking Self Efficacy: $p < .001$
Cooking Attitudes: $p < .001$
Fruit & Vegetable Preferences: $p = .291$
Cooking Behaviors: $p = .050$
Healthy Eating Behaviors: $p = .200$

Descriptive statistics for male participants’ pre- and post-test survey subscale scores and results of ANCOVA analyses with each survey subscale are displayed in Table 11. Male participants experienced significant improvements in cooking self-efficacy, cooking attitudes, and fruit and vegetable preferences. These findings in subgroup analyses with male participants were generally in line with the findings discussed in Research Question 1A for the sample as a whole. In these analyses with male participants, cooking behaviors did not improve significantly from pre- to post-intervention as they had with the full sample (and female participants).
Table 11. Repeated Measures ANCOVA Pre- and Post-Test IJC Survey Scores with Male Participants Only (n = 204)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD) Survey Score</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Test</td>
<td>Post-Test</td>
<td>F</td>
<td>df</td>
<td>p</td>
</tr>
<tr>
<td><strong>Cooking Self-Efficacy</strong></td>
<td>3.26 (0.54)</td>
<td>3.62 (0.43)</td>
<td>112.84</td>
<td>1, 196</td>
<td>&lt; .001</td>
</tr>
<tr>
<td><strong>Cooking Attitudes</strong></td>
<td>3.54 (0.48)</td>
<td>3.66 (0.52)</td>
<td>8.65</td>
<td>1, 196</td>
<td>.004</td>
</tr>
<tr>
<td><strong>Fruit &amp; Vegetable Preferences</strong></td>
<td>3.23 (0.50)</td>
<td>3.33 (0.56)</td>
<td>10.64</td>
<td>1, 196</td>
<td>.001</td>
</tr>
<tr>
<td><strong>Cooking Behaviors</strong></td>
<td>2.14 (0.74)</td>
<td>2.20 (0.78)</td>
<td>1.70</td>
<td>1, 196</td>
<td>.194</td>
</tr>
<tr>
<td><strong>Healthy Eating Behaviors</strong></td>
<td>2.73 (0.66)</td>
<td>2.74 (0.74)</td>
<td>0.44</td>
<td>1, 196</td>
<td>.508</td>
</tr>
</tbody>
</table>

*Note. Estimated marginal means (accounting for covariate influence) are displayed. Youth who participated in IJC in the past were coded as 1, those who hadn’t were coded as 0. The influence (p-value) of past participation in IJC (covariate) on each subscale is listed below. Cooking Self Efficacy: p = .004 Cooking Attitudes: p = .929 Fruit & Vegetable Preferences: p = .865 Cooking Behaviors: p = .603 Healthy Eating Behaviors: p = .432*

**Program Outcomes: Hands-On Cooking Skills Assessment**

A total of 37 participants across three IJC classes took part in the hands-on cooking skills assessment. Demographic information about the skills assessment subsample can be found in Table 5 (shown previously).

**RQ 2A: Is it feasible to measure youth IJC participants’ cooking skills through a pre- and post-intervention hands-on skills testing protocol?**

Research question 2A assessed whether the skills testing protocol was a feasible way to assess hands-on cooking skills in youth participants. To assess the feasibility of the hands-on skills assessment, descriptive statistics describing the implementation of the data collection protocol were calculated. The hands-on cooking skills assessment took an average of seven minutes (with a range of four to nine minutes) per student to administer, and all three testing groups (IJC classes) completed testing for all students within 30 minutes. Each class had between 11-14 students who participated in cooking skills data collection. Implementation of the hands-on cooking skills assessment resulted in complete data for 100% of youth who participated in data collection. All cooking skills assessment participants completed the entire recipe, and researchers were able to obtain data from participants for all cooking skills and
associated criteria. Given that the percent of participants who had complete data (100%) was greater than the predetermined feasibility threshold (80%), the hands-on cooking skills assessment protocol was deemed a feasible way to collect cooking skills data directly from youth.

RQ 2B. *Does participation in the Illinois Junior Chefs Program result in significant positive changes in hands-on cooking skills as measured by the IJC hands-on skills testing protocol?*

Research Question 2B assessed whether participants experienced significant improvements in hands-on cooking skills after participating in IJC. Paired (repeated measures) t-tests were used to test for significant changes in cooking skills (measuring ingredients, using different mixing techniques, using a grater, using a peeler, and cracking eggs) proportion scores from pre-test to post-test. Preliminary analyses were conducted to ensure that the assumptions for these statistical tests were not violated. Descriptive statistics for pre- and post-test cooking skills proportion scores and results of t-test analyses with each cooking skill are displayed in Table 12. Findings demonstrated that participants experienced significant improvements on all cooking skills (measuring water, measuring sugar, measuring flour, beating, folding, using a grater, and using a peeler, and cracking eggs; see Table 12).

Table 12. *Paired T-Tests for Pre- to Post-Test Skills Assessment Proportion Scores*

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD) Proportion Score</th>
<th>t</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Test</td>
<td>Post-Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring: Water</td>
<td>0.57 (0.28)</td>
<td>0.69 (0.21)</td>
<td>2.47</td>
<td>36</td>
</tr>
<tr>
<td>Measuring: Sugar</td>
<td>0.58 (0.27)</td>
<td>0.73 (0.23)</td>
<td>4.02</td>
<td>36</td>
</tr>
<tr>
<td>Measuring: Flour</td>
<td>0.54 (0.25)</td>
<td>0.75 (0.23)</td>
<td>7.07</td>
<td>36</td>
</tr>
<tr>
<td>Mixing: Beating</td>
<td>0.26 (0.41)</td>
<td>0.70 (0.43)</td>
<td>5.05</td>
<td>36</td>
</tr>
<tr>
<td>Mixing: Folding</td>
<td>0.30 (0.37)</td>
<td>0.71 (0.34)</td>
<td>6.67</td>
<td>36</td>
</tr>
<tr>
<td>Using a Peeler</td>
<td>0.40 (0.33)</td>
<td>0.60 (0.23)</td>
<td>5.11</td>
<td>36</td>
</tr>
<tr>
<td>Using a Grater</td>
<td>0.37 (0.41)</td>
<td>0.71 (0.33)</td>
<td>5.62</td>
<td>36</td>
</tr>
<tr>
<td>Cracking Eggs</td>
<td>0.85 (0.28)</td>
<td>0.97 (0.12)</td>
<td>2.70</td>
<td>36</td>
</tr>
</tbody>
</table>
Implementation Effects

Analyses included as part of Research Question 3 (A-C) focused on the influence of implementation variables (lesson structure, teen teachers, and hours of programming) on program outcomes. All analyses used gender and past participation in IJC as a covariate.

RQ 3A. Are program delivery methods (consecutive vs. non-consecutive lessons) related to the magnitude of pre- to post-intervention changes in program outcomes as measured by the IJC survey?

Research Question 3A assessed whether participants who took consecutive and non-consecutive IJC classes differ in program outcomes (pre- to post-test changes in survey subscale scores), controlling for gender and past participation in IJC. Approximately 78% of youth participated in IJC through consecutive classes. This research question was analyzed using one-way analyses of covariance (ANCOVA) for each survey subscale, controlling for gender and past participation in IJC. Preliminary analyses were conducted to ensure that the assumptions for these statistical tests were not violated. Descriptive statistics for changes in IJC survey scores from pre- to post-intervention (program outcomes) by program structure (consecutive vs. non-consecutive) are included with results of ANCOVA analyses with each survey subscale are displayed in Table 13. Results of ANCOVA analyses are presented in Table 13, and demonstrate that participants who took IJC over consecutive classes experienced greater improvements than those who took non-consecutive classes on all survey subscales, with significantly greater improvements in cooking self-efficacy and cooking.
Table 13. **ANCOVA for Differences in Pre- to Post-Test Survey Change Scores for Consecutive and Non-Consecutive Participants**

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD) Change Pre to Post</th>
<th>F</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consecutive</td>
<td>Non-Consecutive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooking Self-Efficacy</td>
<td>0.36 (0.44)</td>
<td>0.23 (0.47)</td>
<td>4.87</td>
<td>1, 364</td>
</tr>
<tr>
<td>Cooking Attitudes</td>
<td>0.12 (0.31)</td>
<td>-0.04 (0.47)</td>
<td>10.90</td>
<td>1, 364</td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>0.10 (0.33)</td>
<td>0.04 (0.34)</td>
<td>2.02</td>
<td>1, 364</td>
</tr>
<tr>
<td>Cooking Behaviors</td>
<td>0.10 (0.79)</td>
<td>0.07 (0.78)</td>
<td>0.04</td>
<td>1, 364</td>
</tr>
<tr>
<td>Healthy Eating Behaviors</td>
<td>0.01 (0.66)</td>
<td>-0.02 (0.77)</td>
<td>0.16</td>
<td>1, 364</td>
</tr>
</tbody>
</table>

**Note.** Estimated marginal means (accounting for covariate influence) are displayed. Participants who took consecutive classes were coded as 1, those who took non-consecutive classes were coded as zero. Females were coded as 0 and males were coded as 1. Youth who participated in IJC in the past were coded as 1, those who hadn’t were coded as 0. The influence (p-value) of covariates (gender and past participation in IJC) on each subscale is listed below.

<table>
<thead>
<tr>
<th></th>
<th>Gender: p = .400</th>
<th>Past IJC: p = .001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooking Self Efficacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooking Attitudes</td>
<td>p = .949</td>
<td>Past IJC: p = .011</td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>p = .586</td>
<td>Past IJC: p = .664</td>
</tr>
<tr>
<td>Cooking Behaviors</td>
<td>p = .119</td>
<td>Past IJC: p = .359</td>
</tr>
<tr>
<td>Healthy Eating Behaviors</td>
<td>p = .685</td>
<td>Past IJC: p = .944</td>
</tr>
</tbody>
</table>

**RQ 3B. Is the use of teen teachers related to the magnitude of pre- to post-intervention changes in program outcomes as measured by the IJC survey?**

Research Question 3B assessed whether participants who did and did not have teen teachers differed in program outcomes (pre- to post-test changes in survey subscale scores), controlling for gender and past participation in IJC. Approximately 19% of youth participated at sites that had teen teachers. This research question was analyzed using one-way analyses of covariance (ANCOVA) for each survey subscale. Preliminary analyses were conducted to ensure that the assumptions for these statistical tests were not violated. Descriptive statistics for changes in IJC survey scores from pre- to post-intervention (program outcomes) grouped by participants with and without teen teachers are included with results of ANCOVA analyses with each survey subscale are displayed in Table 14. Results of ANCOVA analyses are presented in Table 14, and demonstrate that participants who were taught by teen teachers did not differ significantly from participants without teen teachers in any outcome variable.
Table 14. ANCOVA for Differences in Pre- to Post-Test Survey Change Scores for Participants with and without Teen Teachers

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD) Change Pre to Post</th>
<th>F</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Teen Teachers</td>
<td>No Teen Teachers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooking Self-Efficacy</td>
<td>0.37 (0.34)</td>
<td>0.32  (0.49)</td>
<td>0.49</td>
<td>1, 303</td>
</tr>
<tr>
<td>Cooking Attitudes</td>
<td>0.08 (0.23)</td>
<td>0.10  (0.37)</td>
<td>-0.01</td>
<td>1, 303</td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>0.09  (0.29)</td>
<td>0.08  (0.34)</td>
<td>0.01</td>
<td>1, 303</td>
</tr>
<tr>
<td>Cooking Behaviors</td>
<td>-0.01 (0.85)</td>
<td>0.01  (0.78)</td>
<td>-0.91</td>
<td>1, 303</td>
</tr>
<tr>
<td>Healthy Eating Behaviors</td>
<td>-0.01 (0.71)</td>
<td>0.11  (0.69)</td>
<td>-3.13</td>
<td>1, 303</td>
</tr>
</tbody>
</table>

*Note. Estimated marginal means (accounting for covariate influence) are displayed. Participants who had teen teachers were coded as 1, those without teen teachers were coded as 0. Females were coded as 0 and males were coded as 1. Youth who participated in IJC in the past were coded as 1, those who hadn’t were coded as 0. The influence (p-value) of covariates (gender and past participation in IJC) on each subscale is listed below.*

- Cooking Self Efficacy: Gender: $p = .096$ Past IJC: $p = .012$
- Cooking Attitudes: Gender: $p = .976$ Past IJC: $p = .006$
- Fruit & Vegetable Preferences: Gender: $p = .762$ Past IJC: $p = .642$
- Cooking Behaviors: Gender: $p = .790$ Past IJC: $p = .840$
- Healthy Eating Behaviors: Gender: $p = .457$ Past IJC: $p = .142$

**RQ 3C.** *Are the number of hours of programming delivered (dose) to participants related to the magnitude of pre- to post-intervention changes in program outcomes as measured by the IJC survey?*

Research Question 3C assessed whether participants who received the recommended 10 hours of programming and participants who received more than the recommended hours differed in program outcomes (pre- to post-test changes in survey subscale scores), controlling for gender and past participation in IJC. Approximately 75% of youth participated at sites that delivered the IJC lessons in the recommended 10 hours, with approximately 25% of participants receiving more than 10 hours of programming. For sites where the number of hours of programming exceeded recommendations, the average length of programming delivered was 13.4 hours. This research question was analyzed using analyses of covariance (ANCOVA) for each survey subscale. Preliminary analyses were conducted to ensure that the assumptions for these statistical tests were not violated. Descriptive statistics for changes in IJC survey scores from pre- to post-intervention (program outcomes) grouped by participants who received 10 or more hours of programming are included with results of ANCOVA analyses with each
survey subscale are displayed in Table 15. Findings from ANCOVA analyses (also presented in Table 15) demonstrate that participants who received more than the recommended 10 hours of programming had worse program outcomes than participants who received the recommended 10 hours, with significant differences between these groups for cooking self-efficacy and cooking attitudes.

Table 15. ANCOVA for Differences in Pre- to Post-Test Survey Change Scores for Participants with Ten Hours and More Than Ten Hours of Programming

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD) Change Pre to Post</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ten Hours</td>
<td>More Than Ten Hours</td>
<td>F</td>
<td>df</td>
</tr>
<tr>
<td>Cooking Self-Efficacy</td>
<td>0.37 (0.46)</td>
<td>0.22 (0.38)</td>
<td>8.03</td>
<td>1, 363</td>
</tr>
<tr>
<td>Cooking Attitudes</td>
<td>0.12 (0.33)</td>
<td>-0.02 (0.41)</td>
<td>10.75</td>
<td>1, 363</td>
</tr>
<tr>
<td>Fruit &amp; Vegetable Preferences</td>
<td>0.11 (0.35)</td>
<td>0.05 (0.26)</td>
<td>1.87</td>
<td>1, 363</td>
</tr>
<tr>
<td>Cooking Behaviors</td>
<td>0.12 (0.80)</td>
<td>-0.01 (0.73)</td>
<td>1.83</td>
<td>1, 363</td>
</tr>
<tr>
<td>Healthy Eating Behaviors</td>
<td>0.02 (0.72)</td>
<td>-0.07 (0.58)</td>
<td>0.99</td>
<td>1, 363</td>
</tr>
</tbody>
</table>

Note. Estimated marginal means (accounting for covariate influence) are displayed. Participants with ten hours of programming were coded as 1, participants with more than ten hours of programming were coded as 0. Females were coded as 0 and males were coded as 1. Youth who participated in IJC in the past were coded as 1, those who hadn’t were coded as 0. The influence (p-value) of covariates (gender and past participation in IJC) on each subscale is listed below.

Cooking Self Efficacy Gender: $p = .001$ Past IJC: $p = .051$
Cooking Attitudes Gender: $p = .009$ Past IJC: $p = .762$
Fruit & Vegetable Preferences Gender: $p = .690$ Past IJC: $p = .691$
Cooking Behaviors Gender: $p = .140$ Past IJC: $p = .392$
Healthy Eating Behaviors Gender: $p = .694$ Past IJC: $p = .957$
Chapter Seven: Discussion

The current study used a multipronged approach to evaluate the effectiveness of the Illinois Junior Chefs (IJC) program and the influence of demographic and implementation variables. Data were collected through a pre-post intervention design and used IJC surveys and a novel observational protocol that assessed hands-on cooking skills. The specific objectives of the study were to 1) evaluate the effectiveness of the IJC Program through surveys, 2) assess gender effects in IJC survey data, 3) evaluate the effectiveness of the IJC Program through the development of a feasible hands-on cooking skills assessment, and 4) assess the impact of program implementation variables. Research Questions 1A and 2B investigated program effects through surveys and skills assessments, Research Question 2B investigated the feasibility of the skills assessment, Research Questions 1A and 1B investigated gender effects, and Research Questions 3A-C investigated the impact of lesson structure, teen teachers, and hours of programming on the magnitude of program outcomes.

The results of the study showed that participants in IJC experienced significant improvements in all expected domains (cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors) as measured by the IJC survey. A subgroup of participants also experienced significant improvements in all cooking skills (measuring water, flour, and sugar, beating, folding, using a peeler, using a grater, and cracking eggs) from the hands-on skills assessment. Male participants experienced greater improvements in self-efficacy and food preferences as a result of the program than female participants. Female participants, when analyzed separately, experienced significant improvements in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors, (with non-significant improvements in healthy eating behaviors) mirroring the findings for the sample as a whole. Male participants also experienced improvements in all targeted domains, with significant improvements in cooking self-efficacy, cooking attitudes, and fruit and vegetable preferences from pre-to post-intervention. Findings also revealed that consecutive classes were generally more impactful than non-consecutive classes, no effect of teen teachers, and that additional hours of programming beyond the required 10 hours were associated with poorer program outcomes. Findings for each research question are discussed sequentially below.

Program Outcomes: IJC Surveys

Responses to IJC surveys revealed that participants in the program experienced positive changes in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors. Improvements on survey subscales were highly significant for all areas but healthy eating behaviors, which demonstrated non-significant improvements. These findings are in line with our hypotheses, which predicted significant improvements in all domains measured by the IJC survey (cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors)
except for healthy eating behaviors, which were not expected to change during the short duration of this five-lesson program. Our findings also replicate those found in the existing literature on IJC (Metcalfe & McCaffrey, 2016), and hands-on cooking programs as a whole (e.g., Cunningham-Sabo & Lohse, 2013; Fulkerson et al., 2010), which have also documented positive outcomes with self-efficacy, attitudes, preferences, and cooking behaviors resulting from these culinary interventions.

These findings are consequential because they lend strong support to the evidence base documenting the effectiveness of the IJC Program. The documentation of significant positive program outcomes is important to the continued refinement and implementation of the IJC Program, which is a large program that demands substantial resources. While evaluations with IJC data occur yearly (see Jarick et al., 2015; Metcalfe, Fiese, Liu, et al., 2018; Metcalfe & McCaffrey, 2016), it is crucial to conduct ongoing evaluations to assess each phase of refinements in the program and build the evidence base for its effectiveness. Large-scale program evaluations of statewide nutrition education programs are not common, and this study makes a substantial contribution to the literature by clearly documenting the significant program outcomes related to participation in IJC.

Gender effects. The influence of gender on IJC survey program outcomes was examined through an investigation of the main effect of gender on pre- to post-test changes in survey scores, and subgroup analyses with each gender. Overall, findings indicated that male participants experienced larger improvements in cooking self-efficacy, cooking attitudes, and fruit and vegetable preferences than females, with significantly larger improvements in cooking self-efficacy.

These findings are not surprising given current literature on gender differences in cooking program outcomes. In their evaluation of the Cooking with Kids program, Cunningham-Sabo and Lohse (2014) found that males experienced larger improvements in cooking self-efficacy than females after participating in the hands-on cooking program. According to SCT, changes to personal psychosocial factors (like self-efficacy, preferences, and attitudes) can be seen as precursors or even prerequisites to behavior change. Individuals are unlikely to engage in spontaneous changes in cooking behaviors (or health behaviors more broadly) without first experiencing improvements in precursors like self-efficacy, preferences, and attitudes (Bandura, 1998). It could be possible that male participants, who experienced greater improvements in self-efficacy, preferences, and attitudes, but not cooking or eating behaviors, were (on average) lagging slightly behind female participants in this behavior change cycle.

Subgroup analyses with male and female participants separately assessed survey-based program outcomes for each gender. Findings from these analyses revealed similar patterns to program outcomes for the sample as a whole, with some differences in significance levels. Program outcomes with female participants were not significantly different from program outcomes for the entire sample – both groups saw significant improvements in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences,
and cooking behaviors, with non-significant improvements in healthy eating behaviors. Male participants also experienced significant improvements in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, with non-significant improvements in cooking behaviors and healthy eating behaviors. It should be noted that there were approximately 50% fewer males than females in this study (204 vs. 392), making researchers less likely to be able to detect the same level of effect in males due to decreased statistical power and sample size for these subgroup analyses. This reduced sample size diminished our ability to detect statistically significant changes from pre- to post-test in subgroup analyses with male participants. As was discussed above, it is also possible that male participants did not experience significant improvements in cooking behaviors because improvements in cooking self-efficacy, attitudes, and food preferences can be seen as precursors to changes in health behaviors.

These findings indicate that both male and female participants experienced significant benefits after participating in the IJC Program. It seems possible that male participants, on average, fell slightly behind female participants in the behavior change cycle, such that they experienced significant improvements in cooking self-efficacy, cooking attitudes, and fruit and vegetable preferences, but non-significant improvements in cooking behaviors. The influence of past participation in the IJC Program will now be discussed.

Past participation in Illinois Junior Chefs. Past participation in IJC was included as a covariate in all analyses of IJC survey data. Though this variable was included as a covariate and not an independent variable, findings from these analyses still showed a significant impact of past program participation on program outcomes. Past program participation was associated with significantly higher survey scores in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, and cooking behaviors at baseline. Pre- to post-program changes in survey scores showed stronger program outcomes among participants who had no past experience with IJC.

These findings regarding the influence of past participation in IJC are not surprising given the literature examining the impact of past cooking experience on outcomes in youth cooking programs. Research examining the influence of past participation in the same program (as we have in this study) is not especially common, but studies do exist that examine the influence of prior cooking experience on program outcomes in hands-on cooking programs with youth. A study by Cunningham-Sabo and Lohse (2014) found that participants in Cooking with Kids who did not have prior cooking experience had significantly larger improvements in cooking self-efficacy and attitudes than participants who had prior cooking experience. This finding supports the conclusions drawn in this study, and demonstrates that participants with minimal prior cooking experience and more room to improve upon baseline scores have the potential to experience increased benefits from culinary education.
**Hands-On Cooking Skills Assessment**

An observational protocol was successfully developed that allowed for the evaluation of hands-on cooking skills pre- and post-intervention. To our knowledge, this was the first hands-on cooking skills assessment protocol for youth that has demonstrated feasibility and reliability between observers. The protocol was also designed to be an engaging and enjoyable recipe following activity for youth participants. The feasibility of the tool and the findings related to program outcomes are outlined below.

**Feasibility.** Complete data were collected from all 37 participants in the hands-on skills testing assessment protocol. Given that complete data were obtained for 100% of skills variables, the protocol was deemed feasible based on predetermined criteria. The confirmed feasibility of this protocol adds to the literature by proving that it is possible to use a hands-on observational protocol to assess cooking skills. At an average completion time of seven minutes per student, the hands-on skills tests were actually faster to individually complete than the IJC surveys which take around 10-15 minutes for a class to complete. The testing protocol does however require trained research assistants to administer the testing protocol to students one-on-one, and therefore could only be completed in less time than the survey if there were enough personnel resources to run the data collection protocol with a large proportion of the class at once.

Though data were not collected from or about students who chose not to participate, there were several students who chose not to complete the assessment. It is possible that those students who declined to participate had minimal cooking confidence or experience, and did not want to do the skills assessment. While we acknowledge that there might be selection effects between youth who did and did not participate (in cooking self-efficacy, experience, or skills for example), the current study did not allow us to draw these conclusions. Because we did not perform and official data collection with those students who chose not to participate, it is not possible to draw any valid conclusions about this group. Future research using the skills testing assessment protocol could consider collecting qualitative data from students who choose not to participate to better understand why students might chose not to do the skills test. It is important to continue to refine the hands-on skills assessment protocol to ensure that it is an approachable activity in which youth are willing to participate.

**Program outcomes: Cooking skills assessment.** Findings from the hands-on assessment of cooking skills indicated that participants significantly improved their proficiency with all eight cooking skills (measuring water, sugar and flour, beating, folding, using a grater, using a peeler, and cracking eggs). The findings from analyses of hands-on skills data were in line with hypotheses which predicted that participants would experience improvements in all cooking skills assessed by the observational protocol.
Given that this is the first observational protocol of its kind to assess hands-on cooking skills, it is difficult to evaluate this finding in the context of extant literature. While survey-based data from previous cooking programs with youth claim that they saw improvements in cooking skills, these findings were collected through surveys that cannot in actuality measure skills themselves (Caraher et al., 2013; Fulkerson et al., 2010; Thomas & Irwin, 2011; Thonney & Bisogni, 2006). Though it is possible that survey measures of cooking skills are related to tangible skills themselves, there is currently no research investigating this question or suggesting that this is the case. In seeing improvements in cooking skills as a result of the IJC Program, our results align with literature suggesting cooking programs can improve cooking skills, but our findings are novel in that no published literature evaluates youth cooking skills objectively through observations.

These findings confirming that participation in IJC does in fact have a significant positive impact on hands-on cooking skills build upon the evidence base supporting the effectiveness of the program, while contributing a new type of assessment and data collection method to the literature. These findings are important because they indicate that participation in IJC results in significant improvements in its key behavioral target – cooking skills. Though the program endeavors to improve self-efficacy, attitudes, food preferences and behaviors as well, the truly unique component of the program is the intensive focus on the development of hands-on cooking skills. Findings from this novel data collection method show that cooking skills themselves are improving as a result of the program, lending evidentiary support for both the efficacy of IJC and hands-on youth cooking programs as a whole.

It should be noted that the subsample of youth who participated in hands-on skills assessments was notably different from the broader sample in several ways. Compared to the full sample, the skills testing sample had a slightly more even gender distribution, fewer Caucasian and more African American participants, and more participants who had participated in IJC in the past. Due to these differences, the skills testing subsample was not considered to be representative of the full sample, and results from the skills assessment are limited in that they cannot be generalized to all IJC participants.

Implementation Effects

The final objective of this study was to assess the influence of implementation effects (consecutive vs. non-consecutive classes, teen teachers vs. no teen teachers, and 10 vs. more than 10 hours of programming) on program outcomes (pre- to post-test changes in IJC survey subscales: cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and healthy eating behaviors). Overall, findings indicated that participants in consecutive IJC classes experienced stronger program outcomes, teen teachers did not have a strong influence on program outcomes, and participants who received the recommended 10 hours of IJC had stronger program outcomes than participants who received more than 10 hours of programming. Recommendations for best practices in implementing IJC
based on these findings include scheduling classes consecutively if possible, but avoiding extending the length of classes much beyond the two hour per lesson recommendations. Each of these implementation effects will be reviewed sequentially below.

**Lesson structure.** Youth who took part in IJC over consecutive (as opposed to non-consecutive) classes experienced larger improvements in IJC subscale scores, with significantly larger improvements in cooking self-efficacy and cooking attitudes.

Our findings align well with literature suggesting that increases in program intensity can relate to stronger program outcomes (Greenwood, 2009). One challenge with evaluating the findings of this study in light of current literature is that there is more than one way to conceptualize program intensity, and the influence of increased program intensity is not uniform across studies or populations (Greenwood, 2009). This notion will also be discussed later in relation to findings regarding the influence of increased hours of IJC programming.

Given the findings reviewed here, this study lends support to the notion that consecutive IJC classes might be more impactful than non-consecutive classes. While our findings suggest that consecutive classes might be a preferable class structure for IJC, we also acknowledge that many sites are unable to offer flexibility regarding the timing of scheduled lessons. Since IJC is frequently implemented as part of a larger program, recruiting new sites requires IJC instructors to adhere to the time constraints at the implementation site. Findings related to lesson structure should also be interpreted with caution since participants who received participated in non-consecutive lessons only constitutes about 21% of our sample. It is important to note possibility that additional unmeasured factors could be related to whether instructors chose to schedule consecutive or non-consecutive classes and driving the outcomes we see here. Though data were not collected on participant attendance, it is also possible that attendance rates differed between consecutive and non-consecutive classes. In order to capture more detail about implementation effects and parse out the influence of multiple implementation variables, future research with IJC should make attempts to measure and evaluate additional factors (e.g., nutrition educator years of experience, partnerships with program sites, implementation fidelity, participant attendance), that may be related to implementation and program outcomes.

**Teen teachers.** Overall, findings indicated that there was not a consistent or significant effect of teen teachers on program outcomes. In examining the impact of the assistance of teen teachers in leading IJC classes, we found no significant differences between participants who did and did not have teen teachers, and inconsistent directional effects based on this variable. Though these were exploratory analyses, findings related to the non-significant influence of teen teachers are somewhat surprising given the literature on peer leaders in nutrition education. Nelson, Corbin, and Nickols-Richardson (2013) outline theoretical and empirical support for the use of peer leaders to increase the efficacy of hands-on
cooking programs. Studies of interventions that have utilized teen or peer leaders have seen positive program outcomes (Lytle et al., 2004; Pérez-Escamilla, Hromi-Fiedler, Vega-López, Bermúdez-Millán, & Segura-Pérez, 2008; Stock et al., 2007), but rarely compare the influence of peer leaders to traditional education without the assistance of peer leaders.

The lack of findings related to the utilization of teen teachers in this study should be interpreted with caution, as these findings do not constitute conclusive evidence that teen teachers do not influence program outcomes. Findings related to the use of teen teachers should also be interpreted with caution since participants who had teen teachers represented less than 20% of our sample. It should be noted that the inconsistent effects of teen teachers could be related to the high degree of variability in both the training IJC teen teachers receive and their implementation in the IJC Program. Though a standardized curriculum is used to train teen teachers, different Extension regions have different resources available to dedicate to teen teachers training, and teen teachers receive substantially less training than the professional Extension nutrition educators who typically implement the program. The training is mainly focused on teaching teen teachers the requisite nutrition knowledge required to teach IJC, with slightly less attention paid to how to teach these skills to others, and little incorporation of theory or content relevant specifically to teen teachers (as opposed to nutrition educators more broadly). Though efforts were made to create a uniform training program, the use of teen teachers in this IJC Program was not a theoretically based implementation of peer leaders. Additionally, anecdotal observations of IJC classes in 2016 found that teen teachers played a variety of different roles across sites, with some actively leading classes (with only limited assistance from Extension nutrition educators) and others taking on minimal teaching responsibilities (with Extension staff leading classes). This variability in the degree of involvement of teen teachers makes it challenging to draw conclusions about their impact, given the inconsistency with which they were implemented. Finally, it is relevant to note that some teen teachers continued to participate in IJC as peer leaders for multiple years, and therefore have additional experience teaching the program (above and beyond what we would expect from new teen teachers).

Ultimately, future researchers interested in investigating the influence of peer leaders should implement a more consistent, theoretically grounded training program. Additionally, researchers should attempt to measure or control for other factors (e.g., years of experience with the program, cooking experience or skills) that may impact the influence of teen teachers or be related to their inclusion in a program. The inconsistent effect of teen teachers in this study should not be interpreted as conclusive evidence that peer leaders can’t have a positive influence on IJC outcomes, and future research with the IJC Program should increase the theoretical underpinnings of the training program, and endeavor to evaluate the impact of teen teachers (and potentially associated variables) in more detail. While teen teachers could have a positive effect on youth outcomes in culinary interventions (Nelson et al., 2013),
the assistance of teen teachers during IJC was not consistently implemented in this study, and therefore
definite conclusions should not be drawn about the potential influence of peer leaders in IJC.

**Hours of programming.** Youth who participated in the IJC Program in the recommended 10
hours generally had stronger program outcomes than youth who participated in more than 10 hours of
programming. Differences between these groups were significant for cooking self-efficacy and cooking
attitudes, and participants who received only 10 hours of programming also experienced slightly larger
changes in fruit and vegetable preferences, cooking behaviors, healthy eating behaviors. In this study,
participants at sites with greater than 10 hours of programming also experienced longer lessons, which
could have been detrimental since lessons were designed to be of a length that was appropriate for youth
aged 8-13. Increased program length is not always related to stronger program outcomes, and when the
program is delivered over a different number of hours than intended, this can potentially result in
significant changes to the pace or amount of content for each lesson. Implementing the IJC Program over
more than 10 hours would not be considered an evidence-based application of the IJC Program, since the
intervention was designed (and effectiveness evidence was collected) based on five two-hour lessons.
These findings confirm the efficacy of original design of the program (five two-hour lessons), and show
that deviations from the recommended 10 hours of programming were not beneficial. It is also important
to note that additional unmeasured factors could have been related to whether instructors decided to
increase the program length beyond the 10 hour requirement. Findings related to the hours of
programming received should also be interpreted with caution since participants who received over ten
hours of programming only represented 25% of our sample.

These finding have mixed support in the literature, though studies of program length or intensity
on the influence of children’s cooking programs are not common (Hersch et al., 2014), general research
from the fields of learning sciences and instructional design can shed light on these findings. Though
increased program length and intensity is sometimes related to stronger program outcomes, it is also
important to keep treatment integrity in mind, implementing interventions as they were designed to create
replicable outcomes (Greenwood, 2009). Though some participants in certain programs seem to benefit
from increased program exposure, this effect is not uniform, and for each intervention there is a different
“sweet spot” where the dose or length of a program is fine tuned to elicit maximum program outcomes.
Future research on the impact of program length with IJC should also measure other variables that may be
related to or influence program duration. The overall strengths and limitations of this dissertation will
now be discussed in turn.

**Study Strengths and Limitations**

**Strengths.** This dissertation study, though not without limitations, has several key strengths
worth noting. First, a key strength of this study is that it fully incorporated SCT constructs into both IJC
program design and evaluation. The program itself was designed both to target relevant SCT predictors of dietary behavior change (self-efficacy, attitudes, preferences, and skills), and to be tailored to the program audience based on key SCT contextual factors like SES. The evaluation of the program was also designed to be theoretically informed, as the outcomes measured (self-efficacy, attitudes, preferences, skills, and behaviors) are key determinants of intervention-induced behavior change according to SCT. In addition to measuring theoretically relevant outcomes, analyses included assessment of the demographic influences of gender and past participation in IJC on program outcomes. This attention paid to individual demographic factors is methodologically in accordance with SCT, which posits that personal factors (such as gender and past experiences) can have a strong influence on behavior.

An additional unique strength of this dissertation study is that it included the development of a novel observational protocol to assess hands-on cooking skills in youth. The development of this protocol makes an important contribution to the literature on hands-on cooking programs for youth audiences. Currently, hands-on culinary education programs are most frequently evaluated using surveys, which by nature cannot accurately assess culinary skills. Given that most hands-on cooking programs include objectives surrounding teaching participants culinary skills, the protocol developed in this study makes a crucial contribution by providing researchers with a feasible protocol to observationally assess skills themselves, instead of using surveys to measure self-efficacy as a proxy for cooking skills.

The current study was a rigorously designed pre-post program evaluation and collected data from a large, representative sample of IJC Program participants from across the state of Illinois. The study design, large sample size, and collection of data related to demographic and implementation variables also allowed for more detailed subgroup and covariate analyses. Analyses leveraged the natural variability in implementation variables (lesson structure, teen teachers, hours of programming) to better understand the influence of these variables on program outcomes. Insights gleaned from these analyses could allow for recommendations to be made regarding IJC implementation that could improve the efficacy of the program without requiring changes to the curriculum itself or the resources used to deliver it.

**Limitations.** Though the current study aims to address weaknesses in the current literature on hands-on cooking programs, this research is not without limitations. First, it was not possible to obtain an individual-level measure of SES, and as a result, we were unable to account for or analyze the impact of this factor during the analysis phase of this study. School-aged children often do not have knowledge about family-level factors like income level and cannot be expected to reliably provide data on these topics. Extant research indicates that individuals of lower SES have experienced the steepest decline in cooking behaviors in recent years, and that this group encounters several unique barriers to engaging in healthy cooking (Kirkpatrick et al., 2012; Smith et al., 2013). Though it could have been possible to derive some contextual measures of SES from the data included in this study, we did not feel that
community-level measures of SES would accurately capture the influence of this factor on individual student outcomes. Ultimately, because the main outcomes of interest were measured at the individual level (IJC survey and skills data), it was deemed inappropriate to include a contextual or community level measure of SES. We acknowledge the important influence that SES has on cooking attitudes and behaviors, and recognize that not measuring SES variables is a limitation of this study.

This study also does not include any measures or assessments of fidelity, which we acknowledge is a limitation of this research. Though attention to fidelity is an important component of scaled up and widely disseminated interventions, it was not possible to obtain a valid, objective measure of fidelity in this study. Given the statewide nature of the implementation of the IJC Program, there were not enough resources to conduct thorough fidelity observations at each of the 48 sites. Though we were not able to measure fidelity directly, participants who did not receive the intervention as intended (those who were outside of the target 8-13 age range and those who received less than 10 hours of programming) were not included in the analytic sample. This approach was taken with the goal of excluding participants who received low-fidelity implementations of IJC from the analyses. We acknowledge that this approach only captured two aspects of the intervention (target age group and hours of programming) which could be implemented with low fidelity, and that this study is limited in that it did not include a more comprehensive and objective measure of fidelity.

Additionally, this study was limited in that it did not include any control group to allow for comparison between those who participated in IJC and a group that did not receive the intervention. Control groups are not especially common in Extension-based implementation research, and pre-post evaluation designs (similar to the one used in this study) are a more typical method to assess program outcomes. Though the lack of a control group in this study is not atypical for evaluation research with Extension-based nutrition education programs, we nonetheless acknowledge that it is a limitation of this research.

A final limitation of this study is that it did not include any longitudinal data collection to allow for follow-up to assess whether program impacts persisted over time. Though longitudinal follow-up of participants is ideal in evaluations of program impact, while the long-term follow up of parents or adults who participate in cooking programs is common (Flego et al., 2014; Garcia, Reardon, McDonald, & Vargas-Garcia, 2016), this type of methodology is not especially popular with children’s cooking programs. Extension-based programs, unlike school-based programs, often have a harder time tracking participants over long time periods since it is easy for researchers to lose their point of contact if youth no longer attend programs at the site where the intervention took place. Though it would not have been possible to follow the participants in this study long enough to assess longitudinal effects of IJC, we
recognize that this is a limitation of the research. The limitations of this research can help provide potential avenues for future research, which will be discussed in the next section.

Future Research

**Future research with Illinois Junior Chefs.** While this dissertation included a wide variety of research questions and analyses with different types of data, there are still additional research questions that can be answered from the data collected in this study. Specifically, planned future analyses will explore the relationship between survey data and hands-on cooking skills testing data. Each cooking skill taught in IJC is assessed on both the IJC survey (through questions about cooking self-efficacy with specific skills) and through the skills testing assessment. Analyses examining the relationship between survey data and skills data with specific cooking skills will help determine whether these two data collection methods are truly measuring different constructs (self-efficacy vs. skills), or if there is in fact a high degree of association between self-reported confidence levels and observed behavioral cooking skills. Results from these analyses will aid in evaluating the utility of the hands-on cooking skills assessment protocol, as this more intensive data collection method is only warranted if it helps gather richer data which would not be captured through survey measures of cooking skills.

**Recommendations for future basic research.** This dissertation lays ample groundwork for further investigation in the area of basic research. Specifically, the hands-on skills testing assessment protocol developed as part of this study provides several potential avenues for future measurement research. To investigate the external validity of the hands-on cooking skills assessment, it will be necessary to utilize this data collection protocol with different youth populations and additional hands-on cooking programs besides Illinois Junior Chefs. This psychometric research could include studies to examine test-retest reliability of the skills assessment protocol, or use of the protocol to assess the efficacy of other hands-on cooking programs. IJC researchers have already begun to communicate with researchers from other hands-on cooking programs for youth who are interested in collaborating on the implementation of the hands-on cooking skills assessment with their own programs. It is important to note that the cooking skills testing protocol should always be tailored to assess the particular cooking skills that are taught in the program being evaluated (or skill set of interest in lieu of an intervention). Currently, the skills testing protocol collects data specifically on the eight skills taught in the IJC curriculum, so changes would need to be made to reflect any differences in targeted cooking skills between IJC and any new programs being evaluated. After adequate psychometric research has been conducted to support the validity and reliability of the hands-on cooking skills assessment protocol, this data collection method can be packaged for use with non-IJC cooking programs and disseminated.

**Recommendations for future applied research.** In light of the findings, methods, and limitations of this study, several recommendations can be made for future applied research. The key
question that remains regarding hands-on culinary education programs for youth is whether these experiential programs are in fact more effective than more traditional, demonstration-based culinary and nutrition education. Given the increased resources, time, and preparation involved in teaching hands-on vs. demonstration-based cooking classes, it is important to determine whether experiential, hands-on classes offer any additional benefit. To allow these comparisons to be made, it is recommended that future research in this area consider the inclusion of a control group(s). Including control or comparison groups would be especially important to allow researchers to determine whether hands-on cooking programs truly have stronger program outcomes than culinary or nutrition education programs which do not have hands-on components. While an abundance of evidence exists supporting the efficacy of specific culinary education programs (Hersch et al., 2014; Muzaffar et al., 2018), scant research exists that compares the effectiveness of experiential hands-on cooking programs with demonstration-based culinary education.

In addition, future research with hands-on culinary programs should attempt to collect longitudinal follow-up data to allow for the assessment of long-term impacts of youth participation in experiential cooking programs. Programs that teach participants hands-on culinary skills have the potential for sustained long-term impact because participants can use their newly gained skills to prepare a wide variety of healthy foods beyond those specific recipes taught during classes (Hoffinger, 2016). Culinary skills are unique in that different skills can be combined or used in new contexts to aid in the development of increased cooking abilities. In this way, intervention effects from hands-on cooking programs have the potential to be compounded even after the conclusion of the program as participants utilize skills in new ways and combine different cooking techniques to make new recipes. The collection of longitudinal follow-up data in the evaluation of hands-on culinary education programs will allow for the assessment of potential long-term impacts of such programs.

Lastly, it is recommended that future research in the area of nutrition education and even program implementation more broadly attend to, measure, and analyze the impact of implementation and program delivery variables. A key challenge of evaluating scaled-up outreach programs is the inevitable high degree of variability in implementation variables and intervention fidelity (examples include lesson timing, instructor experience level, fidelity of implementation). Inherent in this challenge however, is an opportunity to measure these implementation variables and analyze their influence on program outcomes. When variability occurs in a factor related to program implementation, this factor can often be measured to assess for differences between sites or rounds of implementation. Methods focused on assessing the impact of implementation effects take advantage of the challenges inherent in this type of evaluation research, and can leverage variability in program delivery to better understand how to implement the program to its greatest effect.
Implications for Policy and Practice

As a SNAP-Ed funded program, IJC findings and the growing evidence base for the intervention have clear implications for policy and practice. IJC is a program that serves the stated focus of SNAP-Ed, to “help the SNAP-Ed target audience establish healthy eating habits” (SNAP-Ed Plan, 2018, p. 5). This intervention also aligns with several SNAP-Ed guiding principles, including targeting communities with significant low-income populations, using a combination of educational approaches, and providing education to children (SNAP-Ed Plan, 2018). IJC uses a combination of educational approaches by allowing participants opportunities to observe demonstrations, taste new foods, practice hands-on cooking skills, and prepare full recipes. The SNAP-Ed literature also identifies providing education to children as an area with the “greatest potential impact,” a notion that is supported by our strong program outcomes in this youth education program. In accordance with SNAP-Ed guidance, IJC is an evidence-based, behaviorally focused intervention with demonstrated program outcomes. Strong findings from well-designed studies can like this one can be used for priority setting in SNAP-Ed and to strengthen the evidence base documenting the impact of SNAP-Ed programming.

Conclusions

The dissertation project presented here contributes strong evidence supporting the effectiveness of the IJC Program in eliciting positive program outcomes in cooking self-efficacy, cooking attitudes, fruit and vegetable preferences, cooking behaviors, and cooking skills. This study was the first of its kind to use an observational assessment protocol to collect data on youth participants’ tangible hands-on cooking skills. This research constitutes a key contribution to the evidence base supporting the use of hands-on culinary education with youth in community settings. Findings from this project will be used to advocate for increased development of and funding for hands-on culinary education programs, and in turn, has the potential to have a positive influence on the cooking behaviors and dietary health of young Americans.
References


Appendix A: Recruitment Flyer – English

Learn to Cook This Summer!

University of Illinois Extension’s Illinois Nutrition Education Programs are offering a series of kid–friendly cooking classes. Our Illinois Junior Chefs program is a great way for your child to learn basic cooking skills while having fun. All classes are free of charge! Ages 8 to 13 years old.

Easy to make, tasty recipes
Tips to stay safe in the kitchen
Tips on eating healthy!

Class Information:

Contact:

This material funded by USDA’s Supplemental Nutrition Assistance Program – SNAP and Expanded Food and Nutrition Education Program – EFNEP. University of Illinois Extension * United States Department of Agriculture * Local Extension Councils Cooperating. This institution is an equal opportunity provider.
¡Aprenda a cocinar este verano!

Los Programas Nutricionales de la Extensión de la Universidad de Illinois están ofreciendo una serie de clases de cocina amigable para niños. Nuestro programa de Junior Chefs de Illinois es una excelente forma para que su hijo aprenda habilidades de cocina básica mientras se divierte. El programa está disponible en su área sin ningún costo. Las clases son para niños de 8 a 13 años.

Recetas sabrosas fáciles de preparar
Consejos de seguridad en la cocina
¡Consejos para comer saludable!

Información del campamento:

Contáctenos para más información:

Este material fue financiado por el Programa de Asistencia Nutricional Complementaria (SNAP) y EFNEP. Universidad de Illinois * Departamento de Agricultura de Estados Unidos * Conclios de Cooperación Local de la Extensión.
Esta institución es un proveedor que ofrece igualdad de oportunidades.
Si necesita adaptaciones razonables para participar, por favor contactar a la oficina de registro.
Appendix C: Illinois Junior Chefs Survey

Illinois Junior Chefs Program Survey

I have been told that I can choose to answer the questions in this packet or not. If I choose not to answer any or all questions I won’t get into trouble. If I write my name below, it means I plan to answer the questions in this packet. If I don’t write my name, it means I don’t want to do this.

Name: __________________________
Can you do these things? Please fill in the circle to mark your answer.

<table>
<thead>
<tr>
<th></th>
<th>YES! For Sure</th>
<th>Yes, Maybe</th>
<th>No, Maybe not</th>
<th>NO! Not at all</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I can make a snack with fruit</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2. I can make a snack with vegetables</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. I can use a recipe</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. I can make a meal with family</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5. I can make a salad</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6. I can cut food</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>7. I can measure ingredients</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>8. I can follow recipe directions</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>9. I can make healthy choices when I’m out to eat</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10. I can help make healthy choices at the grocery store</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>11. I can talk to my family about healthy eating</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>12. I can talk to my family about healthy cooking</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>13. I can use a knife safely</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>14. I can use a grater to shred or grate vegetables</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>15. I can juice a lemon or orange</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>16. I can use a peeler to peel vegetables</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>17. I can use spices to make food taste better</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>18. I can crack an egg</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

How do you feel about these activities? Please fill in the circle to mark your answer.

<table>
<thead>
<tr>
<th></th>
<th>I really like to do this</th>
<th>I kind of like to do this</th>
<th>I don’t like to do this</th>
<th>I really don’t like to do this</th>
<th>I’m not sure if I like to do this</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How do you feel about cooking?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2. How do you feel about eating food you helped cook?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. How do you feel about measuring ingredients?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. How do you feel about making snacks?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5. How do you feel about making food with friends?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6. How do you feel about making food with family?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
How much do you like these foods? Please fill in the circle to mark your answer.

<table>
<thead>
<tr>
<th></th>
<th>I really like this food</th>
<th>I kind of like this food</th>
<th>I don't like this food</th>
<th>I really don't like this food</th>
<th>I'm not sure if I like this food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bananas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broccoli</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apples</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oranges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How often do you do these things? Please fill in the circle to mark your answer.

<table>
<thead>
<tr>
<th></th>
<th>Never or Almost Never (0 days a week)</th>
<th>Some Days (1-3 days a week)</th>
<th>Most Days (4-6 days a week)</th>
<th>Every Day (7 days a week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In a normal week, I eat vegetables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. In a normal week, I eat fruit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. In a normal week, I choose healthy snacks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. In a normal week, I eat breakfast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. In a normal week, I do physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. In a normal week, I cook at home</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. In a normal week, I go grocery shopping with my family</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. In a normal week, I help my family plan meals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. How old are you? ____________ Years old

2. Are you:
   ○ Male (a boy)
   ○ Female (a girl)

3. Are you: (You can select more than one answer)
   ○ White
   ○ Black or African American
   ○ Asian
   ○ Native American or Alaskan Native
   ○ Native Hawaiian or Pacific Islander
   ○ Biracial/Multiracial
   ○ Other

4. Are you Hispanic or Latino?
   ○ Yes
   ○ No

5. Have you ever participated in a cooking program before?
   ○ Yes
   ○ No

6. Have you ever participated in Illinois Junior Chefs/Kids in the Kitchen before?
   ○ Yes
   ○ No

7. What school did you attend last year? ________________________________
Appendix D: Survey Administration Instructions

Thank you so much for helping us evaluate the Illinois Junior Chefs Program! Your efforts will help us prove that Illinois Junior Chefs is an effective and impactful program, and help ensure continued funding to keep IJC going. If you have any questions at all about the survey, please don’t hesitate to contact Jessica Metcalfe via phone or email (jmetcalfe@illinois.edu or 908-268-7949). Please send the attached Parent Information Letter (provided in both English and Spanish) home with children on the first day of class (or before then if possible). Before making copies of the parent letter for each child, fill in the blank near the bottom of the letter with the date 2 weeks after the day you will send the letters home (if you forget to send them home on the first day you may send them home during any day of the program as long as the date written on the letter is 2 weeks after the day they are sent home).

Please remember the following:
- PRE-program surveys should be completed BEFORE you do any teaching, and should be the very first thing you do during the first lesson.
- POST-program surveys should be completed AFTER all teaching is complete, and should be the very last thing you do during the last lesson (after students have finished eating the food you prepared that day).
- If a student does not want to take the survey, do not try to convince them to do so.

Please follow the steps listed below to administer the survey:
1. Print out a copy of the survey you need for each student. Make sure you download the survey before printing it. Do not print directly from the portal. If possible, print the surveys double-sided. Make sure you print the PRE and POST surveys separately so you can tell which is which (if you accidentally print and use the pre or post twice, please label the incorrect packets with the correct labelling ("PRE" or "POST") so we know which surveys students took before IJC and which they took after). Please print the surveys exactly as they appear in the pdf file — there is a blank page after the title page — this is intentional.
2. Read the Survey Script (included in this packet) to the youth participants before handing out any surveys. If any of the students do not want to participate, do not give them a survey to fill out.
3. Pass out pencils or pens with to students. Pass out survey to students and ask them to begin.
4. If you feel that the survey would be easier for your class if you read it aloud and have them follow along, you may do so. Please keep students’ age and reading level in mind when making this decision.
5. If any students begin talking to other students, ask them to please stay quiet while they fill out the survey. Also ask students who are talking if they have any questions (often, students will ask each other if they have questions instead of asking the instructor).
6. If students have any questions or need help reading any of the questions, please help them as needed and answer their questions. If students don’t know the answer to any of the questions (i.e., race, school last year) they may leave them blank.
7. As you collect surveys from students, check to make sure they put their name (first name and first initial of last name) on the front page of the survey. You do not need to match the pre and post surveys or remove the first page with the students’ names on it, we will take care of this once we receive the surveys.

After the surveys are complete, you may either:
1. Mail in pre-program surveys after they are completed, then mail in post-program surveys separately after they are completed (with your Lesson Checklist). OR
2. Save pre-program surveys after they are completed, wait for students to complete post-program surveys, and mail them in one package together with the Lesson Checklist. Be sure to store pre-program surveys in a secure location until mailing them with the post-program surveys.

Please mail all materials to:
Jessica Metcalfe
University of Illinois Extension
520 Bevier Hall
905 South Goodwin Ave
Urbana, IL 61801

In this packet, you will also find the Illinois Junior Chefs Lesson Checklist. It is very important that you fill this short form out after each lesson and attach the Form B or EFNEP Youth Enrollment Form for each lesson. If you teach this program over more than 5 lessons, you may print two Lesson Checklists. In the comments section, feel free to list anything that went well or was challenging about the lesson — we use these comments to help us make curriculum modifications next year. You can write on the back of the Lesson Checklist if you run out of room.

Please contact Jessica Metcalfe with any questions you have — no question is too small!
Cell: 908-268-7949  Email: jmetcalfe@illinois.edu
Appendix E: Survey Script

Please read the following script aloud to students **word for word** before the surveys are administered:

Hi everyone! This summer, you participated/are going to participate in the Illinois Junior Chefs Program. We want to know more about how you feel about cooking and eating healthy foods. If you are willing answer some questions for us, you can take our survey.

You can decide whether you want to answer our questions. It is totally up to you. If you do take the survey, you can decide to stop at any time. Whatever you decide is fine with me. You and your family will not get into trouble if you do not take the survey.

If you do take the survey, anything you say will be kept a secret and will not cause you harm. When we look at your answers to the questions, your name will be kept secret and no one will know which survey is yours. We’re going to have you write your name on the front of your survey packet, but once we get everyone’s surveys we’re going to remove the information with your name so no one will know what your answers were.

We just want to learn more about your opinions, so be sure to be honest. **There are no right or wrong answers!** We just want to know more about your thoughts about food and cooking.

Do you have any questions for me? (Answer questions one-on-one if any participant has a private question)

If it is OK with you to answer our questions and take the survey, please write your first name and first initial of your last name on the front of the survey packet and begin.

If you do not want to take the survey, don’t write your name on the front. Please sit quietly while the other kids take the survey. (If a student tells you that they do not want to take a survey before you pass them out, you do not need to give them a survey)

If you have any questions, please raise your hand and I will come help you.
Appendix F: Parent Information Letter – English

Parent Information Letter – Evaluation of the Illinois Junior Chefs Program

Dear Parent,

Hello! We are from the University of Illinois Extension Offices, and we are hoping to get feedback about how our cooking program went so we can make it even better next year. We want to see how your child was impacted by Illinois Junior Chefs, a cooking program that they are currently participating in. This letter is to inform you that your child has/will complete a questionnaire about their experiences with Illinois Junior Chefs. If it is okay with you and your child, we would like to use their questionnaire responses to help us evaluate the effectiveness of the program.

Your child’s participation in this project is completely voluntary, and they may stop participating at any time.

There are not expected to be any risks to your child’s participation beyond those they have in a normal day.

The information that we get during this research project will be kept strictly confidential. Any sharing or publication of the research results will not identify your child by name.

The surveys will ask about your child’s opinions and there is no “right” answer.

Will my study-related information be kept confidential?
Yes, but not always. In general, we will not tell anyone any information about you. When this research is discussed or published, no one will know that you were in the study. However, laws and university rules might require us to disclose information about you. For example, if required by laws or University Policy, study information which identifies you and the consent form signed by you may be seen or copied by the following people or groups:

- The University committee and office that reviews and approves research studies, the Institutional Review Board (IRB) and Office for Protection of Research Subjects;
- University and state auditors, and Departments of the university responsible for oversight of research;
- Federal government regulatory agencies such as the Office of Human Research Protections in the Department of Health and Human Services;
- The financial sponsor of the study, National Institute of Food and Agriculture, USDA

If you do not want your child’s survey responses to be analyzed, please inform Jennifer McCaffrey by phone (217-300-1799) or email (jmccaffr@illinois.edu) by

You may also contact Jennifer if you would like to review the questionnaire before determining if you are willing to release your child’s responses for analysis. If you have any questions about your rights as a participant in this study or any concerns or complaints, please contact the University of Illinois Institutional Review Board at 217-333-2670 or by email at oprs@illinois.edu.

Sincerely,

Jennifer McCaffrey, PhD, MPH, RD
jmccaffr@illinois.edu
217-300-1799

Jessica Metcalfe, MPH
jarick2@illinois.edu
Carta de Información para Padres – Evaluación del programa
Junior Chefs de Illinois

Estimado Padre de Familia,

¡Hola! Somos parte de las Oficinas de la Extensión de la Universidad de Illinois y deseamos obtener retroalimentación de nuestro programa de cocina para que lo podamos mejorar el próximo año. Queremos saber cómo su hijo ha sido impactado por el Junior Chefs de Illinois, un programa de cocina en el que actualmente está participando. Esta carta es para informarle que su hijo ha completado el cuestionario sobre sus experiencias en el Junior Chef de Illinois. Si no hay problema con usted y su hijo, nos gustaría utilizar las respuestas del cuestionario como ayuda para evaluar la efectividad del programa.

La participación de su hijo en este proyecto es completamente voluntaria y puede dejar de participar en cualquier momento.

No existen riesgos en la participación de su hijo, más allá de los que tiene en un día normal.

La información que obtenemos de este Proyecto de investigación se mantendrá estrictamente confidencial. Cualquier información compartida o publicación de los resultados de la investigación no identificará a su hijo por su nombre.

Las encuestas pedirán las opiniones de su hijo y no hay respuesta “correcta”.

¿Mi información relacionada con el estudio se mantendrá confidencial?
Sí, pero no siempre. En general no le daremos a nadie información suya. Cuando esta investigación sea discutida o publicada, nadie sabrá que usted fue parte del estudio. Sin embargo, las leyes y las reglas de la Universidad pueden requerirnos revelar su información. Por ejemplo, si fuera requerido por las políticas o leyes de la Universidad, información del estudio que lo identifica a usted y el formulario de consentimiento firmado por usted pueda ser visto o copiado por las siguientes personas o grupos:

- El comité de la Universidad y la oficina que revisa y aprueba los estudios de investigación, la Junta de Revisión Institucional (IRB) y la Oficina de Protección de Temas de Investigación;
- Auditores de la Universidad y del estado, y departamentos de la Universidad responsables de la supervisión de la investigación;
- Agencias reguladoras del gobierno federal como la Oficina de Protección de Investigación Humana en el Departamento de Servicios Humanos y de Salud;
- El patrocinador financiero del estudio, el Instituto Nacional de Alimentación y Agricultura, USDA

Si usted no desea que las respuestas del cuestionario de su hijo sean analizadas, por favor informar a Jennifer McCaffrey por teléfono (217-300-1799) o correo electrónico (jmccaffrey@illinois.edu) por correo electrónico, ¡también puede contactar a Jennifer si usted quisiera revisar el cuestionario antes de decidir que las respuestas de su hijo sean analizadas! Si usted tiene preguntas sobre sus derechos como participante en este estudio, o cualquier inquietud o reclamo, por favor contactar a la Junta de Investigación Institucional de la Universidad de Illinois al 217-333-2670 o por correo electrónico a oprs@illinois.edu.

Sinceramente,

Jennifer McCaffrey, PhD, MPH, RD jmccaffrey@illinois.edu 217-300-1799

Jessica Jarick, MPH jjarick2@illinois.edu
RECIPE FOR COOKING ACTIVITIES

INGREDIENTS:

1 egg

¼ cup water

½ cup flour

1 tablespoon of sugar

1 carrot, peeled and grated

DIRECTIONS:

1. Crack one egg into a bowl. First, stir the egg. Then, beat the egg.

2. Measure ¼ cup of water, and pour it into the bowl.

3. Measure ½ cup of flour, and pour it into the bowl.

4. Measure 1 tablespoon of sugar, and pour it into the bowl.

5. Stir all of the ingredients together.

6. Peel one carrot.

7. Grate or shred the carrot.

8. Pour the grated carrot into the bowl and fold it in with the other ingredients until combined.
Appendix I: Script for Hands-On Cooking Skills Assessment

Hey there! What’s your name? (Child answers).

Hi (child’s name) my name is ____________________.

How old are you (child’s name)? (Child answers). Awesome! Thanks for answering my questions.

We’re trying to learn more about how kids your age like cooking and what cooking skills you know how to do. Today we’re going to do a few cooking activities if that’s okay with you. If you want to stop at any time, just tell me and we will stop. You can use whatever cooking tools you want for each part of the activity.

Do you have any questions for me before we start? (Answer questions if they have them).

Okay great, let’s get started! The first thing I need you to do is put on a pair of gloves so we can keep everything clean and safe.

Now, we’re going to follow this recipe for our cooking activities (show them recipe).

We’re going to make something sort of like a carrot cake. So let’s take a look at the recipe instructions.

1. The first thing I need you to do is **CRACK ONE EGG** into this bowl.
2. Great job! Now, I need you to **STIR** the egg. You can use whatever you want to stir. (After the student has stirred the egg) Next, can you **BEAT** the egg for me?
3. Next, I need you to measure **½ CUP OF WATER**, and pour it into this same bowl.
4. Great! Now I need you to measure **1 CUP OF FLOUR**, and pour it into the bowl.
5. Next, measure **1 TABLESPOON OF SUGAR**, and pour it into the bowl.
6. Now I need you to **STIR** all of the ingredients together.
7. Great! Next, I need you to **PEEL** this carrot. You can choose whatever peeler you like best to use.
8. Awesome! Now, I need you to **GRATE or shred the carrot**.
9. Good job! Now, let’s take that grated carrot and pour it into the bowl. Okay last thing – can you **FOLD** the shredded carrot into our other ingredients?
10. Okay great! We’re all done! You did an awesome job, thanks for your help. You can go back and join the group and work on your word search now.
Appendix J: Hands-On Cooking Skills Data Collection Worksheet

<table>
<thead>
<tr>
<th>Skill Being Tested</th>
<th>-</th>
<th>+</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cracking an EGG</strong></td>
<td>□ Leaves <em>egg shells</em> in cracked egg</td>
<td>□ Does not have any <em>egg shells</em> in mixing bowl</td>
</tr>
<tr>
<td></td>
<td>□ Does not use another surface or cooking tool to help break egg, tries to pull shell apart using <em>only</em> hands</td>
<td>□ Uses knife, edge of bowl, surface of table, etc. to help break egg</td>
</tr>
<tr>
<td></td>
<td>□ Does not know what cracking an egg means</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Mixing: STIRRING</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Does not move spoon, fork, etc. in circular motion</td>
<td>□ Moves spoon, fork, etc. in circular motion</td>
<td></td>
</tr>
<tr>
<td>□ Does not hold fork or spoon firmly, failing to actually move (stir) ingredients</td>
<td>□ Holds fork or spoon firmly enough to successfully stir (combine) ingredients</td>
<td></td>
</tr>
<tr>
<td>□ Does not know what stirring means</td>
<td></td>
<td>□ Did you HELP or GUIDE the student on this task?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Mixing: BEATING</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Does not move spoon, fork, etc. faster than they did for stirring</td>
<td>□ Moves spoon, fork, etc. faster than they did for stirring</td>
<td></td>
</tr>
<tr>
<td>□ Does not move spoon, fork, etc. in circular motion</td>
<td>□ Moves spoon, fork, etc. in circular motion</td>
<td></td>
</tr>
<tr>
<td>□ Does not know what beating means</td>
<td></td>
<td>□ Did you HELP or GUIDE the student on this task?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Measuring: WATER</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Selects <em>wrong</em> measuring tool (dry measuring cup or measuring spoons)</td>
<td>□ Selects correct measuring tool (<em>liquid</em> measuring cup)</td>
<td></td>
</tr>
<tr>
<td>□ Selects measuring tool of the <em>wrong</em> size (measuring spoons or measuring cups other than ¾ cup)</td>
<td>□ Selects measuring tool of the correct size (measuring cup not spoons)</td>
<td></td>
</tr>
<tr>
<td>□ Does not measure correct amount</td>
<td>□ Measures accurately</td>
<td></td>
</tr>
<tr>
<td>□ Does not measure correct ingredient (measures flour or sugar instead of water)</td>
<td>□ Measures correct ingredient (water)</td>
<td></td>
</tr>
<tr>
<td>□ Does not check <em>eye level</em> for accuracy, or holds cup in mid-air and does not put it on the table</td>
<td>□ Looks at measuring cup at eye level (with measuring cup on table) to ensure accuracy</td>
<td></td>
</tr>
<tr>
<td>□ Does not measure at all (pours water directly into bowl without measuring)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Does not know what measuring means</td>
<td></td>
<td>□ Did you HELP or GUIDE the student on this task?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Measuring: FLOUR</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Selects <em>wrong</em> measuring tool (measuring spoons or liquid measuring cup)</td>
<td>□ Selects correct measuring tool (<em>dry</em> measuring cup – any size)</td>
<td></td>
</tr>
<tr>
<td>□ Selects measuring tool of the <em>wrong</em> size (measuring spoons or measuring cups other than ¾ cup)</td>
<td>□ Selects measuring tool of the correct size (¾ cup)</td>
<td></td>
</tr>
<tr>
<td>□ Does not use provided scoop to add flour to measuring cup, uses measuring cup itself to scoop flour out of bowl</td>
<td>□ Uses scoop to add flour to measuring cup</td>
<td></td>
</tr>
<tr>
<td>□ Does not level off measuring cup for accuracy, uses something besides the knife, or uses knife incorrectly</td>
<td>□ Levels off excess flour with back of bread knife</td>
<td></td>
</tr>
<tr>
<td>□ Does not measure correct amount</td>
<td>□ Measures accurately</td>
<td></td>
</tr>
<tr>
<td>□ Does not measure correct ingredient (measures water or sugar instead of flour)</td>
<td>□ Measures correct ingredient (flour)</td>
<td></td>
</tr>
<tr>
<td>□ Packs down flour when measuring</td>
<td>□ Does not pack down flour when measuring</td>
<td></td>
</tr>
<tr>
<td>□ Does not measure at all (pours flour directly into bowl without measuring)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Does not know what measuring means</td>
<td></td>
<td>□ Did you HELP or GUIDE the student on this task?</td>
</tr>
<tr>
<td>Measuring: SUGAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>□ Selects wrong measuring tool (dry measuring cups or liquid measuring cup)</td>
<td>□ Selects correct measuring tool (measuring spoons)</td>
<td></td>
</tr>
<tr>
<td>□ Selects measuring tool of the wrong size</td>
<td>□ Selects measuring tool of the correct size (1 tablespoon)</td>
<td></td>
</tr>
<tr>
<td>□ Does not level off measuring cup for accuracy</td>
<td>□ Levels off excess sugar with back of bread knife</td>
<td></td>
</tr>
<tr>
<td>□ Does not measure correct amount</td>
<td>□ Measures accurately</td>
<td></td>
</tr>
<tr>
<td>□ Does not measure correct ingredient (measures water or flour instead of sugar)</td>
<td>□ Measures correct ingredient (sugar)</td>
<td></td>
</tr>
<tr>
<td>□ Does not measure at all (pours sugar directly into bowl without measuring)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Does not know what measuring means</td>
<td>Did you HELP or GUIDE the student on this task?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Using a PEELER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Tries to use incorrect equipment (grater, knife, etc.)</td>
<td>□ Uses the correct equipment (peeler)</td>
</tr>
<tr>
<td>□ Peels one area repetitively instead of rotating carrot to remove all skin, or does not successfully peel entire carrot</td>
<td>□ Peels whole carrot (does not leave parts unpeeled)</td>
</tr>
<tr>
<td>□ Incorrect peeler grip (i.e., wrapped around peeler like a fist)</td>
<td>□ Correct grip on peeler (thumb on top, other fingers wrapped around bottom)</td>
</tr>
<tr>
<td>□ Moves peeler towards body while peeling</td>
<td>□ Moves peeler away from body while peeling</td>
</tr>
<tr>
<td>□ Holds carrot in mid-air instead of on table/cutting boards</td>
<td>□ Balances the carrot on the table or cutting board</td>
</tr>
<tr>
<td>□ Does not know what peeling is</td>
<td>Did you HELP or GUIDE the student on this task?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Using a GRATER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Selects incorrect piece of equipment (peeler, etc.)</td>
<td>□ Selects correct piece of equipment (box grater)</td>
</tr>
<tr>
<td>□ Moves carrot in wrong direction (either side to side or bottom to top)</td>
<td>□ Slides carrot down grater from top to bottom (not side to side)</td>
</tr>
<tr>
<td>□ Does not successfully produce any grated carrots</td>
<td>□ Successfully produced grated carrots</td>
</tr>
<tr>
<td>□ Grated with carrot positioned horizontally (even if they are moving the carrot from the top to bottom of the grater)</td>
<td>□ Grated carrot from end/tip, not horizontally (it doesn’t matter which end they use)</td>
</tr>
<tr>
<td>□ Does not know what grating is</td>
<td>Did you HELP or GUIDE the student on this task?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mixing: FOLDING</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Does not select correct tool (spoon, knife, etc.)</td>
<td>□ Selects correct tool (spatula)</td>
</tr>
<tr>
<td>□ Does not move batter in correct folding motion (i.e., pushes down batter from the top to the bottom of the bowl, stirs batter instead of folding)</td>
<td>□ Scraps across bottom and lifts batter to top</td>
</tr>
<tr>
<td>□ Uses aggressive movements that do not allow them to fold batter</td>
<td>□ Uses gentle, slow movements</td>
</tr>
<tr>
<td>□ Does not know what folding is</td>
<td>Did you HELP or GUIDE the student on this task?</td>
</tr>
</tbody>
</table>

OTHER NOTES OR COMMENTS:
Appendix K: Lesson Checklist

Instructor Name: __________________________ Site Name: __________________________

City: __________________________ Did you work with 4-H Teen Teachers during this program? Yes / No (circle one)

Please fill in dates and times of lessons, and check the boxes next to all recipes and activities that were completed.

<table>
<thead>
<tr>
<th>LESSON 1 DATE:</th>
<th>START TIME:</th>
<th>END TIME:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tic Tac Tacos Mix</td>
<td>Hand Washing Review</td>
<td></td>
</tr>
<tr>
<td>Pumpkin Pancakes</td>
<td>Kitchen Safety Rules Review</td>
<td></td>
</tr>
<tr>
<td>Banana Oatmeal</td>
<td>Measuring Ingredients Demonstration</td>
<td></td>
</tr>
<tr>
<td>Bean Salad with Rice</td>
<td>Measuring Ingredients Activity</td>
<td></td>
</tr>
<tr>
<td>Snowman Sandwich</td>
<td>MyPlate Overview</td>
<td></td>
</tr>
<tr>
<td>Other (list here):</td>
<td>Grains Overview</td>
<td></td>
</tr>
</tbody>
</table>

Comments (can also be added on the back of this page): GloGerm® Lotion Activity

<table>
<thead>
<tr>
<th>LESSON 2 DATE:</th>
<th>START TIME:</th>
<th>END TIME:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creamy Vegetable Dip</td>
<td>Dairy Overview</td>
<td></td>
</tr>
<tr>
<td>Pumpkin Pudding</td>
<td>Mixing Food Techniques Demonstration</td>
<td></td>
</tr>
<tr>
<td>Breakfast Parfait</td>
<td>Mixing Food Activity</td>
<td></td>
</tr>
<tr>
<td>Fruit Kabobs</td>
<td>Using Spices/Herbs Activity</td>
<td></td>
</tr>
<tr>
<td>Cheesy Chili Tostada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (list here):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

<table>
<thead>
<tr>
<th>LESSON 3 DATE:</th>
<th>START TIME:</th>
<th>END TIME:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorful Coleslaw</td>
<td>Vegetables Overview</td>
<td></td>
</tr>
<tr>
<td>Easy Pasta Salad</td>
<td>Peeler Activity</td>
<td></td>
</tr>
<tr>
<td>Sweet and Silly Carrots</td>
<td>Grater Activity</td>
<td></td>
</tr>
<tr>
<td>Veggie Chow Mein</td>
<td>Knife Types Review</td>
<td></td>
</tr>
<tr>
<td>Veggie Quesadillas</td>
<td>Cutting Techniques with Knives Demonstration</td>
<td></td>
</tr>
<tr>
<td>Veggie Stuffed Pitas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (list here):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

<table>
<thead>
<tr>
<th>LESSON 4 DATE:</th>
<th>START TIME:</th>
<th>END TIME:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit Salsa</td>
<td>Fruits Overview</td>
<td></td>
</tr>
<tr>
<td>Tortilla Fruit Pizza</td>
<td>Name That Fruit Activity</td>
<td></td>
</tr>
<tr>
<td>Apple Carrot Salad</td>
<td>Juicing Citrus Fruits Activity</td>
<td></td>
</tr>
<tr>
<td>Apple Crisp</td>
<td>Oxidative Browning Activity</td>
<td></td>
</tr>
<tr>
<td>Magic Fruit Salad</td>
<td>Knife Types Review</td>
<td></td>
</tr>
<tr>
<td>Melon Berry Banana Fruit Salad</td>
<td>Cutting Techniques Demonstration</td>
<td></td>
</tr>
<tr>
<td>Other (list here):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

<table>
<thead>
<tr>
<th>LESSON 5 DATE:</th>
<th>START TIME:</th>
<th>END TIME:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pita Pocket Veggie Breakfast</td>
<td>Protein Overview</td>
<td></td>
</tr>
<tr>
<td>Huevos Rancheros</td>
<td>Types of Protein Foods Overview</td>
<td></td>
</tr>
<tr>
<td>Eggs Ole</td>
<td>Cooking with Protein Foods Overview</td>
<td></td>
</tr>
<tr>
<td>Ham and Pineapple Sandwich</td>
<td>Cracking Eggs Demonstration</td>
<td></td>
</tr>
<tr>
<td>Summer Chili</td>
<td>Cracking Eggs Activity</td>
<td></td>
</tr>
<tr>
<td>Layered Bean Dip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy Chicken and Vegetable Chowder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (list here):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:
Appendix L: IRB Approval Letter

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

June 23, 2017

Jennifer McCaffrey
Cooperative Extension
520 Bevier Hall
905 South Goodwin Avenue
Urbana, IL 61801

RE: Illinois Junior Chefs Program Evaluation
IRB Protocol Number: 14913

Dear Dr. McCaffrey:

This letter authorizes the use of human subjects in your continuing project entitled Illinois Junior Chefs Program Evaluation. The University of Illinois at Urbana-Champaign Institutional Review Board (IRB) approved the protocol as described in your IRB-1 application, by expedited continuing review. The expiration date for this protocol, IRB number 14913, is 06/22/2020. The risk designation applied to your project is no more than minimal risk.

The IRB has also reviewed the request for minor modifications. I will officially note for the record that these minor modifications to the original project, as noted in your correspondence received 6/6/2017, Adding 6 questions to the survey; Updating survey format; Adding skills assessment procedure; Adding follow-up online survey; Updating research team; Updating funding, have been approved.

Copies of the attached date-stamped consent form(s) must be used in obtaining informed consent. If there is a need to revise or alter the consent form(s), please submit the revised form(s) for IRB review, approval, and date-stamping prior to use.

Please note that additional modifications to your project need to be submitted to the IRB for review and approval before the modifications are initiated. To submit modifications to your protocol, please complete the IRB Research Amendment Form (see https://www.oprs.research.illinois.edu/forms-templates/forms/protocol-amendment-form). Unless modifications are made to this project, no further submittals are required to the IRB.

You were granted a three-year approval. If there are any changes to the protocol that result in your study becoming ineligible for the extended approval period, the RPI is responsible for immediately notifying the IRB via an amendment. The protocol will be issued a modified expiration date accordingly.

We appreciate your conscientious adherence to the requirements of human subjects research. If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me at the OPRS office, or visit our website at https://www.oprs.research.illinois.edu.

Sincerely,

Rebecca Miller, MSW
Human Subjects Research Specialist, Office for the Protection of Research Subjects

Attachment(s): 1 Research Team Attachment, 1 Waiver of Documentation, 1 Waiver or Alteration of Informed Consent, 7 Consent Forms

c: Jessica Metcalfe