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iCook 4-H Intervention: Food-Related Behavior and Intake of Adult Main Meal Preparers Participating in a 5-State Childhood Obesity Prevention Study

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ICOOK 4-H INTERVENTION: FOOD-RELATED BEHAVIOR AND INTAKE OF ADULT MAIN MEAL PREPARERS PARTICIPATING IN A 5-STATE CHILDHOOD OBESITY PREVENTION STUDY

by

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ICOOK 4-H INTERVENTION: FOOD-RELATED BEHAVIOR AND INTAKE OF ADULT MAIN MEAL PREPARERS PARTICIPATING IN A 5-STATE CHILDHOOD OBESITY PREVENTION STUDY

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Childhood obesity affects 12.7 million children within the United States. The need for childhood obesity prevention programs is high. Research supports family-centered programs and health interventions rooted within the Social Cognitive Theory (SCT); the iCook 4-H program combines these attributes. The objective of this study was to assess differences in adult outcome variables between control and treatment participants and whether the program impacted food security status.

Participants consisted of adult-youth pairs (dyads) that included a 9-10 year-old child and their adult primary meal preparer. The focus of this project was to provide findings on adult participants only. The program was implemented in Maine, Nebraska, South Dakota, Tennessee, and West Virginia. Within each state, treatment (n=150) and control dyads (n=77) were recruited through Extension, 4-H, and community programs with flyers, in-person contact and email.

Dyads participated in 6 educational sessions over the course of 12 weeks that focused on culinary skills, family mealtime, healthful eating, meal planning, and physical activity. Adult outcomes collected included self-reported food intake, procurement, preparation and safety practices, parent-child feeding relationships, family mealtime routines, quality of life, food security status, program evaluation, BMI, and measured blood pressure. Descriptive statistics are presented for demographics at baseline. A linear mixed model approach was used to analyze data across time points (0, 4, and 12 months).

A $p < 0.10$ level of significance was used. Statistical analyses were performed using IBM SPSS Statistics for Mac (Version 23.0, 2015, IBM Corp).

As a result of participating in the iCook 4-H program, adult treatment participants reported significant improvements in the following: fruit intake, shopping with a grocery list, using the "Nutrition Facts" label, eating less family meals at restaurants, receiving honest answers to questions from family members, food security status, planning weekly meals, enjoying making meals with their child, and kitchen skill confidence.

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CHAPTER ONE
INTRODUCTION

Within the United States (US), 78.6 million (34.9%) adults and 12.7 million (17%) children are obese. [1] Obesity is often a family affair; the body mass index (BMI) of a mother and father is one of the strongest predictors of a child's weight status. [2] Obesity is associated with numerous health risks at the child and adult level. Obese children have a greater risk of high blood pressure, high cholesterol, type 2 diabetes, sleep apnea, and self-reported low quality of life. [1] Obese adults are at an increased risk of mortality, type 2 diabetes, dyslipidemia, coronary heart disease, stroke, some cancers, and mental illness. [1] In the US obesity health care costs range from $147 to $210 billion per year. [3] These statistics provide support regarding the need for effective interventions to counter childhood obesity. In 2008, a report released by Trust for America's Health concluded that a $10 per person investment in community-based programs targeting improvements in physical activity and nutrition and tobacco prevention could save the US over $16 billion annually in five years. [4]

Community-based programs have been designed and implemented in the hopes of reducing and preventing childhood obesity within the US. Many of these interventions targeted obesity-related behaviors such as dietary patterns, physical activity, and sedentary lifestyles as well as adiposity outcomes such as lower BMIs. [5] Looking further into community-based programs that focus on nutrition education and physical activity promotion, a spectrum of three variations exist: child-only, parent-only, and family-centered. [5-8] Within this spectrum, evidence suggests that family-centered approaches may be the most effective intervention type. [9] However, studies that examine the secondary parent outcomes of family-centered interventions are limited. Especially when

taking into account the parent's food security status. Research demonstrates that the relationship between obesity and poverty is complex and can vary depending upon gender, race-ethnicity, and age.[10]

The iCook 4-H Program was an intervention designed to promote culinary skills, family meals, and physical activity for obesity prevention. [11] A five-state team of researchers implemented this program in rural, diverse, and/or low-income populations in Maine, South Dakota, Tennessee, West Virginia, and Nebraska. It is a family-centered program with its curriculum grounded in the Experiential 4-H Learning Model (Figure 1.) and the Social Cognitive Theory (SCT) (Figure 2.). Experiential learning occurs after being involved in a hands-on activity where youth critically examine their experience to decide what was most useful. Then, another activity is performed based on the information gained from the original activity. [12] This model begins with the experience where the youth "do" an activity. Next, reflection occurs in which they can share and process their experiences. The youth then generalize the techniques learned from the activity so that these can be applied to a different situation. [12] 4-H encourages youth to positively interact with their peers as well as adults to create a support system at not only the community level but also the state and national level. Within 4-H, adults serve as role models allowing youth to learn though observation and hands-on techniques demonstrating that the iCook 4-H program complements the concepts of both the Experiential 4-H Learning Model and the SCT. [13]

The SCT was chosen as the theoretical framework because of the insight it brings to human research when studying factors that influence behavior. This theory is rooted in the belief that people learn through observation and doing and that their external

surroundings including parents, home environment, and accessibility to food are directly associated with how they perceive their environment. [13] In iCook 4-H, 9-10 year old youth participated along with an adult primary meal preparer, often a parent, as a pair (dyad). This dyad model allowed for synergism and translation from the education session to the home environment. Together, dyads completed six wellness-education sessions over 12 weeks with the goal of increasing their nutrition knowledge, culinary competence, and physical activity levels to improve physical health. [13] Family communication and goal setting were also components incorporated into this program, youth were provided with a video camera and encouraged to create and share short videos of themselves cooking, being physically active, or at family meal times. These videos were then uploaded onto a secure website where other program participants could view them. This provided a sense of accountability in regards to goal setting as well as a way to reinforce concepts and healthy behaviors learned in sessions. Each class began with a session overview then moved onto cooking skills followed by physical activity, family meal time and group recipe tasting and ending with goal setting.[13]

To quantify success, iCook 4-H was designed with assessments at 0, 4, and 12 months. Assessments were conducted with youth and adults, with youth outcomes serving as the primary and secondary outcomes and adult outcomes as tertiary. Areas covered within the adult assessments included: self-reported: food intake, procurement, preparation and safety practices, parent-child feeding relationships, family mealtime routines, quality of life, program evaluation, BMI, and measured blood pressure. [11] As part of the demographics collected from adult participants, the U.S. Household Food Security Survey Module from the USDA Economic Research Service was included

which allowed for food security status to be determined. [14] Currently, a gap in the literature exists between food insecurity and family-centered health interventions that examine adult outcomes. This project will assess adult outcomes, between treatment and control groups, across time points and evaluate how the program impacted food security status.

Figure 1.

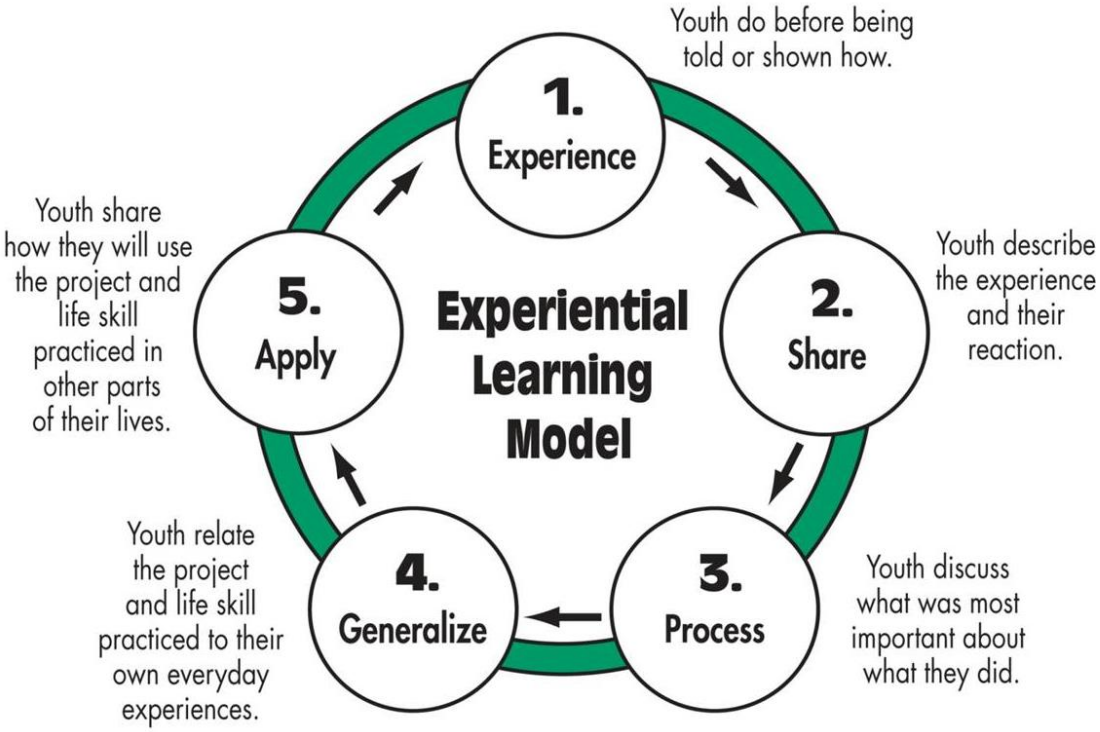
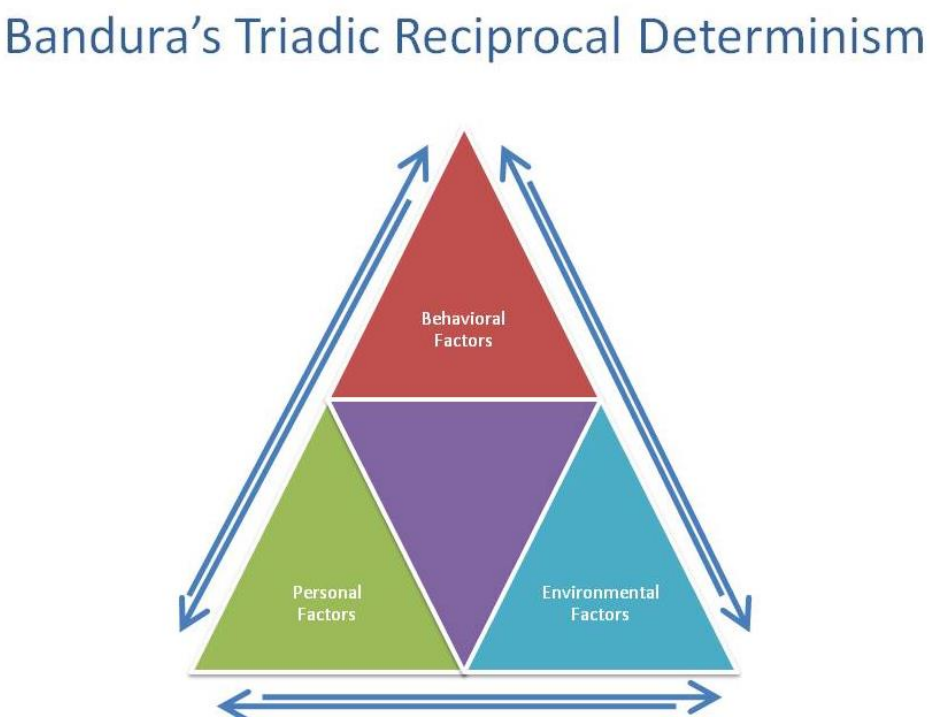


Figure 2.



CHAPTER 2
LITERATURE REVIEW

Community-based health programs have surfaced as an effective intervention for preventing and reducing childhood obesity. Obesity affects 12.7 million children, which puts them at a greater risk for high blood pressure, high cholesterol, type 2 diabetes, sleep apnea, and low self-reported quality of life. [1] However, obesity extends beyond just the child and is a family concern. To address childhood obesity, a family-based approach may be needed. When aiming to improve dietary patterns and increase physical activity behaviors it is important to understand family factors that affect behavior changes, which a family-centered intervention can help incorporate these issues.[5]

The dietary habits that children acquire during childhood follow them into adulthood. These food behaviors are determined by an assortment of factors including individual, socio-cultural, and environmental. Parents serve as an instrumental role model for their children in regards to their dietary consumption patterns. [15] This concept that individuals learn through modeling is rooted within the Social Cognitive Theory (SCT). Modeling is not a result of imitation but rather the generation of new behavior patterns by going beyond what they have observed. [16] This is an important construct within family-centered interventions because adults greatly influence their children in regards to either healthy or unhealthy habits by serving as role models. This reiterates parental involvement is key.

Though, not all childhood obesity interventions involve parents or a family approach. For the purpose of this literature review, interventions will be categorized as

child-only, parent-only, or family-centered interventions. This allows for a comparison of effectiveness between differing types of interventions targeted at childhood obesity.

Social Cognitive Theory and Health Interventions

The SCT has served as the theoretical foundation in numerous nutrition and physical activity intervention programs. [5] A review by Hingle[15] found the SCT to be the most frequently reported behavioral theory when examining child dietary interventions for obesity prevention. Research has shown that using theory within health interventions is valuable. Interventions that extensively use theory tend to exhibit more comprehensive effects on behavior than interventions that make use of no theory. [17] Historically, the SCT evolved in 1977 when Albert Bandura published the *Social Learning Theory,* which was later relabeled as the SCT. This theory brought to light the prominent role of social modeling in human motivation, thought, and action. Social modeling affects motivation in individuals by introducing behavioral outcome expectations. [16] Perceived self-efficacy, outcome expectations, knowledge, goal formation, and socio-structural factors are the main constructs that define the SCT. [18] These constructs can be seen within many obesity-related interventions.

In a review by Wilson[5] intrapersonal approaches that targeted obesity-related behaviors were evaluated. The studies assessed were interventions based on the SCT. Wilson[5] found that improvements in self-efficacy, self-concept, and motivational beliefs acted as important constructs when identifying diet and physical activity intervention effects for youth. This is consistent with Bandura's belief that self-efficacy is the essential construct of the SCT.[18]

The GOALS (Getting Our Active Lifestyles Started) intervention by Watson et

al. [19] was a family-based childhood obesity treatment rooted in the SCT to promote lifestyle change for the entire family. This intervention included 18, two-hour sessions that focused on physical activity, diet, and behavior change over 6 months. The SCT was chosen as the framework because of the triadic reciprocal causation, which states that behavior continuously interacts in a reciprocal manner with an individual's thoughts and surrounding environment. Improvements to children's BMI z-scores were seen and maintained at 12-month follow-up. Parents or caregivers reported positive changes in their own as well as their child's physical activity and diet, [19] suggesting that the SCT is an effective foundation for family-centered obesity interventions.

The SCT was also successful in the Health-E-PALS program by Habib-Mourad et al. [20] Students 9 to 11 years old participated in a multicomponent school-based intervention, which aimed to prevent obesity by promoting healthy eating and physical activity. The SCT served as the intervention's foundation to support student changes. Role modeling by teachers and parents was key because the intervention targeted both the school and home environments. Student's improved in nutrition knowledge and self-efficacy, which act as strong predictors of behavioral change. [20]

Child-Only Childhood Obesity Interventions

A childhood obesity intervention in which the child is the main target is considered conventional. [6] Many of these interventions are school-based. Schools in particular are a channel for obesity intervention because of their access to large student populations[21] and influence on children's diet and physical activity habits. [22] It is thought that school-based interventions may provide social benefits that improve a child's health and help to solidify healthy habits for a lifetime. [22]

In a review examining school-based interventions versus family based interventions in regards to the treatment of childhood obesity, both interventions were found to be effective however the level of effectiveness depended upon factors such as age, short-term or long-term outcomes, and methodological quality. Family-based interventions were based upon theoretical frameworks and demonstrated long-term positive outcomes. In contrast, school-based interventions lacked theoretical models and showed only short-term effects. A review by Kothandan found that additional research is needed where studies will specifically assess primary outcomes such as BMI, weight, waist circumference, and percentage overweight. [22]

One study looked at BMI as a primary outcome with waist circumference, sedentary and dietary behaviors as secondary outcomes. This was a six-month obesity prevention intervention, titled Healthy Habits, Healthy Girls. [23] Uniquely, this school-based intervention was guided by the SCT and included nutrition and physical activity lessons to support healthy lifestyles. The intervention group showed a significant decrease in waist circumference as well as a decrease in weekend computer screen time, and an increase in vegetable intake. However, no significant changes were seen in BMI. [23]

Sahota et al. [24] implemented a comprehensive one academic year school-based intervention that included teacher training, school meal modification, nutrition education, and physical activity. Although implementation of the program itself within the school was highly successful, the results were not significant. Children who participated showed minimal behavioral changes indicating that the program may have fallen short because of a lack of family involvement.[24]

Parent-Only Childhood Obesity Interventions

Obesity interventions that involve the entire family can be costly and resource-intensive. Therefore childhood obesity interventions, which target only parents, have been explored as an alternative to reduce costs. Reviews comparing parent-only interventions with parent-child or child-only interventions have concluded that parent-only interventions may be as effective, however further research is needed. [25,26] Because parents and adult caregivers shape the development of children's eating behavior it has been hypothesized that if a behavior change is introduced first to the parents it will be reflected in the child as well. [6]

Golan et al. [6] investigated a model for childhood obesity treatment where the parents were targeted as the lone agents of change though educational sessions. This was done in an effort to prevent the obese children from resisting the behavior changes; therefore the children were not directly involved in the intervention. The control group consisted of educational sessions given in a child-only intervention format. The parent-only group was found to be more effective than the child-only group in regards to program adherence and percentage weight loss for children.[6]

Another study explored a similar model for childhood obesity treatment by comparing a parent-only group with a parent-and-child group. The rationale being that the parenting skills needed to achieve child weight loss could be delivered to the parent without the child present. [27] The treatment program focused on dietary modifications, increasing physical activity, behavior change skills, and parenting skills created for overweight children. It was found that the use of parents as the sole interventionists was not inferior to the parent-and-child group in regards to child weight loss, parent weight

loss, and child physical activity. Suggesting, that a parent-only intervention for childhood obesity could possibly be easier to disseminate and more cost effective.[27]

Research supports child-only and parent-only interventions to combat childhood obesity. However, these interventions fail to consider the family relationship and environment components that are crucial and seen within family-centered childhood obesity interventions. [28]

Family-Centered Childhood Obesity Interventions

Family-based interventions have been shown to be effective and currently are considered best practice in the management of childhood obesity. [25] Family and home environments play large roles in the development of food intake patterns and preferences as well as eating styles. By modeling healthful eating behaviors and encouraging physical activity children's attitudes and perceived value towards health increased. When parents were involved in interventions that target behavior change to reduce childhood obesity, their involvement contributes to long-term weight maintenance for the child[28] and may improve the parent-child relationship quality which is linked to obesity. [29]

Robson et al. [30] evaluated the impact of a pilot cooking intervention for parent-child pairs, on the consumption of foods outside of the home as eating out often leads to the intake of nutrient-poor, energy-dense foods. These types of foods can contribute to excess energy consumption in children. The proportion of dinners eaten away from home decreased significantly and parents rating of cooking enjoyment increased. Although this study did not target obesity specifically, researchers hypothesized that decreasing foods consumed outside of the home could reduce energy intake and positively impact child weight status.[30]

The Healthy Homes, Healthy Families pilot study[28] was an early childhood obesity prevention intervention that targeted parent-child pairs and their home environment. An interesting component was that a TV monitor was installed to assess child screen time. Vegetable intake increased while fruit juice consumption decreased. Children spent less time watching TV and the amount of homes with TV sets in the child's bedroom decreased. [28]

Even when comparing traditional clinical pediatric weight management techniques to family-based community programs, family-based interventions appear to be more effective and sustainable. [31] A study by Savoye et al. [31] at the Yale Pediatric Obesity Clinic compared these two methods. The control group received conventional counseling and the intervention group participated in the Bright Bodies program, an intensive family intervention that included nutrition education, supervised exercise, and behavior modification. The main outcomes measured were weight change, BMI, body fat, and insulin resistance assessment at both 6 and 12 months. The intervention group had positive effects on insulin resistance and body composition that were sustained at 12 months post-intervention.[31]

Obesity and Food Insecurity/Poverty

The topic of obesity has decades of research behind it, [32] however the relationship between obesity and poverty remains complex and still not well understood. [33] It is hypothesized that when a family is food insecure, the deficiency of resources and associated anxiety lead to the choice of cheaper foods, which are often energy-dense but nutrient-poor. [33]

The complexity behind the coexistence of obesity and food insecurity tempts policy makers to question the need for nutrition assistance programs when a high number of recipients are obese. [34] Numerous studies have linked food insecurity and obesity; [35] however, the relationship varies depending on gender, race-ethnicity, and age. [10] The highest obesity rates often are seen among the greatest disadvantaged groups, with these populations also often having the least amount of education and highest poverty rates. [36]

Food security and subsequently food insecurity are flexible, multidimensional concepts with numerous definitions. [37] The Food and Agriculture Organization of the United Nation's State of Food Insecurity 2001 report defines food security as, "A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." [38] And it goes on to define food insecurity as, "A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active, healthy life. It may be caused by the unavailability of food, insufficient purchasing power or the inappropriate distribution or inadequate use of food at the household level. Food insecurity, poor conditions of health and sanitation and inappropriate care and feeding practices are the major causes of poor nutritional status. Food insecurity may be chronic, seasonal or transitory." [38]

The United States Department of Agriculture (USDA) created it's own language and labels to describe the severity of food insecurity. Food security can be described as high food security, no signs of food-access issues or limitations or, marginal food security, with one or two indications. Food insecurity can be described as low food

security, a reported reduction in quality or variety of diet with minimal reduced food intake or, very low food security, where there are multiple instances of disturbed eating patterns along with reduced intake of food. [39] In 2013, 14.3% of US households (17.5 million) were classified as food insecure and of these, 5.6% experienced very low food security. [40]

Within the literature it is hypothesized that this paradox of low food security with obesity can be explained by two factors. The first factor being that food insecurity is connected to obesity by the palatable, high calorie foods that are consumed by food insecure populations. The second is that low food security is linked to obesity because of limited knowledge, resources, and time to prepare food at home that food insecure populations experience. [41] The foundation of food security is built upon food availability, food access, and food use. Meaning sufficient quantities of food must be consistently available as well as adequate resources to attain appropriate foods for a healthful diet and knowledge of nutrition and sanitation.[42]

Bhattacharya et al. [43] examined the relationship between poverty, food insecurity, and nutritional outcomes for children and adults. Data from the National Health and Nutrition Examination Survey III (NHANES III) from 1988 to 1994 was used. Nutritional outcomes were summarized with the USDA's Healthy Eating Index (HEI) as a means to assess overall diet quality. It was found that poverty is a predictive factor of poor nutritional outcomes among preschoolers and adults however, not among school aged children. A link between poor individuals and lower HEI scores along with low serum nutrient levels was also found. In regards to obesity, non-elderly poor Americans were more likely to be obese which suggested that poor persons are prone to eat

calorically dense, nutrient poor foods rather than suffer from insufficient calories overall. When examining children's nutritional outcomes, food insecurity provides little predictive power. [43] Additional research supports that when examining the relationship between food insecurity and childhood obesity, no significant association exists. [34] Some race and ethnicity differences do exist though; poverty appears to have greater negative effects on diet quality and serum nutrient levels among black and Hispanic children compared to white children.[43]

Ethnicity also played a role in a study by Smith et al. [33] Household food insecurity was used as a determinant of overweight and obesity among low-income Hispanic subgroups. Within the US, an estimated 78% of Hispanics were overweight or obese and it is thought that food insecurity is more prevalent in Hispanic than non-Hispanic white households. The study found that the association between obesity and food insecurity varied among the differing Hispanic subgroups and was seen only in the Mexican-American women. This association was not seen in Mexican-American men or any other Hispanic subgroups (Central American, Puerto Rican, Spanish-American, or South American). To better serve certain populations, obesity prevention strategies and interventions that focus on sociocultural factors and how they may intersect with poverty are needed. [33]

Obesity and Geographic Location

Recent studies have linked neighborhood poverty to a greater BMI in adolescence as well as weight gain over time. [36,44-46] Research suggests that the geographic location (neighborhood or city) an individual lives in, shapes their exposure to physiological, behavioral, and social risks for obesity. It is hypothesized that this may occur due to the

lack of adequate healthy food sources, physical activity opportunities, and increased exposure to stress that exists in poor neighborhoods. [46]

Research supports the correlation between diet quality and residential property values as an objective measure of individual wealth or socioeconomic status (SES). [47] Using geospatial analyses in US residential neighborhoods, researchers have discovered higher obesity rates in underserved and more deprived areas. [48] Drewnowski et al. [48] explored the link between individual food environments, SES and obesity rates in two differing geographic locations: Seattle and Paris. The Seattle Obesity Study and Paris' Residential Environment and Coronary Heart Disease study measured geographic information system (GIS) distances from home to primary supermarket where respondents shopped. Researchers found that the physical distance between home and supermarket was not related to obesity risk; however, low SES was. Factors such as lower income, education and surrounding property values as well as shopping at lower-cost supermarkets were all associated with higher obesity risk. In conclusion, despite urban differences and therefore food environment differences, both Seattle and Paris found a link between higher obesity risk and lower SES.[48]

When describing an obesogenic environment, neighborhood context is considered to be an important feature. [44] Underprivileged neighborhoods often encourage poor eating habits while discouraging physical activity. Parental perceptions of their neighborhood may also deter youth from engaging in physical activity outside. [44] Lippert[46] found that adolescents who come from low-income neighborhoods are at a higher risk of becoming obese adults than peers who come from non-poor neighborhoods. When comparing gender, young women were at an increased risk for obesity in regards to geographic

poverty compared to young men. [46] Nicholson and Browning also found that for males, regardless of race or ethnicity, neighborhood poverty did not have an affect on obesity risk. [45] Research supports that geographic location can directly affect obesity and health outcomes including diet quality, physical activity habits, and smoking and drinking patterns.[36,45,46,49]

Summary

The iCook 4-H Program targets the prevention of childhood obesity by promoting the importance of culinary skills, family meals, and physical activity. Parents are considered the "gatekeepers of food" for children. However many parents lack the cooking confidence and skills necessary to provide healthy dietary options. [30] A strong positive association has been found between adult BMI change and child BMI change post-intervention indicating that obesity prevention needs to be a family matter. [50]

This literature review explored the effectiveness of the SCT as a framework for obesity interventions. It also examined the differences between child-only, parent-only, and family-centered interventions for childhood obesity. The interventions found to be the most effective had similar qualities including parental involvement, combining nutrition and physical activity behavior modification, underlying theory use, specific goal setting, and restructuring the home environment.[51]

In addition, food insecurity and neighborhood poverty are associated with obesity. These associations are complex and depend upon a variety of sociocultural and socioeconomic factors. To create interventions to prevent and reduce obesity, all factors must be taken into account including neighborhood environment.[44]

Although literature can be found on family-centered health programs that target childhood obesity, minimal data exist on how food security status changes after participating in an intervention such as iCook 4-H. Or, on secondary outcomes and food-related behaviors of the adult primary meal-preparer who attended the intervention alongside their child. The tertiary goal of iCook 4-H was to evaluate a variety of adult outcome variables. This project assessed adult outcomes, between treatment and control groups, across time points and evaluated how food security status may have been impacted. Variables included self-reported food intake, procurement, preparation and safety practices, parent-child feeding relationships, family mealtime routines, quality of life, program evaluation, BMI, and measured blood pressure.

CHAPTER THREE
METHODOLOGY

Research Question

Were there significant differences in program outcomes between adult control and treatment participants? Outcomes include: self-reported food intake, procurement, preparation and safety practices, parent-child feeding relationships, family mealtime routines, quality of life, program evaluation, BMI, and measured blood pressure. Additionally, did the program impact food security status of adult participants?

Goal and Objectives

To assess whether or not improvements in adult outcome variables listed above were achieved across time points and how food security status was impacted.

Hypotheses

Treatment participants will show improvements in outcome variables, whereas comparatively, control participants will not show significant improvements.

Study Design

The iCook 4-H intervention was a randomized control treatment design with assessments at 0, 4, 12, and 24 months. However, this project focused on data from the 0, 4, and 12-month assessments due to current data availability. This study took place across five states: Maine, Nebraska, South Dakota, Tennessee and West Virginia where researchers from each state collaborated together to conduct this intervention.

The intervention took place from August 2013 to August 2015. For the treatment group, it consisted of 6 bi-weekly face-to-face educational sessions in fall 2013, website activity across the 12 months, and booster sessions in spring and summer of 2014 and 2015. Treatment participants also received monthly newsletters distributed through email

or mail. These sessions were held at universities, community centers, schools, and Extension offices. Control participants only participated in assessments.

At 0, 4, 12, and 24-month assessment periods, youth and adult participants from both the treatment and control group completed surveys and physical assessments. Dyad members in the treatment and control group received $10.00 cash each after completing assessments for a total of $80.00 per dyad. In addition, the treatment group received another $10.00 per youth-adult pair for attending each of the six educational sessions for a total of $60.00 per dyad. The youth from the treatment group also received a video camera. Each participating state's Human Subjects Institutional Review Board (IRB) approved all methodologies and any researcher involved received training in human subjects research.

Participants

Participants included adult primary meal preparers of 9 and 10 year old youth to create a youth-adult pair known as a dyad (n=228 dyads). Participants had to meet the following inclusion criteria to be eligible to participate in the iCook 4-H program:

- Primary adult meal preparer of child 9-10 years old
- Able to participate in a program from August 2013 to August 2015
- Free from life-threatening illness or other conditions and/or activity-related medical restrictions that would prevent participation in a face-to-face nutrition and physical activity program
- Free from food allergies
- Only one participant per family – no twins, triplets, brothers, or sisters may participate in sessions

- Ability to have regular access to a computer with internet connection
- Participants must be willing to eat meat and dairy products as vegetarian options may not be available

Recruitment

Participants, 9-10 year old youth and their primary adult meal preparer were recruited through direct and indirect contact methods (Appendix A). Researchers from all 5 states partnered with Extension leaders to recruit participants. Direct contact methods included visiting 4-H classes or camps or other existing Cooperative Extension Programming. Boy and Girl Scout Clubs were also visited with adult and youth recruitment materials. Recruiters also reached out to elementary teachers and schools, hosted informational tables at community and family events, and visited various community agencies and churches. Indirect contact methods included flyers distributed to students at elementary schools, community centers, recreational facilities and after school programs. Email messages were sent through community agencies, churches, and social network sites and news releases and announcements were printed in local newspapers.

Once recruiters had established contact with potential adult participants who were interested, researchers were then able to review consent forms (Appendix B) with dyads. After the adult participant provided a signature and the assent form for the child was accepted, the adult-youth pair was considered a participating dyad of iCook 4-H.

Intervention Curriculum

The iCook 4-H curriculum used was created for six, two hour, educational sessions. These sessions were taught in-person by the same session leader biweekly in the fall of 2013. Session leaders came from a variety of backgrounds; some were Extension

educators, graduate students, or community members. All session leaders received extensive training to lessen intervention inconsistencies. Leaders were provided with visual, audio and documented instructions as well as trainings that occurred via webinars and phone conferences. These training sessions were meant to educate leaders on curriculum, increase confidence, and discuss site-specific alterations, all while still maintaining the fidelity of curriculum goals and objectives.

iCook 4-H researchers and Extension staff designed the classes for families as a non-diet approach to child weight management with the SCT serving as the theoretical foundation. Each educational session followed a similar layout to ensure consistency. Although timing varied with each lesson the average session followed the following format: welcome and introduction (10 min); introductory activity (10 min); recipe preparation and culinary skill development (45 min); physical activity break (15 min); family communication (15 min); goal setting (15 min); take-home message and wrap-up (10 min). The sessions emphasized culinary skills, physical activity, nutrition education, family mealtimes, and goal setting. The activities encouraged at home included cooking, playing, and eating together as a family and utilizing the iCook 4-H website.

The iCook 4-H curriculum was adapted from existing 4-H curricula that had been developed by Nebraska Extension, *Fast Foods* and *Youth in Motion*. Alterations for iCook 4-H included the focus of food safety, family mealtime, MyPlate, and technology utilization. [11] The technology aspect was included as a way to add interest, enthusiasm and sustainability. Each child in the treatment group received a video camera to create various cooking, physical activity, and family meal videos at home to demonstrate what they had learned in sessions. Then, these short videos were uploaded to a secure iCook 4-

H website. This website was developed to be an interactive platform that encouraged communication among participants. It also served as a way for children to track nutrition and physical activity goal progress.

Data Collection Instruments

Various instruments were used to assess food-related behavior and food intake of adult participants. These instruments were hosted through an online survey software system called Qualtrics (http://www.qualtrics.com) through secure servers (Qualtrics, Provo, UT). To help provide consistent Internet access, all sites were to have wireless Internet access. However, due to unreliable Internet service, a location in Nebraska used hard copy instruments throughout the study. All data collection instruments were presented to participants as one cohesive document or online survey, no breaks between instruments was specified. Total time spent at each assessment period was 45-60 minutes for all data collection instruments. A pilot study (n=54 dyads) was conducted to ensure validity of questions. The pilot participants were also family dyads consisting of a 9-10 year old youth participant along with their primary adult meal preparer. No control group was used for the pilot study. [52]

Demographic Instrument (Table 1). A variety of adult self-reported demographic information was collected including gender, age, race, marital status, education level, height, weight, income and food security status. This instrument has been previously used in studies by this research team but was modified for this intervention.[13]

Blood Pressure (Table 2). Blood pressure was measured using a standardized protocol. A registered nurse or a trained graduate student took blood pressure measurements. Littman Classic Stethoscopes with combination head, diaphragm and bell to hear pulse sounds

were used (Appendix C). [53] If blood pressure was outside of normal ranges, the participant was provided with a form indicating that it may be beneficial to follow up with the primary physician.

Food Intake (Table 3). Food intake was assessed using two different instruments for a total of 40 questions. Eating habits over the past 12 months were assessed with the National Cancer Institute's "Quick Food Scan for Fat Intake". [54] Food intake over the past month was assessed with the National Cancer Institute's "Fruit and Vegetable Screener". [55] Data for both was scored using the National Cancer Institute's scoring procedures. [56]

EFNEP Behavior Checklist (Table 4). This instrument is a 10-item checklist originally designed for the Expanded Food and Nutrition Education Program (EFNEP). [57] It was used to assess food preparation skills, food handling practices, and mastery of living situation including self-esteem. Currently, it is part of the Evaluation/ Reporting System software for EFNEP and has been assessed to have a 6th grade reading level.

Birch Child Feeding Questionnaire (Table 5). A 28-item questionnaire, created by Birch, was used to assess the attitudes, beliefs, and practices about child feeding and obesity proneness. [58]

Family Meal Routine (Table 6). Family mealtime characteristics were assessed with 7-items from Project Eat. This project has previously been conducted with the primary meal preparers of 8-10 year olds. [59] Meal frequency per week was also assessed with a 7-item tool.

Quality of Life (Table 7). Quality of life was measured using the Centers for Disease Control and Prevention (CDC) Health-Related Quality of Life scale and the PedsQL for

Adults. The CDC's 4-item healthy days core module was used. This has been used in the Behavior Risk Factor Surveillance System, the National Health and Nutrition Examination Survey and the Medicare Health Outcome Survey. [13,60] The PedsQL is a 23-item questionnaire validated for people above the age of 17 to assess quality of life. This survey measures anxiety, sadness, anger, worry, fatigue, and pain.[61]

Family Adaptability and Cohesion Scale (FACES) IV (Table 8). This instrument was used to determine family dynamics. Two subscales were used; family communication and family satisfaction were assessed with 10 questions each. [62]

Food Security (Table 9). Food security status was measured as part of demographics with the US Household Food Security Survey Module: Six-Item Short Form from the USDA Economic Research Service. [14]

Program Evaluation (Table 10). The program evaluation instrument created for the iCook 4-H program underwent psychometric testing; final modified versions were created for youth and adults. Only data from the 0-, 4-, and 12-month assessments were used for instrument testing and development along with only control group data. This was done to avoid bias from participants in the treatment group.

Upon final instrument determination, test-retest reliability occurred comparing 0- to 4-month and 0- to 12-month to test the instrument structure stability. Confirmatory factor analyses determined item inclusion in the final instrument and potential subscales using verimax rotation. Internal consistency of the instrument and subscales was determined with Cronbach's Alpha. The optimal alpha values of 0.6 to 0.8 were used. If an alpha value was above 0.9 it was considered suspect because of too many repetitive items. However, alpha values below 0.5 were considered unacceptable due to lack of

internal consistency within instrument items. Correlations between subscales were tested at all three time points. And test-retest reliability was conducted with Pearson's correlation. Optimal reliability was achieved with correlation values above 0.7. The program evaluation questions were found to be consistent at 0, 4, and 12 months with good reliability: 0.72 – 0.77. Adult test-retest reliability was 0.83 for 0- to 4-month and 0.73 for 0- to 12-month.

The program outcome evaluation was designed to take 15 minutes. Its aim was to serve as a reliable instrument to accompany the iCook curriculum and provide program leaders with program-specific outcome measures. It was designed to address iCook 4-H specific focal areas: increasing eating together, cooking together, physical activity and goal setting. [63]

Data Analyses

Statistical analyses were performed using IBM SPSS Statistics for Mac (Version 23.0, 2015, IBM Corp). Jonathan Moyer, with the University of Maine, served as the consulting statistician on this project. Data was normally distributed. Descriptive statistics (frequencies and percentages) were calculated for baseline demographics. A linear mixed model approach was used to analyze data at baseline, 4, and 12-month time points. Group-time interactions were the focus of the data analyses. Advantages to using this type of analyses include the prevention of false positive associations and an increase in power. [64] The linear mixed model analyses were also able to accommodate the issue of missing data across time points. [65] Level of statistical significance was set at $p<0.10$ for all analyses. One way to reduce the chance of a false negative is to increase the sample size however, with this study that is not feasible so instead, the p value is increased. [66]

Dropout data was analyzed using Pearson's Chi-squared test with Yates' continuity correction.

CHAPTER FOUR
RESULTS

Adult Demographics

At baseline, the control group consisted of 77 adult participants and the treatment group, 150 adult participants. When control and treatment participants were categorized by state, 28% were from Maine, 18% were from Nebraska, 15% were from South Dakota, 19% were from Tennessee, and 20% were from West Virginia. The majority of adult participants across groups were female, with control at 83% and treatment at 93%. Participant ages were similar; control participants were on average 39.2 ± 9.1 years, and treatment participants 38.8 ± 7.5 years. Sixty-eight percent of control and treatment participants were married. Two-thirds of control and three-fourths of treatment participants were white. About half of the control group (51%) and treatment group (59%) had completed at least some college.

With regards to employment status, 58% of control and 64% of treatment participants were employed for wages. When examining food security status, 68% of control and 64% of treatment were categorized as having high food security status. Thirty-eight percent of control and 43% of treatment participants reported receiving some type of government assistance – Aid to Dependent Children/Temporary Assistance for Needy Families (TANF), Expanded Food and Nutrition Education Program (EFNEP), free/reduced price school meals, Medicaid, welfare-to-work, Women, Infants, and Children (WIC), Supplemental Nutrition Assistance Programs (SNAP), and/or supplemental security income. The average number of adults and children per household was 2.08 ± 0.90 adults and 2.70 ± 1.30 children for control and 2.03 ± 0.73 adults and 2.55 ± 1.06 children for treatment. Overall, the child age for both groups ranged from 8

to 11 years (control mean age = 9.26 ± 0.71 years, treatment mean age = 9.4 ± 0.65 years). Eighty-eight percent of adult participants in the control and 97% in the treatment were the parent of the child participating in the program. Complete demographic information can be found in Table 1.

Adult Anthropometrics

At baseline, the control group's BMI category distribution was as follows: Underweight (1.4%), Normal (28.8%), Overweight (23.3%) and Obese (46.6%) with an average BMI of 30.3 ± 7.8. For the treatment group, BMI distribution was Underweight (0.8%), Normal (31.0%), Overweight (29.5%) and Obese (38.8%) with an average BMI of 29.5 ± 7.3. Slight decreases in BMI were seen over time for control and treatment participants however no significant differences were detected.

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were both measured. Participants were categorized as normal SBP or at risk for cardiovascular disease meaning their SBP fell into one of the following categories: prehypertension, stage 1 hypertension, or stage 2 hypertension. At baseline, 44% of control and 29% of treatment were at risk. Percent risk varied across time points however no significant differences were observed between control and treatment participants. Complete anthropometric information can be found in Table 2.

Food Intake

Non-interaction time and group effects occurred; however, only one group-time interaction was seen within the Food Intake assessment tool. Total fruit intake showed a significant interaction. Treatment participants had a moderate increase at 4 months and a similar, additional, increase at 12 months ($p < 0.1$). The control group's total fruit intake

however decreased after baseline. Complete Food Intake information can be found in Table 3.

EFNEP Behavior Checklist

Significant group-time interactions were seen for the food safety subscale and food practice subscale ($p < 0.1$). Within the food safety subscale, the following question was found to have a significant interaction, "This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?" ($p < .05$). Treatment participants worsened across time points saying that they left meat and dairy products out more often as time went on whereas control participants improved and left these products out less often. However, responses for both groups were within the "did not do" to "seldom" category throughout time points.

Within the food practice subscale, a significant interaction was seen for the question, "How often do you shop with a grocery list?" ($p < .05$). At 4 months post-intervention the treatment group showed a large increase, this was maintained at 12 months post-intervention. Also within this practice subscale, a significant interaction was seen for the question, "How often do you use the 'Nutrition Facts' on the food label to make food choices?" ($p < .001$). The treatment group improved at 4 months post-intervention and continued to improve at 12 months post-intervention. Complete EFNEP Behavior Checklist information can be found in Table 4.

Birch Child Feeding Questionnaire

Non-interaction time and group effects occurred; however no group-time interactions were seen within subscales or individual questions of the Birch Child Feeding Questionnaire. Complete Birch Child Feeding information can be found in

Table 5.

Family Meal Routine

For the overall Family Meal Routine scale, no significant differences were detected; however, differences were noted for one individual question. A significant interaction was seen for the question "During the past 7 days, how many times was a family meal purchased and eaten in other types of restaurants (full-service, sit-down)?" ($p < .05$). The treatment group improved the greatest at 4 months, eating out at restaurants less often but slightly decreased at 12 months. The control group had the largest decrease at 12 months and reported eating out more often than at 0- or 4-months. Complete Family Meal Routine information can be found in Table 6.

Quality of Life

For the overall Quality of Life scale, no significant differences were detected. A significant group-time interaction was seen for one question, but this particular question was not a main outcome of the study. Complete Quality of Life information can be found in Table 7.

FACES IV

Non-interaction time and group effects occurred however no significant differences were seen within subscales. When looking at individual questions, a significant group-time interaction was seen for the statement, "When family members ask questions of each other, they get honest answers." ($p < .05$). The largest control/treatment difference was seen 4 months post-intervention where the treatment group significantly improved and reported strongly agreeing compared to the control group that decreased. Complete FACES IV information can be found in Table 8.

Food Security

A significant group-time interaction was seen with overall food security score ($p < .05$). Participants were categorized as having high, low, or very low food security. For the treatment group food security score significantly improved 4 months post-intervention and continued to improve at 12 months compared to the control group.

Program Evaluation

Four program evaluation questions were found to have significant group-time interactions. The first being, "How often do you plan your weekly meals?" ($p<0.1$). The treatment group consistently improved across time points whereas the control group worsened at 4 months and improved at 12 months. "How often do you enjoy making meals with your child" also had a significant group-time interaction ($p<0.1$). Treatment participants showed the largest improvement immediately post-intervention at 4 months however this effect became diluted at 12 months. The control group stayed consistent from baseline to 4 months and increased at 12 months. A significant group-time interaction was also found for "How often do you need to manage your grocery budget carefully to ensure balanced meals for your family toward the end of the pay period?" ($p<0.05$). Both groups decreased throughout the time points; less often did participants have to manage their grocery budget. The final significant question was "How often do you feel confident with your kitchen skills?" ($p<0.1$). The treatment group improved the greatest at 4 months post-intervention and continued to improve at 12 months.

Participant Attrition

The overall attrition rate was 33%, 74 total participants met the dropout criteria of no measured blood pressure at 12 months (attrition data is not reported in tabular form).

No significant association between adult control and treatment group dropout was seen; adults in the treatment group were as likely as control participants to discontinue program participation. No significant associations were seen between adult gender, race, food security category, or education and dropout. A significant association was seen between state and dropout ($p < .05$), Tennessee and West Virginia adult participants were more likely to be dropouts than participants from Maine, Nebraska, or South Dakota. A significant association was also seen between usage of government programs and dropout ($p < .05$). Adults who participated in government programs were more likely to be dropouts. A significant association was seen between married and not married adult participants and dropout rate ($p < .001$). Unmarried adult participants were more likely to dropout than married participants. In regards to adult BMI category, a significant association was seen between BMI category and dropout ($p < .05$). Participants with a higher BMI were more likely to be dropouts.

Table 1: Adult Baseline Demographics

	Control (n=77)	Treatment (n=150)	Sum (n=227)
	n (%)	n (%)	n (%)
Adult Gender[α]			
Male	12 (16.2)	9 (6.7)	21 (10.1)
Female	62 (83.3)	125 (93.3)	187 (89.9)
State			
Maine	24 (31.2)	39 (26.0)	63 (27.8)
Nebraska	18 (23.4)	23 (15.3)	41 (18.1)
South Dakota	9 (11.7)	26 (17.3)	35 (15.4)
Tennessee	12 (15.6)	31 (20.7)	43 (18.9)
West Virginia	14 (18.2)	31 (20.7)	45 (19.9)
Adult Age (years)[β]			
n	73	133	206
Mean ± SD	39.18 ± 9.05	38.80 ± 7.48	38.93 ± 8.05
Range	20-67	25-64	20-67

Adult Age Category (years)[β]			
18-27	6 (8.2)	1 (0.8)	7 (3.4)
28-37	28 (38.4)	62 (46.6)	90 (43.7)
38-47	29 (39.7)	57 (42.9)	86 (41.7)
48-57	6 (8.2)	11 (8.3)	17 (8.3)
58-67	4 (5.5)	2 (1.5)	6 (2.9)
68-77	0 (0)	0 (0)	0 (0)
78+	0 (0)	0 (0)	0 (0)
Adult Marital Status[γ]			
Married	50 (67.6)	95 (68.3)	146 (68.5)
Widowed	0 (0)	2 (1.4)	2 (0.9)
Divorced	10 (13.5)	12 (8.6)	21 (9.9)
Single	9 (12.2)	17 (12.2)	26 (12.2)
Committed	5 (6.8)	13 (9.4)	18 (8.5)
Adult Race[δ]			
White	50 (69.4)	105 (76.1)	155 (73.8)
Black	5 (6.9)	13 (9.4)	18 (8.6)
Asian	1 (1.4)	1 (0.7)	2 (1.0)
Hispanic	13 (18.1)	16 (11.6)	29 (13.8)
Native American	0 (0)	3 (2.2)	3 (1.4)
Other	3 (4.2)	0 (0)	3 (1.4)
Adult Education[Ψ]			
Elementary	2 (2.7)	7 (4.7)	9 (4.0)
Some High School	2 (2.7)	1 (0.7)	3 (1.3)
High School	5 (6.7)	22 (14.9)	27 (12.1)
Some College	28 (37.3)	31 (20.9)	59 (26.5)
Associates	8 (10.7)	20 (13.5)	28 (12.6)
Bachelors	21 (28.0)	44 (29.7)	65 (29.1)
Graduate	7 (9.3)	18 (12.2)	25 (11.2)
Doctoral	2 (2.7)	5 (3.4)	7 (3.1)
Adult Employment Status[Φ]			
Employed for wages	29 (58.0)	68 (63.6)	97 (61.8)
Self-Employed	4 (8.0)	9 (8.4)	13 (8.3)
Out of work and looking for work	0 (0)	1 (0.9)	1 (0.6)
Out of work but not currently looking for work	0 (0)	0 (0)	0 (0)
Stay at-home mom/dad	12 (24.0)	25 (23.4)	37 (23.6)
A student	3 (6.0)	1 (0.9)	4 (2.5)
Retired	2 (4.0)	1 (0.9)	3 (1.9)
Unable to work	0 (0)	2 (1.9)	2 (1.3)

Choose Not to Answer	0 (0)	0 (0)	0 (0)
Food Security Status$^{\Omega}$			
High Food Security	48 (67.6)	86 (64.2)	134 (65.4)
Low Food Security	14 (19.7)	28 (20.9)	42 (20.5)
Very Low Food Security	9 (12.7)	20 (14.9)	29 (14.1)
Food Security- Receiving Gov't Assistance?$^{\Sigma}$			
Yes	27 (37.5)	60 (42.9)	87 (41.0)
No	45 (62.5)	80 (57.1)	125 (59.0)
Adults in Household$^{\lambda}$			
n	74	142	216
Mean ± SD	2.08 ± .90	2.03 ± .73	2.05 ± .79
Children in Household$^{\Theta}$			
n	74	137	211
Mean ± SD	2.70 ± 1.30	2.55 ± 1.06	2.60 ± 1.15
Child Age (years)$^{\varpi}$			
n	77	150	227
Mean ± SD	9.26 ± 0.71	9.4 ± 0.65	9.35 ± 0.67
Range	8-11	8-11	8-11
Relationship to Child$^{\pi}$			
Parent	44 (88.0)	105 (97.2)	149 (94.3)
Grandparent	3 (6.0)	3 (2.8)	6 (3.8)
Other	3 (6.0)	0 (0)	3 (1.9)
Choose Not to Answer	0 (0)	0 (0)	0 (0)

$^{\alpha}$Missing n=19; $^{\beta}$Missing n=21; $^{\gamma}$Missing n=14; $^{\delta}$Missing n= 17; $^{\Psi}$Missing n=4; $^{\Phi}$Missing n=70; $^{\Omega}$Missing n=22; $^{\Sigma}$Missing n=15; $^{\lambda}$Missing n=11; $^{\Theta}$Missing n= 16; $^{\varpi}$Missing n= 1; $^{\pi}$Missing n=69;

Table 2: Adult Anthropometrics

	Control Group (n=77)			Treatment Group (n=150)		
	Baseline	4 Months	12 Months	Baseline	4 Months	12 Months
	n (%)			n (%)		
BMI						
n	73	51	48	129	109	93
Mean ± SD	30.27 ± 7.80	29.76 ± 7.57	29.04 ± 7.07	29.49 ± 7.34	29.07 ± 7.60	28.49 ± 7.56
BMI Category						
Under	1 (1.4)	0 (0)	1 (2.1)	1 (0.8)	2 (1.8)	1 (1.1)
Normal	21 (28.8)	17 (33.3)	14 (29.2)	40 (31.0)	37 (33.9)	37 (39.8)
Over	17 (23.3)	13 (25.5)	15 (31.3)	38 (29.5)	35 (32.1)	28 (30.1)
Obese	34 (46.6)	21 (41.2)	18 (37.5)	50 (38.8)	35 (32.1)	27 (29.0)
Sum	73	51	48	129	109	93
SBP						
n	75	54	45	149	117	93
Mean ± SD	117.6 ± 14.4	120.4 ± 14.4	116.0 ± 13.6	113.7 ± 14.4	113.8 ± 15.4	111.9 ± 11.5
DBP						
n	75	54	45	149	117	93
Mean ± SD	77.6 ± 11.3	79.0 ± 10.2	73.6 ± 10.2	73.9 ± 11.8	74.5 ± 12.4	71.4 ± 10.4
SBP Category						
Normal SBP	42 (56.0)	26 (48.1)	29 (64.4)	105 (70.5)	77 (65.8)	68 (73.1)
Pre Hypertension	27 (36.0)	24 (44.4)	14 (31.1)	36 (24.2)	29 (24.8)	23 (24.7)
Stage 1 Hypertension	5 (6.7)	3 (5.6)	2 (4.4)	7 (4.7)	11 (9.4)	2 (2.2)
Stage 2 Hypertension	1 (1.3)	1 (1.9)	0 (0)	1 (0.7)	0 (0)	0 (0)
Sum	75	54	45	149	117	93

* denotes p value <0.1

**denotes p value <0.05

Table 3: Adult Food Intake

Thinking about your eating habits over the past 12 months. About how often did you eat or drink each of the following foods? Remember breakfast, lunch, dinner, snacks, and eating out. Click on only one for each food.	Control Group (n=77)						Treatment Group (n=150)					
	n	Baseline	n	4 Months	n	12 Months	n	Baseline	n	4 Months	n	12 Months
Cold cereal[1]	74	4.23 ± 1.86	53	4.23 ± 1.60	49	4.29 ± 1.67	143	4.29 ± 1.76	123	4.25 ± 1.64	103	4.16 ± 1.78
Skim milk, on cereal or to drink[1]	73	4.04 ± 2.51	52	4.42 ± 2.37	48	4.04 ± 2.67	142	3.80 ± 2.57	123	4.04 ± 2.54	104	3.93 ± 2.51
Eggs, fried or scrambled in margarine, butter, or oil[1]	73	3.45 ± 1.48	52	3.42 ± 1.42	48	3.69 ± 1.21	142	3.49 ± 1.56	122	3.37 ± 1.42	104	3.50 ± 1.58
Sausage or bacon, regular fat[1]	73	3.00 ± 1.29	54	2.87 ± 1.13	49	2.86 ± 1.00	143	2.87 ± 1.19	123	2.66 ± 1.03	104	2.88 ± 1.15
Margarine or butter on bread, rolls, pancakes[1]	74	3.76 ± 1.58	54	3.74 ± 1.52	49	3.86 ± 1.68	141	3.71 ± 1.70	123	3.52 ± 1.62	104	3.60 ± 1.41
Orange juice or grapefruit juice[1]	73	3.38 ± 1.77	54	3.26 ± 1.79	49	3.39 ± 1.68	142	3.18 ± 1.76	123	3.76 ± 1.84	104	3.52 ± 2.00
Fruit (not juices)[1]	74	5.54 ± 1.79	52	5.37 ± 2.06	49	5.43 ± 2.00	142	5.23 ± 1.94	123	5.48 ± 1.88	103	5.90 ± 1.86
Beef or pork hot dogs, regular fat[1]	74	3.28 ± 1.45	54	2.94 ± 1.27	49	3.22 ± 1.42	141	2.84 ± 1.44	122	2.55 ± 1.25	104	2.84 ± 1.36

Cheese or cheese spread, regular fat[1]	74	4.47 ± 1.53	54	4.61 ± 1.56	48	4.50 ± 1.69	143	4.38 ± 1.65	119	4.30 ± 1.65	103	4.16 ± 1.67
French fries, home fries, or hash brown potatoes[1]	74	3.42 ± 1.14	54	3.31 ± 1.37	49	3.31 ± 1.08	142	3.20 ± 1.14	123	3.13 ± 1.13	104	3.04 ± 1.13
Margarine or butter on vegetables, including potatoes[1]	74	3.93 ± 1.44	54	3.80 ± 1.52	48	3.69 ± 1.64	143	3.72 ± 1.66	123	3.72 ± 1.54	104	3.44 ± 1.62
Mayonnaise, regular fat[1]	73	2.90 ± 1.46	54	2.57 ± 1.25	49	2.98 ± 1.55	142	2.81 ± 1.52	123	2.63 ± 1.33	104	2.65 ± 1.41
Salad dressing, regular fat[1]	73	3.32 ± 1.36	54	3.37 ± 1.56	48	3.35 ± 1.50	143	3.20 ± 1.51	121	3.09 ± 1.44	102	3.28 ± 1.49
Rice[1]	74	3.66 ± 1.25	54	3.67 ± 1.39	49	3.45 ± 1.53	142	3.54 ± 1.41	120	3.58 ± 1.20	104	3.47 ± 1.35
Margarine, butter or oil on rice or pasta[1]	74	3.18 ± 1.53	54	3.30 ± 1.60	48	3.12 ± 1.48	143	3.08 ± 1.70	122	2.99 ± 1.57	104	2.67 ± 1.50
Over the past 12 months, when you prepared foods with margarine or ate margarine, how often did you use reduced-fat margarine?[2]	74	2.68 ± 1.95	54	2.59 ± 1.74	49	2.49 ± 1.73	143	3.04 ± 2.00	123	3.14 ± 2.07	104	3.20 ± 2.15
Overall, when you think about the foods you ate over the past 12 months, would you say your diet was high, medium, or low in fat?[3]	74	1.96 ± .48	54	1.94 ± .45	49	2.06 ± .59	142	2.00 ± .55	123	2.19 ± .50	103	2.24 ± .49

Estimated percent of energy due to fat	68	31.92 ± 5.60	46	31.31 ± 4.26	42	32.10 ± 4.58	122	31.60 ± 5.15	108	30.46 ± 5.12	88	30.97 ± 5.30
Over the last month, how many times per month, week, or day did you drink 100% juice such as orange, apple, grape, or grapefruit juice? Do not count fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals[4]	74	3.19 ± 1.79	54	3.00 ± 1.40	49	3.22 ± 1.79	143	3.04 ± 2.05	122	3.31 ± 1.68	104	3.23 ± 2.02
Each time you drank 100% juice, how much did you usually drink?[5]	65	2.31 ± .83	49	2.10 ± .96	44	2.07 ± .82	111	2.14 ± .80	104	2.02 ± .78	85	1.99 ± .79
Over the last month, how many times per month, week, or day did you eat fruit? Count any kind of fruit--fresh, canned, and frozen. Do not count juices. Include fruit you ate at all mealtimes and snacks[4]	72	5.17 ± 1.97	54	5.20 ± 1.87	49	5.33 ± 2.21	143	5.08 ± 1.93	122	5.17 ± 1.90	103	5.34 ± 1.96

Each time you ate fruit, how much did you usually eat?[6]*	74	2.43 ± .68	53	2.30 ± .67	46	2.39 ± .68	141	2.30 ± .76	122	2.19 ± .55	103	2.37 ± .71
Over the last month, how often did you eat lettuce salad (with our without other vegetables?[4]	74	3.18 ± 1.16	54	3.48 ± 1.51	49	3.41 ± 1.21	142	3.35 ± 1.45	123	3.32 ± 1.17	103	3.58 ± 1.38
Each time you ate French fries or fried potatoes, how much did you usually eat?[7]	67	1.66 ± .77	48	1.56 ± .62	46	2.35 ± .74	127	1.49 ± .62	107	1.38 ± .59	99	2.58 ± .76
Over the last month, how often did you eat other white potatoes? Count baked, broiled, and mashed potatoes, potato salad, and white potatoes that were not fried[4]	72	2.72 ± 1.08	53	2.83 ± 1.11	49	2.71 ± .98	142	2.72 ± 1.18	122	2.70 ± .94	103	2.64 ± 1.26
Each time you ate these potatoes, how much did you usually eat?[8]	68	2.04 ± .82	50	2.12 ± .80	45	2.11 ± .75	136	1.93 ± .67	115	1.89 ± .65	100	1.81 ± .65
Over the last month, how often did you eat cooked dried beans? Count baked beans, bean soup, refried beans, pork and beans and other bean dishes[4]	72	2.64 ± 1.42	54	2.69 ± 1.04	48	2.69 ± 1.10	142	2.56 ± 1.46	123	2.60 ± 1.15	104	2.54 ± 1.31

Each time you ate these beans, how much did you usually eat?[9]	0	N/A	48	2.08 ± .71	45	1.96 ± .64	0	N/A	110	1.99 ± .67	91	1.99 ± .71
Over the last month, how often did you eat other vegetables? DO NOT COUNT: Lettuce salads, white potatoes, cooked dried beans, vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.; rice. COUNT: All other vegetables--raw, cooked, canned, and frozen[4]	0	N/A	54	5.04 ± 1.94	49	5.18 ± 1.91	0	N/A	123	5.18 ± 1.76	104	5.40 ± 1.90
Each of these times that you ate other vegetables, how much did you usually eat?[9]	65	2.02 ± .74	53	2.15 ± .60	48	2.23 ± .66	118	1.93 ± .74	123	2.12 ± .62	104	2.23 ± .578
Over the last month, how often did you eat tomato sauce? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes[4]	73	2.86 ± .90	54	3.02 ± .92	49	2.98 ± 1.42	143	2.99 ± 1.14	122	2.98 ± 1.09	104	2.89 ± .975
Each time you ate tomato sauce, how much did you eat?[10]	73	1.75 ± .81	51	1.63 ± .75	45	1.64 ± .65	139	1.76 ± .74	120	1.75 ± .65	103	1.71 ± .76

Over the last month, how often did you eat vegetable soups? Include tomato soup, gazpacho, beef with vegetable soup, minestrone soup, and other soups made with vegetables[4]	72	2.13 ± 1.20	54	2.43 ± 1.27	49	2.14 ± 1.17	142	1.79 ± .77	123	2.31 ± 1.01	103	2.08 ± 1.54
Each time you ate vegetable soup, how much did you eat?[11]	50	2.10 ± .74	42	2.02 ± .41	32	2.16 ± .63	87	2.05 ± .48	96	2.04 ± .56	65	2.08 ± .62
Over the last month, how often did you eat mixtures that included vegetables? Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos[4]	73	3.82 ± 1.52	54	3.72 ± 1.49	49	3.71 ± 1.62	143	3.64 ± 1.45	123	3.73 ± 1.44	103	3.79 ± 1.68
Including snacks, how many cups of fruit and 100% fruit juice do you usually eat each day?[12]	74	3.54 ± 2.25	53	3.32 ± 1.90	49	3.47 ± 2.02	141	3.09 ± 1.67	122	3.49 ± 1.86	103	3.78 ± 2.25
Including snacks, how many cups of vegetables do you usually eat each day?[12]	73	3.63 ± 2.13	54	4.04 ± 2.12	49	3.98 ± 2.06	143	3.57 ± 1.79	122	3.89 ± 1.86	104	4.11 ± 2.17
How many servings of grains do you eat on average per day? From Healthy Eating Index[13]	73	3.75 ± 1.44	54	3.78 ± 1.30	49	3.53 ± 1.47	142	3.96 ± 1.56	122	3.74 ± 1.34	104	3.74 ± 1.50

How many servings of whole grains do you eat on average per day? Examples: 1 serving = 1 slice whole wheat bread; 5-6 whole grain crackers; 1/2 cup cooked brown rice; 1/2 cup oatmeal[4]	74	2.97 ± 1.59	53	2.98 ± 1.26	49	2.71 ± 1.46	142	2.80 ± 1.39	122	3.03 ± 1.45	104	3.13 ± 1.50

Data shown are mean ± SD

[1]Scale: 1= Never; 2= Less than once per month; 3= 1-3 times per month; 4= 1-2 times per week; 5= 3-4 times per week; 6= 5-6 times per week; 7= 1 time per day; 8= 2 or more times per day

[2]Scale: 1= Didn't use margarine; 2= Almost never; 3= About 1/4 of the time; 4= About 1/2 of the time; 5= About 3/4 of the time; 6= Almost always or always

[3]Scale: 1= High; 2= Medium; 3= Low

[4]Scale: 1= Never; 2= 1-3 times last month; 3= 1-2 times per week; 4= 3-4 times per week; 5= 5-6 times per week; 6= 1 time per day; 7= 2 times per day; 8= 3 times per day; 9= 4 times per day; 10= 5 or more times per day

[5]Scale: 1= Less than 3/4 cup; 2= 3/4 to 1 1/4 cups; 3= 1 1/4 to 2 cups; 4= More than 2 cups

[6]Scale: 1= Less than 1 medium fruit; 2= 1 medium fruit; 3= 2 medium fruits; 4= More than 2 medium fruits

[7]Scale: 1= Small order or less; 2= Medium order; 3= Large order; 4= Super size order or larger

[8]Scale: 1= 1 small potato or less; 2= 1 medium potato; 3= 1 large potato; 4= 2 medium potatoes or more

[9]Scale: 1= Less than 1 cup; 2= 1/2 to 1 cup; 3= 1 to 1 1/2 cups; 4= More than 1 1/2 cups

[10]Scale: 1= About 1/4 cup; 2= About 1/2 cup; 3= About 1 cup; 4= More than 1 cup

[11]Scale: 1= Less than 1 cup; 2= 1 to 2 cups; 3= 2 to 3 cups; 4= More than 3 cups

[12]Scale: 1= Less than 1/2 cup; 2= 1/2 cup; 3= 1 cup; 4= 1 1/2 cup; 5= 2 cups; 6= 2 1/2 cups; 7= 3 cups; 8= 3 1/2 cups; 9= 4 cups; 10= 4 1/2 cups; 11= 5 cups; 12 = 5 1/2 cups; 13= 6 cups

[13]Scale: 1= Less than 1; 2= 1; 3= 2; 4= 3; 5= 4; 6= 5; 7= 6 or more

* denotes p value <0.1
**denotes p value <0.05

Table 4: EFNEP Behavior Checklist

	Control Group (n=77)						Treatment Group (n=150)					
	n	Baseline	n	4 Months	n	12 Months	n	Baseline	n	4 Months	n	12 Months
How often do you plan meals ahead of time?[1]	74	3.65 ± .87	54	3.70 ± .94	49	3.92 ± .79	143	3.58 ± 1.02	122	3.84 ± .89	104	3.92 ± .90
How often do you compare prices before you buy food?[1]	74	4.03 ± 1.02	54	4.13 ± .97	49	4.04 ± 1.08	143	4.03 ± 1.14	123	4.07 ± 1.02	104	4.18 ± .95
How often do you run out of food before the end of the month?[1]	73	2.51 ± 1.23	54	2.15 ± 1.19	49	1.86 ± 1.04	143	2.31 ± 1.36	122	2.03 ± 1.23	103	1.74 ± .97
How often do you shop with a grocery list?[1]**	74	3.89 ± 1.09	54	3.83 ± .1.13	49	4.14 ± 1.04	143	3.87 ± 1.09	123	4.09 ± 1.02	104	4.11 ± 1.11
This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?[1]**	73	1.58 ± .80	53	1.53 ± .64	49	1.37 ± .53	143	1.39 ± .73	123	1.41 ± .69	102	1.49 ± .88

How often do you thaw frozen food at room temp.?[1]	74	2.74 ± 1.15	54	2.56 ± 1.13	49	2.33 ± 1.05	142	2.38 ± 1.18	121	2.28 ± 1.09	104	2.32 ± 1.20
When deciding what to feed your family, how often do you think about healthy food choices?[1]	74	4.07 ± .80	54	4.15 ± .79	49	4.29 ± .68	142	4.04 ± .79	123	4.24 ± .76	103	4.40 ± .69
How often have you prepared foods without adding salt?[1]	74	3.36 ± 1.22	54	3.43 ± 1.21	49	3.41 ± 1.24	142	3.32 ± 1.26	122	3.56 ± 1.08	104	3.50 ± 1.17
How often do you use the "Nutrition Facts" on the food label to make food choices?[1]**	74	3.11 ± 1.03	54	3.20 ± 1.00	49	3.06 ± 1.01	142	3.02 ± 1.10	123	3.49 ± .95	104	3.63 ± 1.05
How often do your children eat something in the morning within two hours of waking up?[1]	71	4.48 ± .81	53	4.60 ± .74	48	4.58 ± .82	140	4.49 ± 1.01	121	4.64 ± .68	102	4.68 ± .69

Food Resource Management Subscale	73	15.07 ± 2.69	54	15.52 ± 2.79	49	16.24 ± 2.30	143	15.17 ± 3.01	122	15.97 ± 2.66	103	16.48 ± 2.38
Food Safety Subscale*	73	7.68 ± 1.55	53	7.94 ± 1.43	49	8.31 ± 1.29	142	8.23 ± 1.57	121	8.31 ± 1.44	102	8.23 ± 1.75
Food Practice Subscale*	71	15.06 ± 2.38	53	15.42 ± 2.49	48	15.44 ± 2.15	129	14.86 ± 2.82	120	15.95 ± 2.22	101	16.21 ± 2.33

Data shown are mean ± SD

[1]Scale: 1= Do not do; 2= Seldom; 3= Sometimes; 4= Most of the time; 5= Almost always

* denotes p value <0.1

**denotes p value <0.05

Table 5: Birch Child Feeding Questionnaire

Answer for the child that is participating in iCook4-H with you.	Control Group (n=77)						Treatment Group (n=150)					
	n	Baseline	n	4 Months	n	12 Months	n	Baseline	n	4 Months	n	12 Months
I have to be sure that my child does not eat too many sweets (candy, ice cream, cake, pastries)[1]	74	4.36 ± 1.03	54	4.02 ± 1.27	48	4.06 ± 1.14	143	4.23 ± 1.203	122	3.96 ± 1.41	103	3.76 ± 1.46
I have to be sure that my child does not eat too many high-fat foods[1]	73	4.14 ± 1.11	54	3.76 ± 1.37	48	3.92 ± 1.11	143	3.99 ± 1.20	121	3.80 ± 1.41	103	3.52 ± 1.53
I have to be sure that my child does not eat too much of his/her favorite foods[1]	74	3.78 ± 1.27	52	3.58 ± 1.38	48	3.92 ± 1.18	143	3.40 ± 1.39	122	3.40 ± 1.37	103	3.27 ± 1.39
I intentionally keep some food out of my child's reach[1]	74	3.04 ± 1.59	53	3.06 ± 1.51	48	3.21 ± 1.70	141	3.16 ± 1.61	121	2.84 ± 1.67	104	2.89 ± 1.67

I offer sweets (candy, ice cream, pastries) to my child as a reward for good behavior[1]	72	2.32 ± 1.37	53	2.06 ± 1.26	48	1.92 ± 1.20	140	2.29 ± 1.31	119	2.09 ± 1.33	103	1.94 ± 1.24
I offer my child his/her favorite foods in exchange for good behavior[1]	73	2.22 ± 1.33	52	2.10 ± 1.225	49	1.86 ± 1.19	143	2.02 ± 1.23	122	1.93 ± 1.25	104	1.81 ± 1.15
If I did not guide or regulate my child's eating, he/she would eat too many junk foods[1]	73	3.40 ± 1.46	53	3.45 ± 1.45	48	3.50 ± 1.52	143	3.50 ± 1.49	122	3.25 ± 1.58	103	3.20 ± 1.59
If I did not regulate my child's eating, they would eat too many of their favorite foods[1]	73	3.53 ± 1.48	53	3.49 ± 1.50	47	3.26 ± 1.48	143	3.47 ± 1.47	121	3.34 ± 1.47	104	3.23 ± 1.55
My child should always eat all of the food on his/her plate[1]	73	3.00 ± 1.43	54	2.50 ± 1.30	48	2.27 ± 1.30	143	2.59 ± 1.52	121	2.18 ± 1.30	104	2.13 ± 1.27
I have to be especially careful to make sure my child eats enough[1]	73	2.70 ± 1.53	53	2.36 ± 1.37	48	2.25 ± 1.42	141	2.44 ± 1.49	122	2.13 ± 1.41	101	2.10 ± 1.40

If my child says "I'm not hungry", I try to get him/her to eat anyway[1]	73	2.79 ± 1.38	53	2.77 ± 1.35	49	2.41 ± 1.35	412	2.69 ± 1.41	122	2.55 ± 1.39	102	2.41 ± 1.34
If I did not guide or regulate my child's eating, he/she would eat much less than he/she should[1]	74	2.22 ± 1.35	52	2.33 ± 1.42	48	1.98 ± 1.31	142	2.23 ± 1.40	122	1.91 ± 1.34	104	2.00 ± 1.34
How much do you keep track of the sweets (candy, ice cream, cake, pastries) that your child eats?[2]	74	3.81 ± 1.03	53	3.92 ± .92	49	3.88 ± .88	143	3.97 ± .92	122	3.87 ± 1.05	104	3.69 ± 1.14
How much do you keep track of the snack food (potato chips, Doritos, cheese puffs) that your child eats?[2]	74	3.78 ± .98	53	3.87 ± .94	49	3.88 ± .88	142	3.96 ± .87	120	3.89 ± 1.04	104	3.72 ± 1.16
How much do you keep track of the high-fat food that your child eats?[2]	74	3.54 ± 1.11	53	3.72 ± .97	49	3.76 ± 1.01	143	3.64 ± 1.06	121	3.64 ± 1.13	104	3.64 ± 1.15

Data shown are mean ± SD

[1]Scale: 1= Disagree; 2= Slightly disagree; 3= Neutral; 4= Slightly agree; 5= Agree

[2]Scale: 1= Never; 2= Rarely; 3= Sometimes; 4= Most of the time; 5= Always

* denotes p value <0.1

**denotes p value <0.05

Table 6: Adult Family Meal Routine

	Control Group						Treatment Group					
	n	Baseline	n	4 Months	n	12 Months	n	Baseline	n	4 Months	n	12 Months
It's important that our family eat a meal together.[1]	74	3.80 ± .44	54	3.85 ± .36	49	3.76 ± .43	143	3.79 ± .50	121	3.87 ± .41	104	3.84 ± .44
Different schedules make it hard to eat together.[1]	73	2.89 ± .86	54	3.00 ± .73	49	2.86 ± .76	141	2.84 ± .87	122	2.95 ± .80	104	2.83 ± .84
It's difficult to find time for a family meal.[1]	74	2.28 ± .77	54	2.41 ± .79	49	2.37 ± .88	143	2.18 ± .83	122	2.34 ± .89	104	2.32 ± .92
Dinner is more than food; we all talk.[1]	74	3.43 ± .62	54	3.63 ± .59	49	3.55 ± .61	141	3.51 ± .61	120	3.57 ± .62	103	3.62 ± .56
Mealtime is a time for talking with family.[1]	74	3.49 ± .58	54	3.63 ± .59	49	3.59 ± .54	141	3.59 ± .51	121	3.62 ± .60	102	3.64 ± .50
Eating family meals brings people together in an enjoyable way.[1]	73	3.62 ± .49	53	3.72 ± .46	49	3.69 ± .47	142	3.66 ± .49	121	3.69 ± .47	103	3.67 ± .51
We are expected to follow rules at mealtimes.[1]	71	3.32 ± .58	52	3.54 ± .54	49	3.43 ± .61	142	3.44 ± .61	119	3.54 ± .53	103	3.53 ± .54
Manners are important at the dinner table.[1]	74	3.55 ± .53	54	3.56 ± .50	49	3.55 ± .50	142	3.59 ± .56	121	3.65 ± .50	102	3.68 ± .47
We watch TV while eating dinner.[1]	72	2.10 ± .95	54	2.02 ± .92	49	1.88 ± .88	140	1.96 ± .96	122	1.84 ± .82	103	1.88 ± .88

How many times did you snack (eat in-between meals) yesterday?[2]	72	2.38 ± .70	53	2.47 ± .78	47	2.34 ± .70	140	2.36 ± .79	121	2.16 ± .80	103	2.18 ± .75
What is the number of times your family had a family meal together in the past week?[3]	68	4.29 ± 1.29	54	4.31 ± 1.30	49	4.55 ± 1.34	120	4.28 ± 1.37	123	4.41 ± 1.21	101	4.33 ± 1.31
During the past week, how many days did you eat breakfast?[4]	71	3.76 ± 1.37	53	4.09 ± 1.17	49	4.02 ± 1.23	120	3.88 ± 1.44	123	3.81 ± 1.47	104	4.16 ± 1.28
During the past week, how many days did you eat lunch?[4]	70	4.27 ± .98	53	4.38 ± .90	49	4.35 ± .99	120	4.27 ± 1.10	119	4.19 ± 1.16	104	4.39 ± .97
During the past week, how many days did you eat dinner?[4]	69	4.81 ± .58	52	4.77 ± .61	48	4.65 ± .67	120	4.72 ± .66	119	4.82 ± .55	102	4.75 ± .62
In the past week, how often did you eat something from a fast food restaurant (like McDonalds, Hardees, Burger King)[3]	70	1.64 ± .64	54	1.52 ± .57	49	1.78 ± .77	120	1.72 ± .70	122	1.65 ± .64	104	1.64 ± .59

Where did you usually eat dinner last week?[5]	68	1.03 ± .17	54	1.00 ± .00	49	1.04 ± .20	117	1.10 ± .44	121	1.07 ± .43	103	1.09 ± .47
How many times did you snack (eat in-between meals) yesterday?[2]	73	2.41 ± .76	54	2.52 ± .84	49	2.45 ± .87	142	2.40 ± .84	122	2.18 ± .83	103	2.18 ± .75
During the past 7 days, how many times…												
Did all, or most, of your family living in your home eat dinner or supper (evening meal) together?[6]	74	3.80 ± 1.09	54	3.83 ± .91	49	3.80 ± 1.04	143	3.95 ± .95	123	3.97 ± .87	103	3.86 ± .94
Did all, or most of your family living in your home eat breakfast together?[6]	74	2.57 ± 1.11	53	2.51 ± 1.07	48	2.50 ± .99	140	2.58 ± 1.25	122	2.76 ± 1.34	104	2.63 ± 1.32
Was at least one parent present when your child ate his/her evening meal?[6]	73	4.56 ± .78	54	4.33 ± .93	49	4.39 ± .86	141	4.63 ± .75	123	4.67 ± .66	103	4.47 ± .81
Was a family evening meal purchased from a fast-food restaurant, and eaten either at the restaurant or at home?[6]	73	1.67 ± .63	54	1.67 ± .67	48	1.69 ± .59	141	1.64 ± .67	123	1.57 ± .62	104	1.57 ± .60

Was a family meal purchased and eaten in other types of restaurants (full-service, sit - down)?[6]**	74	1.50 ± .58	54	1.52 ± .57	49	1.71 ± .82	143	1.60 ± .63	123	1.41 ± .54	104	1.45 ± .52
Was a family evening meal delivered to your home (pizza, sandwiches)?[6]	74	1.24 ± .43	54	1.19 ± .44	49	1.24 ± .66	143	1.15 ± .36	123	1.19 ± .39	103	1.17 ± .38
Was a family evening meal picked up as takeout food?[6]	74	1.45 ± .53	54	1.28 ± .49	49	1.47 ± .74	143	1.35 ± .53	122	1.25 ± .47	104	1.37 ± .48

Data shown are mean ± SD

[1]Scale: 1= Strongly disagree; 2= Disagree; 3= Agree; 4= Strongly agree; [2]Scale: 1= None; 2= 1 time; 3= 2-3 times; 4= 4-5 times; 5= More than 5 times [3]Scale: 1= Never; 2= 1-2 times; 3= 3-4 times; 4= 5-6 times; 5= 7 times; 6= More than 7 times; [4]Scale: 1= Never; 2= 1-2 days; 3= 3-4 days; 4= 5-6 days; 5= Every day; [5]Scale: 1= At home; 2= At a fast food restaurant; 3= At another type of restaurant; 4= At someone else's house; 5= I did not eat dinner; [6]Scale: 1= Never; 2= 1-2 days; 3= 3-4 days; 4= 5-6 days; 5= 7 days

* denotes p value <0.1

**denotes p value <0.05

Table 7: Adult Quality of Life

	Control Group						Treatment Group					
	n	Baseline	n	4 Months	n	12 Months	n	Baseline	n	4 Months	n	12 Months
It is hard for me to walk more than one block.[1]	74	88.18 ± 21.19	54	89.81 ± 17.18	49	86.73 ± 26.57	143	88.64 ± 25.13	122	86.68 ± 27.31	102	90.44 ± 22.26
It is hard for me to run.[1]	74	65.20 ± 34.58	54	67.59 ± 38.43	48	72.40 ± 37.27	141	58.16 ± 37.26	121	63.43 ± 36.23	103	63.83 ± 35.65
It is hard for me to do sports activity or exercise.[1]	72	74.65 ± 30.11	54	79.63 ± 26.63	49	78.06 ± 33.32	143	70.45 ± 32.04	122	71.93 ± 33.03	103	75.00 ± 29.50
It is hard for me to lift something heavy.[1]	74	72.97 ± 28.30	53	78.30 ± 24.53	48	76.04 ± 27.75	143	73.43 ± 30.14	122	74.18 ± 31.81	103	73.30 ± 30.37
It is hard for me to take a bath or shower by myself.[1]**	73	98.63 ± 5.73	54	98.61 ± 7.55	49	92.35 ± 24.05	143	97.20 ± 12.27	122	96.72 ± 13.23	104	98.08 ± 11.39
It is hard for me to do chores around the house.[1]	73	90.41 ± 18.93	54	93.52 ± 18.29	49	85.71 ± 29.32	143	92.31 ± 18.35	122	89.55 ± 23.14	103	91.26 ± 19.08
I hurt or ache.[1]	72	69.79 ± 29.35	54	68.06 ± 30.10	48	65.63 ± 31.21	143	65.38 ± 33.69	122	66.60 ± 33.80	103	66.99 ± 31.35
I have low energy.[1]	73	59.25 ± 28.72	54	57.87 ± 29.87	49	64.80 ± 27.44	142	56.87 ± 26.32	120	60.21 ± 30.83	104	62.50 ± 29.97

I feel afraid or scared.[1]	74	83.78 ± 19.16	54	87.96 ± 18.00	47	86.17 ± 18.66	142	87.85 ± 17.80	121	89.26 ± 17.33	104	89.18 ± 15.49
I feel sad or blue.[1]	74	71.96 ± 23.02	54	74.54 ± 24.52	48	73.44 ± 22.72	141	73.76 ± 24.52	121	76.86 ± 23.53	104	77.40 ± 24.27
I feel angry.[1]	74	70.27 ± 22.92	54	73.61 ± 21.40	48	71.88 ± 21.65	141	74.11 ± 21.22	120	75.63 ± 23.02	103	73.79 ± 21.97
I have trouble sleeping.[1]	73	59.25 ± 28.42	54	66.67 ± 30.33	48	60.94 ± 28.20	142	58.98 ± 30.70	121	64.67 ± 30.05	104	65.63 ± 30.41
I worry about what will happen to me.[1]	74	77.70 ± 24.33	54	82.41 ± 22.06	48	81.77 ± 20.46	142	74.82 ± 27.53	120	84.38 ± 19.46	104	82.93 ± 22.38
I have trouble getting along with other adults.[1]	74	81.76 ± 19.97	54	85.65 ± 19.79	49	83.16 ± 16.45	141	86.17 ± 17.02	120	88.75 ± 13.69	104	88.22 ± 14.76
Other adults do not want to be my friend.[1]	72	84.72 ± 18.07	54	88.89 ± 21.54	49	85.20 ± 16.86	138	87.32 ±17.15	119	87.18 ± 16.55	102	87.25 ± 17.85
Other adults tease me.[1]	73	91.78 ± 13.85	54	92.59 ± 18.58	49	93.88 ± 12.00	142	93.13 ± 13.36	120	94.37 ± 13.54	104	93.75 ± 14.68
I cannot do things others my age can do.[1]	72	88.54 ± 19.65	54	87.04 ± 22.64	49	89.80 ± 16.86	142	86.97 ± 22.03	120	87.92 ± 19.71	104	88.94 ± 19.65
It is hard to keep up with my peers.[1]	74	91.22 ± 14.59	54	88.89 ± 20.41	48	88.02 ± 17.86	142	88.91 ± 20.09	119	89.29 ± 20.99	104	89.90 ± 17.60

It is hard to pay attention at work or school.[1]	72	73.96 ± 26.68	53	75.94 ± 28.15	49	78.06 ± 25.33	140	83.57 ± 19.38	119	85.29 ± 18.53	102	81.86 ± 21.15
I forget things.[1]	72	56.94 ± 27.59	53	63.68 ± 27.55	49	61.73 ± 21.71	143	63.11 ± 24.26	121	65.70 ± 22.39	102	65.69 ± 22.23
I have trouble keeping up with my work or studies.[1]	71	77.46 ± 23.59	53	74.06 ± 27.28	48	78.65 ± 22.47	139	82.19 ± 20.02	119	84.66 ± 19.56	100	81.00 ± 22.51
I miss work or school because of not feeling well.[1]	73	87.33 ± 18.69	53	83.49 ± 20.77	48	92.19 ± 13.80	138	89.67 ± 16.19	118	89.19 ± 19.19	100	90.00 ± 18.465
I miss work or school to go to the doctor or hospital.[1]	71	89.44 ± 17.76	53	87.74 ± 19.38	49	92.35 ± 12.71	139	87.95 ± 16.58	118	88.77 ± 18.08	101	90.84 ± 16.85
Would you say that in general your health is:[2]	74	3.23 ± 1.00	54	3.50 ± .86	49	3.55 ± .84	143	3.32 ± .82	122	3.48 ± .91	103	3.62 ± .79
Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?	73	3.01 ± 6.63	54	1.50 ± 2.19	48	2.83 ± 6.56	141	2.68 ± 5.56	120	4.35 ± 8.41	101	2.76 ± 5.80

Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 was your mental health not good?	74	5.54 ± 8.23	54	3.44 ± 5.42	48	3.06 ± 4.53	141	5.41 ± 8.08	119	4.71 ± 8.25	100	3.73 ± 7.23
During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?	74	2.09 ± 5.32	54	0.56 ± 1.69	48	1.21 ± 4.58	141	2.17 ± 5.06	121	2.58 ± 6.44	102	1.75 ± 4.98
During the past 30 days, for about how many days have you felt SAD, BLUE, or DEPRESSED?	74	2.91 ± 5.24	54	2.52 ± 4.69	48	2.63 ± 4.77	141	3.23 ± 6.51	121	2.37 ± 5.63	102	2.37 ± 5.28
During the past 30 days, for about how many days have you felt WORRIED, TENSE, or ANXIOUS?	73	5.85 ± 7.39	54	6.35 ± 7.75	48	5.48 ± 7.06	141	7.62 ± 9.56	120	5.25 ± 8.14	102	4.83 ± 6.78
During the past 30 days, for about how many days have you felt you did NOT get ENOUGH REST or SLEEP?	74	9.70 ± 8.49	52	8.27 ± 8.14	48	8.08 ± 8.22	140	10.71 ± 9.93	121	8.74 ± 9.70	102	9.20 ± 9.44

During the past 30 days, for about how many days have you felt VERY HEALTHY AND FULL OF ENERGY?	74	15.59 ± 9.71	53	15.13 ± 10.14	48	17.92 ± 9.19	141	15.18 ± 9.95	120	14.03 ± 10.14	101	15.73 ± 10.49
Total unhealthy days	73	7.12 ± 8.59	54	4.94 ± 6.47	48	5.79 ± 7.60	140	7.51 ± 9.15	118	8.25 ± 10.55	100	5.88 ± 8.76

Data shown are mean ± SD

[1]Scale: 0= Almost always, 25= Often; 50= Sometimes; 75= Almost never; 100= Never

[2]Scale: 1= Poor; 2= Fair; 3= Good; 4= Very good; 5= Excellent

* denotes p value <0.1

**denotes p value <0.05

Table 8: FACES IV

	Control Group						Treatment Group					
	n	Baseline	n	4 Months	n	12 Months	n	Baseline	n	4 Months	n	12 Months
Family members are satisfied with how they communicate with each other.[1]	75	3.65 ± 1.01	54	3.72 ± 1.00	49	3.86 ± 1.00	136	3.86 ± .96	121	4.02 ± .93	104	3.96 ± .88
Family members are very good listeners.[1]	74	3.59 ± .98	54	3.69 ± .99	49	3.76 ± .95	143	3.90 ± .78	120	3.96 ± .77	104	3.84 ± .77
Family members express affection to each other.[1]	73	4.33 ± .73	54	4.17 ± .97	49	4.18 ± .97	139	4.40 ± .81	122	4.34 ± .88	103	4.40 ± .83
Family members are able to ask each other for what they want.[1]	74	4.16 ± .81	53	4.17 ± .80	48	4.10 ± .88	141	4.23 ± .74	122	4.31 ± .78	104	4.33 ± .76
Family members can calmly discuss problems with each other.[1]	74	3.81 ± .87	54	3.74 ± 1.03	47	3.81 ± 1.06	141	3.96 ± .84	120	4.00 ± .91	104	3.91 ± .99
Family members discuss their ideas and beliefs with each other.[1]	73	4.19 ± .68	54	4.15 ± .92	49	4.14 ± .82	143	4.25 ± .73	121	4.36 ± .73	102	4.22 ± .88
When family members ask questions of each other, they get honest answers.[1]**	71	4.27 ± .63	54	4.00 ± .85	49	4.12 ± .88	141	4.30 ± .72	121	4.41 ± .63	104	4.28 ± .79
Family members try to understand each other's feelings.[1]	73	4.01 ± .84	54	3.89 ± .98	49	3.96 ± .89	143	4.12 ± .73	121	4.21 ± .78	103	4.12 ± .77
When angry, family members seldom say negative things about each other.[1]	73	3.27 ± 1.16	54	3.24 ± 1.16	49	3.33 ± 1.01	142	3.37 ± 1.16	120	3.67 ± 1.12	103	3.49 ± 1.19

Family members express their true feelings to each other.[1]	74	3.97 ± .88	53	4.08 ± .73	49	3.96 ± .84	143	4.11 ± .69	120	4.20 ± .72	104	4.24 ± .70
The degree of closeness between family members.[2]	74	3.68 ± .97	54	3.61 ± 1.05	49	3.57 ± .91	142	3.75 ± .99	121	3.87 ± 1.02	104	3.77 ± .96
Your family's ability to cope with stress.[2]	73	3.22 ± 1.02	53	3.34 ± .98	49	3.45 ± .89	143	3.34 ± 1.02	121	3.52 ± .97	104	3.39 ± .99
Your family's ability to be flexible.[2]	74	3.46 ± .92	54	3.63 ± .92	48	3.67 ± .78	143	3.66 ± .99	120	3.66 ± .91	104	3.60 ± .97
Your family's ability to share positive experiences.[2]	74	3.64 ± .96	54	3.80 ± .81	49	3.69 ± .82	142	3.85 ± .87	121	4.00 ± .84	104	3.85 ± .94
The quality of communication between family members.[2]	74	3.45 ± 1.06	54	3.48 ± 1.02	49	3.53 ± .92	143	3.48 ± .99	121	3.68 ± 1.04	104	3.59 ± .97
Your family's ability to resolve conflicts.[2]	73	3.38 ± 1.08	54	3.33 ± 1.01	49	3.49 ± 1.02	143	3.41 ± .98	120	3.53 ± 1.08	104	3.55 ± .99
The amount of time you spend together as a family.[2]	74	3.41 ± 1.05	54	3.48 ± .97	49	3.49 ± 1.00	143	3.52 ± 1.07	121	3.71 ± .97	104	3.54 ± .96
The way problems are discussed.[2]	74	3.27 ± 1.06	53	3.36 ± 1.00	49	3.31 ± 1.07	142	3.29 ± 1.01	121	3.40 ± 1.08	103	3.46 ± .97
The fairness of criticism in your family.[2]	74	3.16 ± .95	54	3.26 ± 1.05	49	3.33 ± .97	143	3.40 ± .99	121	3.39 ± 1.08	104	3.39 ± 1.00
Family members concern for each other.[2]	74	3.78 ± .90	54	3.83 ± .89	49	3.76 ± .93	142	3.84 ± .97	120	3.92 ± .95	103	3.83 ± .98
FACES Communication Subscale Sum	70	39.37 ± 5.74	53	39.11 ± 7.18	47	39.28 ± 7.59	129	40.57 ± 5.62	112	41.65 ± 6.35	99	40.64 ± 6.37
FACES Satisfaction Subscale Sum	71	34.46 ± 7.96	52	34.85 ± 7.93	48	35.40 ± 8.11	140	35.59 ± 8.73	118	36.64 ± 8.60	102	36.02 ± 8.45

Data shown are mean ± SD

[1]Scale: 1= Strongly disagree; 2= Generally disagree; 3= Undecided; 4= Generally agree; 5= Strongly agree

[2]Scale: 1= Very dissatisfied; 2= Somewhat dissatisfied; 3= Generally satisfied; 4= Very satisfied; 5= Extremely satisfied

* denotes p value <0.1

**denotes p value <0.05

Table 9: Adult Food Security

	Control Group						Treatment Group					
	n	Baseline	n	4 Months	n	12 Months	n	Baseline	n	4 Months	n	12 Months
The food that I bought just didn't last, and I didn't have money to get more.[1]	73	2.58 ± .60	53	2.58 ± .60	48	2.69 ± .51	139	2.56 ± .65	119	2.67 ± .58	101	2.81 ± .44
I couldn't afford to eat balanced meals in the last 12 months.[1]	73	2.56 ± .71	54	2.59 ± .60	49	2.61 ± .53	141	2.55 ± .66	119	2.62 ± .58	99	2.77 ± .45
In the last 12 month, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?[2]	74	1.78 ± .41	53	1.77 ± .423	49	1.78 ± .42	142	1.75 ± .44	118	1.83 ± .38	101	1.84 ± .37
If Yes is selected to foodsecurity3, how often did this happen?[3]	74	3.64 ± .82	53	3.58 ± .89	49	3.57 ± .89	142	3.49 ± .95	118	3.68 ± .79	101	3.73 ± .66
In the last 12 months, did you every eat less than you felt you should because there wasn't enough money for food?[2]	74	1.74 ± .44	54	1.76 ± .43	49	1.71 ± .46	140	1.76 ± .43	117	1.85 ± .36	100	1.89 ± .31

In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?[2]	73	1.86 ± .35	53	1.87 ± .34	49	1.84 ± .37	141	1.88 ± .33	120	1.92 ± .26	102	1.93 ± .25
Do you or any members of your family participate in any of the following? Aid to dependent children/TANF, EFNEP, Free/Reduced price school meals, Medicaid, welfare-to-work, WIC, SNAP, Supplemental security income[2]	72	1.62 ± .49	53	1.51 ± .51	49	1.67 ± .47	140	1.57 ± .50	120	1.60 ± .49	102	1.67 ± .47
Food security score[4]**	71	1.38 ± 1.90	52	1.48 ± 2.13	48	1.44 ± 2.05	134	1.55 ± 2.08	111	1.00 ± 1.79	91	0.84 ± 1.66
Food security category[4]	71	1.45 ± .71	52	1.46 ± .75	48	1.46 ± .71	134	1.51 ± .74	111	1.32 ± .64	91	1.30 ± .61

Data shown are mean ± SD

[1]Scale: 1= Often true; 2= Sometimes true; 3= Never true

[2]Scale: 1= Yes; 2= No

[3]Scale: 1= Almost every month; 2= Some months but not every month; 3= Only 1 or 2 months; 4= Did not happen

[4]Scale: 0-1 = High; 2-4 = Low; 5-6 = Very low

* denotes p value <0.1

**denotes p value <0.05

Table 10: Adult Program Evaluation

	Control Group (n=77)						Treatment Group (n=150)					
	n	Baseline	n	4 Months	n	12 Months	n	Baseline	n	4 Months	n	12 Months
How often do you shop with a grocery list?[1]	74	3.65 ± 1.03	53	3.47 ± 1.14	49	3.78 ± 1.07	143	3.69 ± 1.01	121	3.74 ± 1.05	103	3.87 ± 1.026
When you think about each day of the week, how often is your child physically active for at least 60 minutes each day?[1]	74	4.01 ± .69	53	4.13 ± .76	48	3.92 ± .71	143	3.82 ± .82	122	3.94 ± .78	104	3.88 ± .82
How often do you plan your weekly meals?[1]*	71	3.44 ± .87	53	3.15 ± .99	49	3.49 ± .79	141	3.23 ± 1.02	120	3.35 ± .98	103	3.54 ± .91
How often does your child help you cook meals?[1]	73	2.52 ± .71	54	2.67 ± .55	47	2.85 ± .59	142	2.56 ± .72	121	2.87 ± .65	103	2.81 ± .69
When you think about each day of the week, how often are you physically active for at least 30 minutes each day?[1]	74	3.50 ± .91	54	3.57 ± 1.00	49	3.61 ± .95	140	3.49 ± .99	122	3.34 ± .87	102	3.49 ± .89
How often does your family eat together each week?[1]	72	3.94 ± .75	53	3.92 ± .73	48	3.96 ± .68	142	3.99 ± .70	121	4.02 ± .64	104	4.02 ± .64

How often do you enjoy making meals with your child?[1]*	72	3.31 ± .99	54	3.31 ± .84	49	3.65 ± .99	142	3.29 ± 1.06	120	3.58 ± .98	103	3.52 ± 1.01
How often does your child help in meal planning?[1]	73	2.71 ± .81	53	2.83 ± .85	48	2.77 ± .63	142	2.65 ± .75	122	2.89 ± .72	103	2.68 ± .76
How often do you enjoy making meals?[1]	72	3.68 ± .89	54	3.69 ± .93	49	3.59 ± .86	141	3.76 ± .89	122	3.75 ± .80	103	3.74 ± .79
How often do you need to manage your grocery budget carefully to ensure balanced meals for your family toward the end of the pay period?[1]**	73	3.51 ± 1.18	52	3.12 ± 1.25	48	2.60 ± 1.09	143	3.24 ± 1.37	120	2.96 ± 1.41	104	2.86 ± 1.38
How often do you make eating together as a family a priority?[1]	74	3.99 ± .90	54	4.13 ± .83	49	4.10 ± .71	143	4.05 ± .88	122	4.11 ± .73	102	4.08 ± .79
How often do the topics of conversation at mealtimes include all family members?[1]	73	3.99 ± .72	54	4.19 ± .78	48	4.02 ± .67	143	4.04 ± .91	120	4.22 ± .78	103	4.16 ± .72

How often does your child help you shop for groceries?[1]	73	3.11 ± .83	54	3.04 ± .97	48	2.96 ± .65	140	3.34 ± .97	122	3.27 ± .91	104	3.30 ± .93
How often would you rather eat out than make the evening meal?[1]	74	3.19 ± .81	54	3.28 ± .86	49	3.27 ± .79	140	3.31 ± .80	121	3.45 ± .79	104	3.38 ± .80
How often is it stressful to eat together as a family?[1]	73	2.07 ± .87	53	2.09 ± .84	49	2.08 ± .91	140	1.95 ± .96	120	1.95 ± .83	104	1.93 ± .79
How often does your family actively play together?[1]	72	3.10 ± .74	54	3.28 ± .74	49	3.29 ± .74	140	3.07 ± .78	120	3.11 ± .71	103	3.17 ± .72
How often do you feel confident with your kitchen skills?[1]*	74	3.92 ± .75	54	3.91 ± .94	49	3.98 ± .95	142	3.99 ± .96	120	4.20 ± .85	104	4.25 ± .79

Data shown are mean ± SD

[1]Scale: 1= Never; 2= Rarely; 3= Sometimes; 4= Most of the time; 5= Always

* denotes p value <0.1

**denotes p value <0.05

CHAPTER FIVE
DISCUSSION

The primary goal of this project was to examine if significant differences in adult outcome variables were achieved for treatment participants and how food security status changed over time. As a result of participation in the iCook 4-H program, adult treatment participants reported significant improvements in the following: fruit intake, shopping with a grocery list, using the "Nutrition Facts" label, eating less family meals at restaurants, receiving honest answers to questions from family members, food security status, planning weekly meals, enjoying making meals with their child, and kitchen skill confidence. A decrease in managing a grocery budget to ensure balanced family meals toward the end of the pay period was also reported by the treatment group as well as an increase in the time participants left meat and dairy foods sit out for more than two hours.

The NCI food screener showed a notable improvement in total fruit consumption for the treatment group across all time points. At 4 months, a moderate increase was reported followed by an additional increase at 12 months. Each iCook 4-H session focused on a different MyPlate food group therefore one week, the focus was on fruit. A variety of recipes using fruit were utilized throughout the iCook 4-H program including fruit salsa, fruit smoothies, fruit salad, and baked apples. This taught participants the ease of incorporating fruit into their daily diets perhaps contributing to the reported increase in total fruit consumption. A review [67] found that higher fruit consumption is linked with a lower BMI, however the current study did not see any significant changes in BMI despite an increase in total fruit consumption.

Grocery lists serve as a successful tool to aid individuals as they navigate food-marketing environments. Shopping with a grocery list is an important skill because it is associated with lower BMI and higher dietary quality. [68] It can function as a guide to reduce impulse purchases, a memory aid, and a planning method to structure meals, eating habits, and preserve financial resources. [68] Therefore, educating individuals, particularly low-income individuals, on the benefits of shopping with a grocery list is an important area within nutrition education. It is shown that women use grocery lists more often than men and that act of creating one is undervalued. Using a grocery list can be a way to involve other family members besides the individual doing the actual shopping. [69] Making a grocery list and sticking to it when shopping was an emphasis during the "Supermarket Smarts" educational session, which was session 5. iCook 4-H participants showed the largest improvement in shopping with a grocery list post-intervention at 4 months demonstrating an immediacy effect. However, even at 12 months, this improvement was maintained.

Another emphasis of the "Supermarket Smarts" session was learning to read and utilize food labels. During this session, dyads were educated with a hands-on nutrition facts label lesson and application activity. They were also provided with a handout on how to read and utilize the label. Adult participants reported using food labels more often at 4 months and even more so at 12 months. Reading food labels is another valuable consumer resource however it is typically underutilized. It is particularly valuable because label reading may impact dietary intake, purchasing decisions, and health in general.[59]

A review by Miller and Cassady[70] found that nutrition knowledge provides support for food label use frequency as well as comprehension. An increase in consumer nutrition knowledge leads to an increase of likelihood they will consult and understand the food label. This is consistent with current results. Over the course of six educational sessions, a variety of nutrition information was taught, post-intervention the use of the "Nutrition Facts" label increased demonstrating that as nutrition knowledge increased, so did food label use.

Despite food safety being the focus of the "Keeping it Cool in the Kitchen" session, as well as food safety practices being incorporated into other sessions, adult treatment participants reported leaving meat and dairy products out more often compared to control participants who left these products out less. This could have happened due to the wording of a question because differences in responses were minimal. Both groups reported within the "Did not do" to "Seldom" categories.

A study by Robson et al. [30] conducted a pilot cooking intervention for parent-child dyads similar to the iCook 4-H program. However this program focused more in depth on consumption of foods prepared away from home. Ten weekly cooking sessions were conducted lasting 60-90 minutes each. Many of the results Robson et al. found were similar to that of the iCook 4-H intervention. Robson et al. found a significant decrease in dinners consumed way from the home; this is consistent with the current study that saw a decrease in the number of meals purchased and eaten at non-fast-food restaurants such as full-service and sit-down restaurants. Confidence in preparing a meal at home was also seen; this too is similar to the increase in kitchen skill confidence iCook 4-H participants reported as part of the program evaluation. Within the iCook 4-H intervention group an

immediacy effect was seen, an increase in kitchen skill confidence was most pronounced at 4 months and continued to improve at 12 months.

Parents of the Robson et al.[30]pilot study reported cooking with their child at home post intervention, which is consistent with the results seen for iCook 4-H program evaluation in which an improvement was shown in adults who enjoy cooking meals with their child. At 4 months, iCook 4-H participants showed a significant increase demonstrating that post-intervention, adults enjoyed making meals with their child however by 12 months this effect became diluted.

Other studies have examined the consumption of food away from home (FAFH). One found that FAFH was positively correlated with percent body fat and that obese children and adolescents consume significantly more FAFH when compared to their non-obese counterparts. [71] Another found that decreasing FAFH was associated with reductions in BMI and percent body fat and an improved diet quality in children. [72] According to the US Healthful Food Council, the average American adult purchases a snack or meal from a restaurant 5.8 times per week and spends half of their food dollars eating out. [73] Kim et al. [74] found that frequent FAFH consumption, specifically at full-service restaurants was significantly associated with a higher waist circumference as well as BMI in adults. For the iCook 4-H treatment group, a significant reduction was seen in the number of family meals purchased and eaten in restaurants in the past 7 days. This included full-service restaurants as mentioned by Kim et al. [74] The iCook 4-H curriculum heavily targeted family meal times at home therefore it is reasonable that the number of restaurant meals consumed was reduced. However, unlike previous studies that decreased FAFH no changes in BMI were observed.

It is thought that family context influences child weight and weight-related behaviors.[75]A review examining the relationship between family functioning found that poor behavior control, high levels of family conflict, low family hierarchy values, and poor communication were all associated with an increased risk of child and adolescent obesity.[76]A study by Mellor et al. [77] however, found that family functioning was not a strong predictor of BMI. The iCook 4-H program emphasized and encouraged effective family communication. Treatment participants reported a significant improvement in agreement to the statement "When family members ask questions of each other, they get honest answer." This biggest improvement was seen at 4 months, this indicates an immediacy effect. Directly following the completion of the program, and adult participants felt an improved sense of communication and honesty among family members.

Few studies involving family-centered interventions look at how program participation may impact food security status. Evidence suggests that food insecurity leads to the consumption of energy-dense, nutrient-poor foods. [33] Research suggests that resource management education and improved dietary practices can increase food security. Nutrition education programs that provide this knowledge and skill can help individuals who are food insecure manage their food purchases and become more food secure. [78]

A study by Farrell[79] examined the impact of nutrition education, specifically EFNEP on food security status as well as food-related behaviors. Treatment participants were educated with the CHOICE: Steps Towards Health program. This program focused on food budgeting, preparation, and safety. Food security was measured using the USDA

six-item Food Security Module; this is consistent with the tool used to measure food security within the iCook 4-H program. Farrell[79] found significant improvements in food security status after receiving the nutrition education. This too is consistent with the iCook 4-H program. For treatment participants, overall food security score improved immediately post-intervention at 4 months. This improvement was maintained and improved more at 12 months post-intervention indicating a sustained effect. A similar study by Eicher-Miller et al.,[78] examined the effectiveness of Food Stamp Nutrition Education on food insecurity and nutrition. The USDA six-item Food Security Scale was used. Both food insecurity and food insufficiency significantly improved compared to the control group. These results are consistent with our study.

The Freshplace food pantry intervention focused more so on motivational interviewing and self-efficacy through the SCT to examine the program's impact on food security.[80] The USDA 18-item Food Security Module was used to assess food security status. Self-efficacy was measured using questions similar to those assessed as part of the iCook 4-H intervention such as "How confident are you that you can: plan meals ahead of time, make your food money last all month, make a shopping list before going to the grocery store, and buying foods that you think are healthy for your family?" Both iCook 4-H and the Freshplace food pantry intervention found positive results for increasing food security among participants.[80]

Meal planning, as demonstrated previously is positively associated with food security.[80] iCook 4-H treatment participants reported a moderate improvement in meal planning at 4 months with a larger increase at 12 months. One of the six educational sessions was titled "The Art of Meal Planning," demonstrating the significance within the

curriculum. Meal planning revolved around budgeting, being resourceful, and preparing balanced meals from all of the five MyPlate food groups.

Although a positive improvement was seen for meal planning, the treatment group reported a decrease in how often it was necessary to manage a grocery budget carefully to ensure balanced meals toward the end of the pay period. It has been established that having increased confidence in making food money last all month is association with increased food security[80] however, this was not seen in our study. iCook 4-H participants reported a continual decrease in managing grocery budget across time points. Although this can be interpreted as negative, a plausible explanation may be that the iCook 4-H curriculum provided participants the knowledge to budget or plan at the beginning of the month and become more food secure so adults did not stress about managing food money toward the end of the month or pay period. An increase in meal planning practices with a decreased prevalence of budgeting as seen in our intervention study is consistent with the iCook 4-H pilot intervention. [52]

CHAPTER SIX
CONCLUSION

Adults who participated in the intervention and attended iCook 4-H sessions reported getting a variety of things out of the program including increased fruit intake, shopping with a grocery list more, better utilizing the "Nutrition Facts" label, and eating less family meals at restaurants. Treatment participants also reported receiving honest answers to questions from family members and showed an increase in food security status. Increases were also seen in planning weekly meals, enjoying making meals with their child, and kitchen skill confidence. iCook 4-H demonstrated the value of family-based programs for adult participants.

Many of the results were consistent with the iCook 4-H pilot intervention demonstrating that adults received similar things out of the program each time. [52] In the future, obesity prevention programs should target low-income, food insecure participants with the goal of reducing obesity while improving food security status. Creating curriculum specifically tailored for this population could help achieve this goal. Future studies could also assess both parents within a household, rather than just the primary meal preparer as both parents contribute to the home environment. And finally, future studies may want to design family-based interventions with a delayed treatment effect so that both groups have the opportunity to participate in the educational sessions.

Strengths and Limitations

A strength of this study was the randomized control treatment design. A control group allows researchers the ability to make comparisons between program outcomes. The multiple assessment collection time points were also a strength because they helped

to eliminate the possibility of only an immediacy effect. By collecting data across time points (0, 4, and12-months) the immediate and longer-term impacts of the program were examined. Also, this study was a 5-state project providing geographical diversity.

Some limitations include that the adult outcomes were self-reported which may have led to overestimated or underestimated values as well as missing data. Our sample can be described as a convenience sample whom was already interested in health and wellness, therefore these results cannot be generalized to all individuals, especially a more diverse and lower socioeconomic population. Attrition is another limitation. Analysis showed an overall attrition rate of 33%. Participants who reported being unmarried were most likely to discontinue program participation. Not offering childcare may have played a role in this. Perhaps individuals wanted to participate but had other young children to consider and with no spouse, this is a barrier. Providing childcare is something that could be built into future project budgets to keep unmarried participants in family-centered interventions. Participants who reported usage of government programs or were from Tennessee or West Virginia were more likely to be dropouts. BMI was also associated with attrition; participants with a higher BMI were more likely to dropout.

Attrition rates have been shown to be traditionally high in dietary intervention studies, some as high as 30-60%.[81,82]In regards to pediatric obesity treatment, clinical programs report attrition rates that range from 27-73% with over 50% attrition in the majority of hospital-based clinics. [83] Therefore, although the iCook 4-H intervention showed an attrition rate of 33%, community interventions may serve as an effective avenue for obesity prevention.

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Appendices

Appendix A: Recruitment Methods and Materials

4-H

- Nutrition Educators and/or Nutrition Associates will work with their local 4-H agency.
- Emails should be sent through 4-H listservs
- Email a copy of the flyers or provide copies of the flyer to 4-H leaders to hand out to youth and adults
- Posters should be given to 4-H leaders to put up in the community
- Verbal recruitment from 4-H leaders should occur in current 4-H programs, other community meetings, and individual contacts
- Emails with flyers attached should be distributed to other Extension Staff
- Informational news releases in Cooperative Extension publications

Local Schools

Nutrition Educators and/or Nutrition Associates must submit any needed paperwork obtaining permission to recruit in the schools.

- Flyers should be given to teachers to give to children in fourth and fifth grade classrooms.
- Visits to classrooms, school meetings, school events with the distribution of flyers as allowed.

Community

Nutrition Educators and/or Nutrition Associates and/or students can make additional contact by:

- Googling after-school and summer camp programs, pediatricians offices, churches, and community agencies (health departments, Boys and Girls clubs, YMCA, etc)
- Call identified programs and make arrangements to speak with youth, post posters, and provide take home flyers.
- Visit programs and distribute information as allowed.
- Host informational tables at community family-oriented events (health fairs, fairs, sporting events, etc).
- Place news releases/announcements in local newspapers.
- Provide interviews on local television about the program.
- Send e-mail messages through community agencies, churches, and social network sites.
- Put posters up in community locations (grocery stores, parks, etc)

Script for In-person Adult Recruitment:

My name is _____ and I am working with Researcher's Dr. Lisa Franzen-Castle and Dr. Michelle Krehbiel from the University of Nebraska-Lincoln to offer a new 4-H program, called iCook 4-H for 9-10 year old children. It's a 4-H program and also a research project to study how to help kids make healthy choices about what they eat and how physically active they are.

Because it is a research study, we will ask all families to complete some surveys; have your blood pressure measured; and have your child's height, weight, waist and blood pressure measurements taken four different times over two years. We would also ask some children to wear a monitor to measure physical activity for 1 week at some of the assessment times. You and your child would each get $10 at each assessment. The total amount your family could receive for participating in all four assessments would be $80.

You may be selected to participate in a series of six, two hour lessons focused on culinary skills, family meals, physical activity and goal setting. The classes will be from August until November 2013.

If you decide to be in the iCook research study, you would be helping us to learn more about how to help our children be smart in the kitchen and have healthy, active lifestyles in the future.

To participate:

- You must be at least 18
- Have a child between 9-10 years old,
- Have access to computer with internet connection in the home,
- Be free from food allergies and/or activity-related medical restrictions that would prevent being in a food and fitness program
- Eat meat and dairy, as vegetarian options may not be available
- Only one child participant per family may participate (no twins, triplets, other brothers or sisters may participate in lessons).

If you are interested in iCook, please give me your contact information today. I would like to share your phone number another member of our team at the University of Nebraska-Lincoln who call you with details about the project. I have a flyer and additional handout with information for you to take home. If you are not sure today, you can call the number on the flyer after talking with your child. There are a limited number of spots available, so please respond quickly if you are interested.

Script for In-person Child Recruitment: 2013 Study

My name is _____ and I am with the University of Nebraska-Lincoln and I am here to tell you about a project called iCook 4-H that we are offering youth, like you who are 9-10 years old and your parents.

It's about helping make choices about what you eat and how physically active you are so that you will grow strong and have a healthy life.

- **It's a 4-H program and also a research project**
- We would be starting this fall and we would get to see how you grow over 2 years
- You would be asked to answer some questions about your cooking skills and family meals
- We will measure your height, weight and waist
- You and your parent will each get $10 each time you answer the questions and have your measurements taken (like your height and weight).

We will have 2 groups in the project. One group will only answer the questions and be measured four different times. The other group will answer the questions and be measured four times but will also participate in six cooking classes with their parents this fall and have online activities on the iCook website.

To be in iCook, you must be between 9-10 years old and have your parent's permission.

If you want to be in iCook, you will be in an important project because you will be helping to see how a project with children and parents working together and focused on healthful eating and physical activity can help children be strong and healthy.

To be in iCook, please take this flyer and letter home to your parents to see if they are interested and ask them to call the number on the flyer to register you.

Email/letter to Community Agency, Church, or Other Organization

Dear Organization Representative's name,

We are enrolling children ages 9-10 years old and the adult that cooks most of the child's meals in a special 4-H cooking program. This is an IRB-approved study (iCook 4-H). The 4-H approach to "learn by doing" is at the heart of this project. Youth, 9-10 years old, will learn the importance of a healthful lifestyle by doing activities that contribute to good health. Through the iCook program and website, youth will collaborate with their primary meal preparer to develop cooking skills and increase and enhance family mealtime and activity.

The purpose of this letter is to request your permission for us to recruit in your organization. Enclosed is a copy of the informational flyer a copy of some frequently asked questions about iCook 4-H.

The objective of this study is to test whether a 24-month study, based on increasing culinary skills, family meals and physical can positively impact weight in children. We intend to enroll the sample of 200 participants in name of state. Targeting the children through your organization is one way we hope to reach our recruitment goal.

Would it be possible for us to inform parents and children about this study in one of the following ways by _____?

- Distribution of an informational flyer to children for them to take home, AND/OR
- Come in to briefly (5 minutes) speak with the children, AND/OR
- Attend events to speak with parents and distribute flyers

I appreciate your consideration of this request. Please contact me by email or phone to let me know if I may recruit through your organization.

Sincerely,

Lisa Franzen-Castle, PhD, RD
Assistant Professor and Extension Nutrition Specialist
University of Nebraska-Lincoln
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Example County Schools Permission Document:

1. Principal Investigators:
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2. Title of Proposed Study: iCook-4H

3. Description of Study
The 4-H approach to "learn by doing" is at the heart of this project. Youth, 9-10 years old, will learn the importance of a healthful lifestyle by doing activities that contribute to good health. Through the iCook 4-H program youth will collaborate with their primary meal preparer to develop cooking skills and increase and enhance family mealtimes and physical activity. Culinary skills and physical activity of youth will be increased to help prevent childhood obesity.

a.) **Purpose for data-** Data collected through iCook-4H will be used for publications and national presentations
b.) **Targeted population-** One hundred 9-10 year olds and their adult primary meal preparer (Dyads). Targeted recruitment in Knox County Schools- 4th and 5th graders.
c.) **Data collection procedures-** Recruitment in Schools - Flyers would be given to teachers to give to children in fourth and fifth grade classrooms. Visits by researchers to classrooms, school meetings, school events with the distribution of flyers as allowed.

Fifty of the 100 Dyads will be randomly assigned to be in a control group. The control group participants will participate in research assessments at 0, 4, 12, and 24 months. Outcome measures for youth include physical measurements (blood pressure, height, weight, and waist circumference), physical activity, diet quality, cooking knowledge, family meal characteristics, and quality of life. Accelerometer data will be gathered on 25% of youth. Adults will be asked to complete surveys on physical activity, diet, cooking, and family meals and have blood pressure measurements assessed. The remaining 50 Dyads will be assigned to be in the treatment group. The treatment group will also be assessed at 0, 4, 12, and 24 months with the same outcome (physical measurements, physical activity, diet quality, cooking knowledge, family meal

characteristics, and quality of life). Accelerometer data will be gathered on 25% of youth. Adults will be asked to complete surveys on physical activity, diet, cooking, and family meals and have blood pressure measurements assessed.

d.) Time requirements-
Time requirements related to recruitment in Schools- 5-10 minutes to distribute flyers to children in fourth and fifth grade classrooms. 5-15 minute visits by researchers to classrooms, school meetings, school events with the distribution of flyers as allowed.

Time requirements for participants in study- Four assessment points, approximately one hour per assessment point, will require a total of 4 hours of participants' time over a two year time period. In addition to assessments, the Dyads in the treatment group will also be asked to participate in six 4-H cooking classes (two hours each lesson) that will include a focus on physical activity, family mealtimes, and preparation and sampling of recipes for a total of 12 hours per intervention participant. In addition, youth in the treatment group will be asked to create and upload cooking demonstration videos to the iCook-4H website. Time required for this activity will vary by participant. The website is a secure website accessible to iCook participants only. The iCook-4H project is being conducted in 5 states, Tennessee, West Virginia, Maine, South Dakota, and Nebraska, as part of a large multi-state USDA funded research project. After the 6 cooking lessons, treatment group youth will be asked to visit the interactive 4-H cooking website for 2 years. The website includes nutrition and physical activity games, healthy recipes, and a chat forum that will be managed by a team of researchers. Time required for this activity will vary by participant.

e.) Statement of confidentiality-
All information that is provided is confidential. The participants will be seen by some of the recruiters, the educators and the researchers. All data collected will be kept on the researcher's password protected computer for up to five years and in locked filing cabinets for up to five years and then destroyed.

Website data collection and educational intervention will be password protected. The participant created videos will be viewed on the password protected website. Participants will be asked to not share their website login information with any other people. Participant contact information will be requested for payment purposes and for contacting them for follow up assessments. This information will be destroyed once they are paid at the end of the study. All data will be reported in summary format and no names will be used.

f.) Projected benefit to participants - Participants will gain knowledge and experience to improve culinary skills, child feeding practices, family meal times, and physical activity. Participation in this study will help to assist in creating healthier habits for children.

- Children will receive $10 for participation in each assessment point (at 0, 4, 12, and 24) for a total of $40.
- Adults will receive $10 for participation in each assessment point (at 0, 4, 12, and

24) for a total of $40.

- Dyads in the intervention group will receive $10 at each of the 6 lessons to support intervention specific costs (e.g. travel) for a total of $60.

4. Single copies of all questionnaires, surveys, tests, answer sheets, structured interviews, or other instruments that will be used by participants. Each instrument needs to contain a statement indicating that all responses are voluntary. See Appendices

5. Single copies of cover letters, copies of instructions, parent permission statements (for voluntary student participation). See Appendices

6. Approximate proposed times for the beginning and end of the study: Grant funded 08-01-12 to 07-31-17. Recruitment through Schools- upon approval until 8-15-13.

Recruitment Flyer Information- Graphics being determined

Youth, aged 9 and 10, and the adult who prepares most meals in the home are invited to take part in a 4-H Food and Fitness research study. It's a special offering and youth do not have to be current 4-H members to be part of the program.

The program purpose is to learn about food and physical activity habits of youth to help them grow strong and have healthy lives.

Together, youth and adult family members will receive up to $80 for being in the 2 yearlong study, which starts in late August.

Some families will be asked to attend 4-H cooking classes this fall. All families will have blood pressure taken and complete surveys on cooking, eating, and physical activity 4 times over the next 2 years. Youth will also have physical measurements taken. To participate, youth and adults will need to:

- Be free from food allergies and/or activity-related medical restrictions that would prevent being in a face-to-face food and fitness program
- Eat meat and dairy, as vegetarian options may not be available in the food and fitness program.
- Have a computer at home with Internet

Space is limited, so please call _____ as soon as possible if you are interested or have questions. Only one youth and one adult per family may be in the study.

Appendix B: Intervention Treatment Group/Control Group Consent Forms

University of Nebraska Lincoln

INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES
PANHANDLE RESEARCH AND EXTENSION CENTER

Consent Form - Intervention Treatment Group

Thank you for your interest in the iCook Project, which is a 4-H program and a research study. Lisa Franzen-Castle and Michelle Krehbiel and their team at the University of NebraskaLincoln, including Cooperative Extension staff, are studying health and fitness of children between 9-10 years old and the adult in their home who makes most of the food. To participate, you and your child must be free from food allergies and/or activity-related medical restriction that would prevent participation in a face-to-face food, nutrition and fitness program. We want to study you and your child over 2 years to help understand the impact of physical growth, nutrition and physical activity on health and fitness.

The purpose is to study how to help children make choices about what they eat and how physically active they are so that they will grow strong and have healthy lives.

You will be part of a 5-state study about children's nutrition and physical health. The four other researchers are at South Dakota State University, University of Maine, University of Tennessee, and West Virginia University.

There will be 6 cooking classes every other week from August through November. In addition to the cooking sessions, you will be asked to participate in other activities that will be primarily online thorough an educational community for parents and children. The project will last for 2 years so that eating habits and physical activity can be assessed long term to see their impact on health and fitness.

What Will You Be Asked to Do? You will be asked to have your blood pressure measured and complete a 30-minute online survey at the start of the program, and then at 4 months, 12 months and 24 months. Sample questions for the online survey are:

How often do you compare prices before you buy food?
How concerned are you about your child eating too much when you are not around him or her?
During the past 30 days, for how many days have you felt very healthy and full of energy?
I worry about what will happen to me.

You will be asked to visit the program website regularly, at least once per week during the fall sessions, and help upload videos your child has made about cooking, being

physically active and eating as a family. You will be given a login and password for security.

You will be asked to be assessed in August and November of this year and then in August of 2014 and August of 2015 to complete the 2 year study. At each assessment period we will ask you to take the 30 minute survey and have your blood pressure measured.

What will your child be asked to do? Your child will be asked to complete a 50 minute assessment that includes 30 minutes for an online survey and 20 minutes for physical assessments (e.g. height, weight, waist circumference; blood pressure). Your child will be asked to pick the outline of a girl's/boy's body that looks most like she/he does. The reason for this assessment is because children often grow and mature very quickly between 9-10 years old and we want to measure that growth. The body outline question will be asked by an older female researcher or a male researcher for boys and a female researcher for girls. Assessments will be at the start of the program, and then at 4 months, 12 months, and 24 months. Sample questions for the online survey your child will be asked are:
During the past week, how many days did you eat breakfast?
I can follow a recipe by myself (answer from agree to disagree)
I worry about what will happen to me (answer from never to almost always)

In addition your child will be asked to make and share video clips with camera equipment provided by the program staff about themselves and your family cooking, eating, and being active together. These videos will be hosted on a private YouTube channel and will only be accessible to other people participating in the project.

During the 2-year period, your child may be asked to wear a waistband that contains an activity monitor for a week each time physical assessments are taken. This device records your child's activity (e.g., step and movement during day and night).

What will both of us be asked to do? For the first twelve weeks you and your child will be asked to participate in 2-hour cooking sessions every other week with your child. Between sessions you and your child will be asked to cook together, participate in family meals, and be physically active.

Following the first twelve weeks, you and your child will be asked to participate for 22 months in an online community website that is developed just for this study. The website will have educational sections designed for both the adult and the child. You will be able to interact with your peer group in forums moderated by program staff. Your child will also be able to continue creating and sharing videos. Online activities can be done from home or anywhere you have an Internet connection. The site is mobile friendly.

Benefits to Participation: You will gain knowledge and experience to improve culinary skills, child feeding practices, family meal times, and physical activity. Your family's participation in this study may lead to better understanding of the role of nutrition and fitness in childhood obesity.

Risks to Participation: There is minimal risk to participating in the study, primarily due to time and inconvenience. Normal kitchen risk is possible.

Compensation: You and your child will receive $10.00 each time you complete the assessments for a total of $80.

Program Resources: You will receive $10 each time you come to one of the six cooking sessions for a total of $60. Your child will receive a video camera to shoot the requested videos on family activities around cooking, mealtime and recreation. This camera will be the child's to keep.

Confidentiality: All information that is provided is confidential and protected. All data collected will be kept on the researcher's password protected computer and in locked filing cabinets at the University of Nebraska-Lincoln, for up to five years and then destroyed. Not identifiable information will be stored indefinitely in an electronic version accessible to the researchers who are part of the 5-state study.

Website data collection and educational intervention will be password protected. Your contact information will be requested for payment purposes and for contacting you for follow up assessments. This information will be destroyed once you are paid at the end of the study. All data will be reported in summary format and no names will be used.

Voluntary: Participation in this study is voluntary. If you choose to take part in this study, you may stop at any time. If you choose to stop you will only receive incentives for the assessments and program activities that you have completed.

Contact Information: Contact Dr. Lisa Franzen-Castle (phone: 308-632-1256; e-mail: lfranzen2@unl.edu) or Dr. Michelle Krehbiel (phone: 402-472-9020; e-mail: mkrehbiel2@unl.edu) for questions about the research project. For questions about your rights as a study participant, you may contact the UNL Institutional Review Board at (402) 472-6965.

Your signature below indicates that you have read, understand the above information, and that you agree that you and your child will participate in the iCook-4H Research Program. You will receive a copy of this form for your records.

_____ _____

Printed Name Signature

_____

Date

_____

Your child's first and last name

4502 Avenue I / Scottsbluff, NE 69361-4939 / (308) 632-1230 / FAX (308) 632-1365

INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES
PANHANDLE RESEARCH AND EXTENSION CENTER

Consent Form- Control Group

Thank you for your interest in the iCook Project, which is a 4-H program and a research study. Lisa Franzen-Castle and Michelle Krehbiel and their team at the University of Nebraska-Lincoln, including Cooperative Extension staff, are studying health and fitness of children between 9-10 years old and the adult in their home who makes most of the food. To participate, you and your child must be free from food allergies and/or activity-related medical restriction that would prevent participation in a face-to-face food, nutrition and fitness program. We want to study you and your child over 2 years to help understand the impact of nutrition and physical activity on health and fitness.

The purpose is to study how to help children make choices about what they eat and how physically active they are so that they will grow strong and have healthy lives.

You will be part of a 5-state study about children's nutrition and physical health. The four other researchers are at South Dakota State University, University of Maine, University of Tennessee, and West Virginia University. We want to study you and your child over 2 years to help understand the impact of physical growth, nutrition and physical activity on health and fitness.

What Will You Be Asked to Do? You will be asked to have your blood pressure measured and complete a 30-minute online survey at the start of the program, and then at 4 months, 12 months and 24 months. Sample questions for the online survey are:
How often do you compare prices before you buy food?
How concerned are you about your child eating too much when you are not around him or her?
During the past 30 days, for how many days have you felt very healthy and full of energy? I worry about what will happen to me.

What will your child be asked to do? Your child will be asked to complete a 50 minute assessment that includes 30 minutes for an online survey and 20 minutes for physical assessments (e.g. height, weight, waist circumference; blood pressure). Your child will be asked to pick the outline of a girl's/boy's body that looks most like she/he does. The reason for this assessment is because children often grow and mature very quickly between 9-10 years old and we want to measure that growth. The body outline question will be asked by an older female researcher or a male researcher for boys and a female researcher for girls. Assessments will be at the start of the program, and then at 4 months, 12 months, and 24 months. Sample questions for the online survey your child will be asked are:

During the past week, how many days did you eat breakfast?
I can follow a recipe by myself (answer from agree to disagree)
I worry about what will happen to me (answer from never to almost always)
During the 2-year period, your child may be asked to wear a waistband that contains an activity monitor for a week each time physical assessments are taken. This device records your child's activity (e.g., step and movement during day and night).

Benefits to Participation: We will provide you and your child with your blood pressure assessment in writing within a month of each assessment period. Your family's participation in this study may lead to better understanding of the role of nutrition and fitness in childhood obesity.

Risks to Participation: There is minimal risk to participating in the study, primarily due to time and inconvenience.

Compensation: You and your child will receive $10.00 each time you complete the assessments for a total of $80.

Confidentiality: All information that is provided is confidential and protected. All data collected will be kept on the researcher's password protected computer and in locked filing cabinets at the University of Nebraska-Lincoln, for up to five years and then destroyed. Not identifiable information will be stored indefinitely in an electronic version accessible to the researchers who are part of the 5-state study. Your contact information will be requested for payment purposes and for contacting you for follow up assessments. This information will be destroyed once you are paid at the end of the study. All data will be reported in summary format and no names will be used.

Voluntary: Participation in this study is voluntary. If you choose to take part in this study, you may stop at any time. If you choose to stop you will only receive incentives for the assessments that you have completed.

Contact Information: Contact Dr. Lisa Franzen-Castle (phone: 308-632-1256; e-mail: lfranzen2@unl.edu) or Dr. Michelle Krehbiel (phone: 402-472-9020; e-mail: mkrehbiel2@unl.edu) for questions about the research project. For questions about your rights as a study participant, you may contact the UNL Institutional Review Board at (402) 472-6965.

Your signature below indicates that you have read, understand the above information, and that you agree that you and your child will participate in the iCook-4H Research Program. You will receive a copy of this form for your records.

_____ _____

Printed Name Signature

_____

Date

_____
Your child's first and last name
4502 Avenue I / Scottsbluff, NE 69361-4939 / (308) 632-1230 / FAX (308) 632-1365

Appendix C: Blood Pressure Assessment

Blood pressure should be the 4rd assessment to be conducted during the assessment appointment. This measurement will be completed on both the adult and the child.

Important Information
This procedure needs to take place in a relatively quiet location. The participant should be as still as possible during the readings.

Required Item(s) for Blood Pressure Assessment
1. 2 Omron HEM 907 XL Intellisense Prof. Digital BP monitor

Blood Pressure Assessment Protocol
1. Participant should be sitting with arm resting on the table at heart level.
2. Avoid placing the cuff over clothing or a rolled up sleeve that might constrict the arm.
3. Make sure the cuff is the appropriated size
    a. Cuff width should be ½ to 2/3 the upper arm length.
4. Palpate for the brachial artery pulse point
    a. Found in the antecubital space on the little finger side of the palm-up extended arm.
    b. Gently hyperextending the arm might make this easier to find.
5. Center the bladder over the brachial artery with the lowest edge 2.5 cm above the antecubital space.
6. Obtain palpated systolic pressure and at 30 mmHg
7. Deflate rapidly and wait 30 seconds before reinflating
8. Apply bell head making a light but airtight seal over the palpable artery. The diaphragm end may be adequate, but the bell is preferable and may help block ambient noise.
9. Inflate rapidly to level determined in step 6.
10. Release pressure 2-3 mmHg/sec. (slowly).
11. Listen for onset of 2 consecutive beats, Korotkoff Phase 1, = systolic pressure.
12. Listen for the absence of sound, Korotkoff Phase 5, = diastolic pressure.
13. Deflate cuff and remove. Record reading.