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An Explanatory Sequential Mixed Methods Nutrition and Physical Activity Intervention Study on Changes in Knowledge, Self-Efficacy, and Outcome Expectations of Fathers

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**An Explanatory Sequential Mixed Methods Nutrition and Physical Activity Intervention Study
on Changes in Knowledge, Self-Efficacy, and Outcome Expectations of Fathers**

by

Sarah Hortman, MS, RDN

A DISSERTATION

Presented to the College of Public Health Faculty in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy

Health Promotion and Disease Prevention Graduate Program

Under the Supervision of Professor Brandon Grimm

University of Nebraska Medical Center

Omaha, Nebraska

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In memory of my late mom and dad. Their best characteristics carry on in the hearts of Bill and I, and their four grandsons.

**An Explanatory Sequential Mixed Methods Nutrition and Physical Activity Intervention Study
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Sarah Hortman, Ph.D.

University of Nebraska Medical Center, 2021

Abstract

Overweight and obesity rates are a continuing concern resulting in poor health outcomes and annual healthcare costs in the billions of dollars. An upstream approach of health promotion is critical to change the focus from treatment and management to prevention of chronic disease. Preventing chronic disease through evidence-based health promotion practices incorporating educational interventions aimed at dietary and physical activity behaviors will preclude negative health outcomes including cardiovascular disease, type 2 diabetes, and hypertension.

The family environment is an important consideration in the prevention of chronic disease including obesity. Parents are role models for their children, including fathers who are underrepresented in research, exploring their role in their children's dietary intake, weight, and health status. Furthermore, the limited research on a father's role on their children's dietary and physical activity behaviors is not founded in health behavior theory and is mainly qualitative research.

This study utilized a mixed methods research study design and the Social Cognitive Theory (SCT). The explanatory sequential mixed methods study design of this research included an educational intervention variant and used the qualitative strand to help explain the results of

the quantitative strand. This increased understanding of the effectiveness of this nutrition and physical activity (PA) education intervention from the participants' viewpoints. SCT's cognitive, environmental, and behavioral constructs provided a more in-depth understanding of fathers' knowledge, self-efficacy, and outcome expectations pre and post nutrition and PA education intervention. Additionally, fathers' preferences for delivery of a nutrition education intervention were explored.

This study revealed the Eating Smart Being Active (ESBA) curriculum, as delivered by an experienced Registered Dietitian, was successful in producing a positive change in the healthy lifestyle habits of fathers. This study also showed that the ESBA curriculum can be delivered successfully online. Study participants expressed the online delivery option was convenient and preferable in some cases. The online delivery option is especially important during this unprecedented time of the COVID-19 pandemic.

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List of Abbreviations

| | |
|---------|---|
| SSB | Sugar-sweetened beverages |
| SCT | Social Cognitive Theory |
| PA | Physical Activity |
| TTM | Transtheoretical Model |
| FPP | Food Parenting Practices |
| BMI | Body Mass Index |
| MM | Mixed Methods |
| UNMC | University of Nebraska Medical Center |
| PI | Principal Investigator |
| RCT | Randomized Control Trial |
| IRB | Institutional Review Board |
| DGA | Dietary Guidelines for Americans |
| EFNEP | Expanded Food and Nutrition Education Program |
| SNAP-Ed | Supplemental Nutrition Assistance Program Education |
| USDA | United States Department of Agriculture |
| MDC | Midwest Dairy Council |
| NCES | National Center for Educational Statistics |
| RDN | Registered Dietitian Nutritionist |
| CI | Confidence Interval |
| ELVPHD | Elkhorn Logan Valley Public Health Department |
| COPH | College of Public Health |
| WIC | Women, Infants, Children |

Chapter 1: Introduction

The annual health expense directly related to childhood obesity, a preventable chronic disease is approximately fourteen billion dollars (Cawley, NCCOR, 2009). These direct costs include prescriptions, outpatient and emergency room visits. Indirect costs add another \$237.6 million for inpatient treatment due to complications of this chronic disease (Cawley, 2010). Nearly 70% of youth who are obese have one or more risk factors for heart disease, such as high cholesterol or high blood pressure. Approximately 40% of this population has two or more risk factors for heart disease (Frieden, 2010). Additionally, chronic disease takes a toll on the wellbeing of individuals and their family members, impacting their quality of life.

Lifetime healthcare costs are estimated at \$2.77 billion for those born in 1993. Lifetime healthcare costs are estimated at \$6.24 billion for overweight and obese children who were born in 1993 and become obese adults. Additional estimation reveals reducing obesity rates by 1% in children aged 12 in 2005 (16.3% to 15.3%) would reduce healthcare costs by \$260.4 million (Trasande, 2010).

Childhood obesity is a leading cause of cardiovascular disease, type 2 diabetes, asthma, and psychosocial problems (CDC, 2017). Approximately 23 million youths, or 1 in 3, are overweight or obese (Ogden, 2010). Obesity affects one out of every six children (16.4%) aged 10-17 (Bethell, 2010). Rates of obesity in 2-19 year olds have tripled since the 1970s (Fryar, 2014). In a span of 40 years (1963 to 2004), the numbers of children aged 6-11 and adolescents aged 12-19 who are overweight or obese has quadrupled and tripled, respectively (Ogden 2002, 2006).

Disability and premature death are the main health risks associated with childhood obesity. The health consequences affect an individual in the short term and long term, these

include asthma, sleep apnea, gallstones, acid reflux, heart disease, stroke, diabetes, osteoarthritis, cancer and psychological conditions such as depression, anxiety, low self-esteem, and social issues stemming from weight stigma. A minimum of 2.6 million people die annually due to the health impact of overweight or obese status (CDC, 2017; WHO, 2014). Research suggests children who are obese have increased school absenteeism leading to decreased learning, parental job absenteeism, and increased costs for the school system (Pan, 2013). Children who are overweight or obese without special healthcare needs are 1.59 times more likely to miss more than 2 weeks of school annually (Bethell, 2010). There is a 50% chance of an obese child who is 6 years old or older to become an obese adult, independent of their parents' weight status (Frieden, 2010). Children who are obese are at an increased risk to become an adult with severe levels of the long-term chronic health conditions associated with obesity (CDC, 2017).

There is a need to explore the rapid increase of overweight and obese individuals to halt this trend and the repercussions involving quality of life aspects, and the strain on healthcare and society. Childhood obesity is the outcome of a complex system with unsolved dynamic elements involving demographic elements, plus social and environmental factors including family life, and the built environment.

Dietary Concerns

The American diet includes an abundant amount of highly processed, energy dense foods. Energy dense foods provide a high number of calories, more than is needed for a typical American, especially if they are sedentary or not physically active. This Western type of diet combined with a highly sedentary lifestyle for all ages is an equation for suboptimal health outcomes. Ample amounts of refined (white) grains, unhealthy fat, including saturated and trans

fats, high fat protein sources, salt-laden snacks, and sugary snacks including sugar-sweetened beverages (SSB), are readily available 24 hours a day. In addition, only 1 out of 10 Americans meet the Dietary Guidelines for Americans (DGA) recommended daily fruit and vegetable servings (Wallinga, 2010).

Suboptimal food choices also push aside nourishing food intake such as whole grains, vegetables, fruits, milk or milk alternatives, lean proteins, and healthy unsaturated fat. Suboptimal foods are those with high calorie levels and low micronutrient levels, which are not ideal for a typical American who is only lightly or not physically active. The nourishing foods - whole grains, vegetables and fruits, lean proteins, healthy fat, and dairy, that are crowded out by less healthy choices means a lack of health promoting nutrients with an array of vitamins, minerals, fiber, and antioxidants critical for healthy organs and internal body processes including the heart, brain, bones, immunity, and other optimal physiological functions. Human physiology is set to prefer high-energy foods reaching back to our ancestors who worked to survive through the physical arduous task of a hunting and gathering lifestyle. Modern times do not dictate much energy to obtain food from the grocery store, yet Americans' average daily calorie intake increased by 400 calories from 1985 to 2007 and increased by 600 calories from 1970 to 2007 (Wallinga, 2010). This modern era westernized diet, environment, and sedentary lifestyle reveals an association with the onset of mainly preventable chronic diseases including obesity, heart disease, diabetes, and cancer (Conner, 2000; Simopoulos, 1999; Estruch, 2013; Sacks, 2001; Wing, 2013; Williamson, 2009; Marik, 2009; Fleming, 2013; Knowler, 2002; Hastert, 2013; Vargas, 2012; Ledikwe, 2007; de Souza, 2012).

Serving sizes of all foods have increased over the last 30 years. This includes foods often chosen by adolescents such as salty snacks, french fries, boxed cereals, and SSB. High energy, low nutrient foods including SSB, salty snacks, desserts, candy, sugar, and fat make up 30% of

daily calorie intake for 8-18 year olds (Briefel & Johnson, 2004). Calories from sugar and fat equates to a daily intake of 1,000 calories in boys and approximately 800 calories in girls (National Cancer Institute, 2010). Dietary patterns of youth reveal SSB and 100% juice (processed fruit) account for 10-15% of the daily calories for youth aged 2-19 years old (Frieden, 2010; Wang, 2007; Imamura, 2015). These foods displace healthier food choices and are associated with a decreased intake of vitamin A, folate, calcium, magnesium, iron, and zinc (Edelstein, 2015).

Nutrition Education Promotes Health

The United States Department of Agriculture's (USDA) Food and Nutrition Services (FNS) define nutrition education as: "any combination of educational strategies designed to facilitate voluntary adoption of food choices and other food- and nutrition related behaviors conducive to health and well-being; . . . it is delivered through multiple venues and involves activities at the individual, community, and policy levels.' This definition recognizes that many factors influence behavior; successful nutrition education uses a systematic approach and strategies that include a variety of activities to help the target group make behavior changes." (USDA FNS, 2010). Nutrition education has become an important factor in promoting health and preventing disease, an outcome of the prevalent use of evidence-based practice. Nutrition intake and diet behaviors are a lifestyle practice affecting health and wellness. Nutrition plays a role in health outcomes and preventing chronic disease, the leading causes of death. Newer research reveals nutrition and exercise interventions as beneficial as, sometimes even more beneficial than pharmaceutical interventions, with a lower rate of side effects, risk, and cost. Dietary interventions have been shown to lower the prevalence, and risk of death associated with hypertension, elevated cholesterol levels, type 2 diabetes, certain cancers, and obesity (Estruch,

2013, Sacks, 2001, Wing, 2013, Williamson, 2009, Marik, 2009, Fleming, 2013, Knowler, 2002, Hastert, 2013, Vargas, 2012, Ledikwe, 2007, de Souza, 2012).

Nutrition education allows individuals to understand how dietary intake affects their health and well-being. It increases awareness, establishes motivations, and enhances aspects of the environment as a foundation to take action (Contento, 2011). Integrating the constructs of a behavioral theory such as Social Cognitive Theory (SCT) into education lesson goals can influence actions to practice healthy behavior. Behavioral theories serve as a guide to explain human behavior. SCT is a model theorizing how the exchange between personal, environmental, and behavioral factors dictate human behavior (Glanz, 2015). The constructs of SCT are the foundation of this health behavior intervention. The Cognitive aspects include self-efficacy opportunities for modeling, mastery, and verbal persuasion. Collective efficacy includes opportunities for a group to create goals and work together. Outcome expectations emphasize the positive and negative outcome possibilities. Knowledge informs participants of the risks and benefits, which is necessary for behavior change. Environmental constructs include providing and exploring opportunities for observational learning, normative beliefs, social supports, barriers, behavioral skills, intentions, and reinforcement. Behavioral aspects involve learning behavioral skills and intentions through short-term and long-term goal setting. Achieving goals addresses reinforcement of the desired behavior (Bandura, 1986).

Empowerment is an outcome of nutrition education, allowing individuals, communities, and organizations to improve their ability for practicing healthy food habits through self-directed learning, learning activities, and building social support (Contento, 2011). These strategies allow a group to collaborate with an instructor to determine how they want to learn. This could encompass improving nutrition skills, such as a group of fathers choosing to learn about healthy food choices in the grocery store through label reading, considering there are

50,000+ food items on our grocery store shelves in an average supermarket (Contento, 2011). Fathers could also learn how to prepare quick and healthy meals or snacks and make healthy choices away from home. This takes into consideration resources such as time and money, which are priority considerations for families.

A systematic review of 44 studies by Pomerleau et al. (2005) on nutrition interventions promoting fruit and vegetable intake in adults concluded positive behavior change in fruit and vegetable intake with up to 1.4 more servings per day. This was especially true with in-person nutrition education and counseling (Pomerleau, 2005). Another systematic review by Fjeldsoe et al. found 21 out of 29 physical activity (PA) and dietary interventions achieved maintenance of the desired behavior. The authors state the aspects of these interventions that were associated with maintenance included intervention duration of 24 weeks or more, in-person education, multiple education strategies, and a follow-up plan (Fjeldsoe, 2011). Additionally, the Evidence Analysis Library Nutrition Counseling Workgroup of the American Dietetic Association (now the Academy of Nutrition and Dietetics), conducted a systematic review of peer-reviewed literature on nutrition education behavior change theories and strategies. This review concluded with 87 studies revealing a combination of behavioral theory, including cognitive behavior theories, was the most effective strategy to modify dietary intake, weight status, and risk factors for diabetes and cardiovascular disease. They found limited research documenting the effectiveness of nutrition education interventions based on the Transtheoretical Model (TTM) or SCT. However, successful interventions included goal setting, problem solving, and social support, which are aspects or constructs of SCT (Spahn, 2010). This evidence reveals positive behavior change as an outcome of nutrition education interventions.

Family Environment as Prevention

Parental involvement in the home environment affects the dietary intake of children (Clark, 2007). Multiple studies support this finding that parental interventions improve childhood obesity (Jang, 2015). Parents serve as role models for their children's behavior (Goslin, 1969). Regular family mealtime has shown to affect a child's dietary intake with increased consumption of vegetables and fruits, decreased soda consumption and greater nutrient intake of fiber, calcium, and iron (Neumark-Sztainer, 2003; Sweetman, 2011). Parents' dietary and health habits establish either a healthy or an unhealthy norm for their children. Parents set up a home environment as the 'gatekeepers' for the types of foods brought into the household. Registered Dietitian Nutritionists are educated to understand the elements of dietary behavior and food environments, including this system within the home. Parents are the main source of establishing what foods are available in the home; ideally, children should be allowed to choose the types and amounts of these available foods in the home to establish autonomy, enabling them to learn to listen to their hunger and satiety signals (Satter, 2008). Considering adult obesity rates show approximately 1 in 3 are obese (CDC, 2017), parents wrestling with their own weight and health issues are concerned about their children's weight and health status, potentially leading to restrictive measures of their children's dietary intake (Hood, 2000).

Well-intentioned actions by parents can inadvertently create inappropriate dietary intake patterns and reinforce behaviors leading to an overweight status for their children (Branscum, 2017; Khandpur, 2016; Morgan, 2014). Nutrition is a science, and there is a lack of accurate information and education in the everyday world on appropriate nutrition intake, including behavioral strategies and understanding of nutrition within human physiology (Spronk,

2014). An example of well-intentioned parents taking misinformed action is preventing exposure of their children to foods that are high in calories or providing food favorites to their children as a reward and punishment behavioral strategy (Haire-Jooshu & Nanney, 2002). Research reveals restricting high calorie foods increases the desirability to eat greater quantities of these foods (Campbell, 2006). Essentially a lack of nutrition knowledge enables unhealthy dietary behavior and disables children from learning that appropriate dietary intake should have a foundation of nourishment through balance, variety, and moderation (AND, 2013).

This lack of knowledge is confounded with the spread of misinformation and diet fads prevalent in the media from individuals lacking formal nutrition and health education, an abundant food environment, plus food marketing and advertising. Food marketing affects youth food preferences and food requests through the avenues of television, radio, billboards, and the internet (AND, 2006). These foods are commonly high in calories, sugar, salt, fat, and low in vitamins and minerals (IOM Food and Nutrition Board, 2006). This advertising is especially concerning for younger children who are unable to distinguish between factual information and commercial advertising. Children aged 2-11 years old form food preferences, request, and consume foods based on these food advertisements. There is a positive association of body fat and television-based food advertising in children and adolescents. Television advertisements promote energy dense food products that are low in nutrients (McGinnis, 2006).

The home and family serve as a microenvironment, a smaller environment within a bigger environment, which influences a child's weight status. Addressing this environment is critical to prevent and treat overweight status in children (Clark, 2007; Contento, 2011; Jang, 2015). Parents must be knowledgeable on sound nutrition basics for establishing healthy eating behaviors and patterns in their children. It is important for families to be educated on how to

make informed decisions and how to eat healthfully on a daily basis with strategies to address barriers such as time, energy, money, external influences, and nutrition knowledge.

Critical Need to Explore Fathers' Role

Research focusing on the father's role in their child's dietary intake is limited. A 2016 systematic review revealed a gross underrepresentation of the father's role in childhood obesity research (Davison, 2016). There are studies highlighting factors on the importance of a father's role on their children's dietary intake. However, more studies are needed to fill this research gap. This could help improve dietary intake promoting a healthy status among children and effective interventions to manage and treat childhood obesity. According to a systematic review by Davison et al., 1% of the studies on parenting and childhood obesity related observational studies included only fathers compared to 36% included only mothers, the rest of the studies had combined parents. Mean sample sizes for fathers were 139 versus a mean sample size of mothers at 672. Fathers equated to 17% of parent participants in the eligible studies of this systematic literature review (Davison, 2016).

Three areas should be considered in research on a father's role in promoting children's health and preventing or treating childhood obesity, according to Morgan et al. in "The Influence of Fathers on Children's Physical Activity and Dietary Behaviors: Insights, Recommendations and Future Directions." The first area is recruiting fathers, the second area is engaging the fathers, and the third area is future considerations for research prioritizing fathers. A sampling of suggestions in these areas involves highlighting a father's motivation to improve their relationships with their children. This includes involving fathers, as they are interested in improving their children's dietary behaviors. Provide interventions with father only groups, programs, and sessions, which fathers are more comfortable with versus groups where mothers

are the majority. Prioritizing fathers as a facilitator of improving health within their family unit, will add to the research, adding to the limited 1% of research published that solely highlights fathers.

Attitudes and beliefs set good intentions for fathers who expressed the importance of guiding their children towards healthy eating as found in qualitative themes established in focus group sessions of US Latino fathers. Most of the fathers in this study also reported routine dining out and takeout plus less emphasis on their children's eating habits and their own child feeding practices versus a higher emphasis on their children's PA levels. Even though they expressed more emphasis on their children's PA, they reported mainly willingly interacting in sedentary behavior and not setting screen time limits with their children (Lindsay, 2017).

A father's dietary practices serve as a guide for children's eating behaviors. A dietary intake assessment for a cross-section of father-child subjects who were a priority population for the Healthy Dads, Healthy Kids research by Morgan et al. revealed positive correlations between father and child dietary intakes. A positive correlation related to the father and child consuming similar food types. Results included moderate to strong associations for the intake of fruit, cookies, and potato chips (Hall, 2011).

Food parenting practices (FPP) are another area for nutrition education interventions for fathers and children to increase healthy eating patterns. One study revealed 20 responsive FPPs of fathers including food rules, making healthy foods available, and scheduling mealtimes. Fathers who lived in the same household were more likely to provide food on a routine schedule and model eating practices for their children. This contrasted with fathers who did not live in the same household, who were more likely to watch the child's food intake, encouraging their

children to eat, and letting the child choose their own foods based on the child's taste preferences (Khandpur, 2016). Two literature reviews of father's FPPs summarized the evidence of father's unique role on the dietary intake of their children. A review by Pulley et al. found fathers are less likely to monitor and practice responsibility in their child's dietary intake compared to mothers. Fathers are more likely to use pressure as a strategy to encourage their children to eat compared to mothers. One incident in the study revealed older male siblings feeling the most pressure to eat from their fathers. These findings are supported by a review by Khandpur et al. where fathers are more likely to use pressure as a strategy to encourage their children to eat during mealtimes. This review also noted father's FPPs were associated with adiposity in their children, finding a positive association between a children's BMI, and their father's use of food restriction.

Interventions prioritizing fathers may improve their FPPs. One intervention resulted in significant improvement of fathers' weight, waist circumference, diet, and physical activity. Fathers improved their limit setting and reinforcement in their FPP. Additionally, significant improvement occurred in children's PA and Body Mass Index (BMI) (Lloyd, 2014; Morgan, 2014).

Father's FPPs are unique compared to mother's FPPs. One study found fathers were less likely to monitor SSB intake for their children versus the children's mothers. The authors associate the fathers' lack of SSB monitoring with the fathers' historic secondary role as meal planners. They note that this trend is changing with increased interaction and feeding responsibility of fathers in current times (Branscum, 2017).

Qualitative data include viewpoints of British fathers ranging from considering themselves as a regular cook in their families to not cooking at all. The majority of the fathers

expressed a shared role in shopping for food. Fathers strongly expressed that they aim to have close interaction with their children and that their children should be able to choose what foods they would like to have from the store to eat. The fathers did not impart health advice on the way they chose foods for their children but wanted to ensure their children had enough to eat (Owen, 2010).

An association between fathers and their children's weight status was found in a study exploring dietary and PA behaviors in multi-ethnic fathers. About one-third of the fathers stated they were solely responsible or shared the role of grocery shopping and preparing family meals. The authors state a child's flavor preferences are created with dietary intake based on the consumption of these high calorie foods as the norm. The authors suggest healthy behaviors should be promoted as a norm to reduce screen time by including frequent PA that a father and child can do together, such as walking (Snethen, 2008).

Additional evidence of the weight association between father and child among Mexican American families was found in another study on FPPs. The FPPs of fathers in this study directly related to their children's weight status, independent of the FPPs of the mothers. The authors related this to undermining the children's regulation of hunger and satiety. Positive FPPs and feeding interactions were not associated with their children's weight status (Penilla, 2017).

Other studies highlight the importance of a father's role in various ways. One study states a social modeling factor in low-income female adolescents who had an increased calcium intake among those who say they saw their fathers drinking milk verses the females who did not see their fathers drinking milk (Savage, 2007). A study by McIntosh prioritized fathers as an under-represented role model in research on children's eating behaviors and childhood obesity.

The authors concluded the main factor in determining the frequency of children dining in fast food and full-service restaurants was the frequency of their fathers dining in these establishments. This study also found an association between fathers who practiced authoritarian style parenting and an increased likelihood of their children consuming 'junk' food. Fathers who did not prioritize family mealtimes and felt a lack of control in their work environment had children who were more likely to eat in fast food establishments. Time spent commuting reduced a father's time spent with their children and prioritizing family mealtimes (Carollo, 2011). A child's dietary intake was highest in foods categorized as sweets and fats, including SSB when the fathers consumed these foods. The authors state this agrees with previous studies finding fathers mainly influence non-core food types (Hebestreit, 2017).

The interaction of fathers within family dynamics is a factor in the microenvironment affecting the eating behavior of their children and a lifetime of health implications. Fathers are critical in their potential role to reinforce healthy or unhealthy dietary patterns for their children. A father's role must be included in order to fill the current research gap. This could enable the development of tools promoting appropriate dietary intake for healthy children and effective interventions to manage and treat childhood obesity. The evidence implies this should incorporate more research focusing on:

- Nutrition education covering the following areas:
 - Culturally appropriate healthy eating, dining out strategies plus easy, healthy snack, and meal planning.
 - Encourage responsive and positive FPPs that enable children to establish healthy eating patterns, behaviors, and a subsequent health status, including weight.

- Prioritize the changing roles of fathers including knowledge on nutrition needs and portion sizes for children with empathy that includes children's food preferences for choices that fit within healthy food guidelines.
- Exploration of the father-child relationship as it pertains to dietary intake and health for determining appropriate tools to promote healthy behaviors among this population.

An Opportunity for Exploration

This research, prioritizing nutrition and PA education, focused on fathers as role models of school-aged children will add critical evidence-based information to help the dire need to explore these areas needed in research. Nutrition and PA education with a group of fathers addressed the confidence and support needed for change with SCT under the constructs of self-efficacy, collective efficacy, social support, and normative beliefs. The priority population of the research was a sample of fathers residing or working remotely for a company in Omaha, Nebraska.

The benefits of this research study include a sound intervention based on SCT, a theoretical framework involving the cognitive, environmental, and behavioral constructs. This research study's population of fathers adds to an area lacking in research on this topic (Calancie, 2015). As revealed in the literature review for this research study, Quantitative and Mixed Methods (MM) designs are lacking in this area. Many studies of this nature typically comprise of a cross-sectional design, merely providing a snapshot in time. This MM study, consisting of quantitative and qualitative data, allowed for a more in depth understanding of the changes that take place pre and post intervention. This study focused on fathers of children aged 6 and older. This study went beyond the provision of information. It allowed fathers to interact with each other as support and guided them to synthesize the nutrition and PA information into

realistic, personalized strategies that set them up for success in optimizing health, maintaining weight, and sustaining healthy habits for themselves and for their children.

It is imperative to promote health and maintain healthy weight status of children through establishing healthy nutrition and PA behaviors in order to prevent the far-reaching and costly condition of childhood obesity.

Social Cognitive Theory Foundation

The constructs of Bandura's SCT are based upon reciprocal determinism – the interactions between cognitive, environment, and behavior.

Cognitive constructs involve self-efficacy, collective efficacy, outcome expectations, and knowledge. Self-efficacy, an individual's belief that they are able to successfully carry out a task or behavior, is achieved through modeling, mastery, and verbal persuasion. Collective efficacy, a group's belief that they are able to successfully carry out a task or behavior collectively, is achieved through goals, communication, teamwork, and success. Outcome expectations are the belief of what individuals will achieve, the likelihood of success, and the value associated with the outcome. This can be positive or negative based on physical, social, or self-evaluative. Knowledge is a pre-condition for a change in behavior and involves understanding the risks and benefits.

Environmental constructs involve observational, normative, social support, and barriers or opportunities for change. Learned behaviors are accomplished through observation of others, including normative beliefs and practices or what is considered a normal belief or behavior within an environment. This involves the aspects of social support that enables or encourages a certain behavior or belief and the aspects that make a behavior difficult or easy to practice.

Behavioral constructs involve skills, intentions, and reinforcement or punishment. Skills are necessary in order to practice a behavior. Intentions are the short-term and long-term goals set to practice a behavior. Reinforcement and punishment are added or removed, either tangible such as money, or social such as praise from a peer (Glanz, 2015).

Vicarious learning occurs in SCT. Children learn eating behaviors based on what their family or peers eat, which is the role-modeling element of the self-efficacy and environmental constructs. Additionally, children's food intake is connected to cognitive, environmental, and behavioral constructs, which involve modeling, observation, normative beliefs, social support, barriers/opportunities, and skills. Proxy efficacy occurs as children can learn behaviors through their parents (Bandura, 2001).

Purpose Statement

The purpose of this mixed methods study was to understand the impact of a nutrition and PA education intervention on changes in knowledge, self-efficacy and outcome expectations of fathers. This study utilized a variant of an explanatory sequential mixed methods design to include a nutrition and PA education intervention. This process involved collecting quantitative data first and then explaining the quantitative results with detailed qualitative data. The first phase was quantitative with pre- and post-survey data collected from father participants to assess participants' change in healthy eating and PA knowledge, and food-related behaviors. The second phase was qualitative follow up interviews of the extreme cases to explain the most successful and least successful quantitative results. In this explanatory qualitative follow-up, the participants learning experience was explored to help establish information on changes in knowledge, self-efficacy, and outcome expectations of their food-related behaviors.

Research Questions

Quantitative research questions:

What is the change between healthy eating knowledge pre- and post- nutrition and PA education intervention?

What is the change between healthy eating food-related behaviors pre- and post- nutrition and PA education intervention?

Qualitative research questions:

How do participants describe their change in knowledge of healthy food choices after participating in this nutrition and PA education intervention?

How do participants describe their change in food-related behaviors towards food choices after participating in this nutrition and PA education intervention?

Mixed Methods research question:

How does the interview data describing the fathers' perspectives of the nutrition and PA education intervention help explain the quantitative results of this intervention as an effective and sustainable tool for this population?

Theoretical Foundation

This mixed methods study allowed for deductive research in the quantitative strand through measurement of data from a quantitative research question. It also allowed for an inductive research approach in the qualitative strand through collaboration to help explain data from the participants' viewpoints as reflected in the qualitative research question. This

approach created an in-depth application of the synergistic real-world interactions by considering both objective and subjective information. (Creswell, 2011).

The explanatory sequential mixed method design specifically chosen for this research study was complementary through using the qualitative strand to help explain the results of the quantitative strand. This helped understand and explain the effectiveness of this nutrition and PA education intervention from the participants' viewpoints.

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Chapter 2: Literature Review

Health status and lifestyle behaviors are a synergistic system. This complex system applies to a father's role in the dietary intake and health status of their children. 'Thinking in Systems' by Donella Meadows postulates that complex systems consist of elements, interconnections, and purpose along with leverage points to create change. The elements in a father's dietary intake and their role in their child's dietary intake could be assigned as: the father, the child, and the available food. The interconnections could be assigned as: the rules of the food environment – how, where, when, types and amount of food available, and the purpose. The purpose of dietary intake in this case could be the father is helping to put food on the table or looking to promote health in themselves or their children, or eating out of habit or entertainment, all the while serving as a role model. Leverage points include nutrition and lifestyle behavior education that may be justified by nutrition and behavioral research which has determined that food preferences and eating behavior are a learned process based on exposure and repetition (Edelstein, 2015). Therefore, modeling behaviors may be viewed as a synergistic component added to exposure and repetition.

Role modeling is integral in the foundation of behavior, including health behaviors such as dietary intake and food preferences. Role modeling is a major concept of Albert Bandura's SCT, a framework shown to influence behavior. Parents are role models for their children's behavior. Research by Harper and Sanders has shown children will more readily eat a food their mother eats than if they see a stranger eating that food. Additionally, modeling impacts older children as well as young children and a child is more likely to eat a food their adult role model eats with the child versus the child only being offered a specific food to eat on their own (Edelstein, 2015). Parental behavior within the home environment is a factor in the dietary

intake of children (Clark, 2007). Traditionally, research focused on the mother's impact on their children's diet with limited research exploring a father's influence. A systematic review by Davison et al revealed 1% of 667 observational studies involved the fathers influence on parenting and childhood obesity (Davison, 2016). Research reveals that father's feeding influence is unique compared to mothers. Mothers are more likely to monitor their children's SSB intake and have greater intentions, attitudes, and personal agency in regard to the monitoring (Branscum, 2017). Today, fathers are increasingly involved in food decisions for the household. The purpose of this literature review was to explore the evidence-based data associated with how a father's food-related behaviors may influence the dietary intake of their children. This can be applied to the cognitive, environmental, and behavioral constructs of SCT through reciprocal determinism, or the interaction of these three constructs as a framework for determining behavior.

A comprehensive literature review was conducted in May 2018 with the assistance of the Head of Education & Research Services at the University of Nebraska Medical Center (UNMC) McGoogan Library of Medicine. A title search was done initially focused on terms related to fathers' impact on their children's dietary intake. Five databases were searched: PubMed/Medline, Embase, CINAHL, PsychINFO, and SCOPUS, for relevant research articles published within 10 years.

The process used included a title search by the librarian. This was followed by an abstract search by the principal investigator (PI) of this research study. Exclusion criteria were selected to focus on fathers, children, and nutrition. Citations excluded duplicates and those containing terms that were in line with the focus and research questions of this research study. Exclusion terms included breastfeeding, pregnancy, infants, preschoolers, family, grandparents,

food allergies, food rewards, socioeconomic factors, behavioral issues, eating disorders, alcohol/drug use, specific diseases or conditions such as ADHD, non-specific to diet, genetics, and animals. A review of the remaining citation abstracts by the study PI narrowed the articles to 19, excluding systematic reviews and meta-analyses, ensuring the remaining articles specifically highlighted fathers' impact on their children's dietary intake.

Database Search Terms

PubMed/Medline:

((("Fathers"[Mesh] OR "Father-Child Relations"[Mesh] OR father[tiab] OR fathers[tiab] OR dads[ti])) AND (((("Nutritional Status"[Mesh] OR "Nutrition Assessment"[Mesh] OR "Diet, Food, and Nutrition"[Mesh] OR "Food Assistance"[Mesh] OR "Eating"[Mesh] OR "Feeding Behavior"[Mesh] OR "Healthy Diet"[Mesh] OR "Food and Beverages"[Mesh])) OR (food[tiab] OR eating[ti] OR eat[ti] OR diet[ti] OR feeding[ti] OR feed[ti] OR nutrition[ti] OR nutritional[ti] OR fruit[tiab] OR fruits[tiab] OR vegetable*[tiab]))) Filters last 10 years; English

Embase:

('father'/exp OR 'father child relation'/exp OR father:ti,ab OR fathers:ti,ab OR dads:ti) AND ('nutrition'/exp/mj OR 'nutritional assessment'/exp/mj OR 'food assistance'/exp/mj OR food:ti OR eating:ti OR eat:ti OR diet:ti OR feeding:ti OR nutrition:ti OR nutritional:ti OR fruit:ti OR fruits:ti OR vegetables:ti OR vegetables:ti) AND [English]/lim AND 2008-2018]/py AND [humans]/lim

CINAHL:

(MH "Nutrition+" OR MH "Nutritional Status" OR MH "Nutritional Assessment" OR MH "Diet+" OR MH "Food+" OR MH "Eating OR MH "Eating Behavior+" OR MH "Feeding and Eating Disorders of Childhood+" OR MH "Food Habits" OR MH "Beverages+" OR MH "Food and Beverages+") OR TI (food OR eating OR eat OR diet OR feeding OR feed OR nutrition OR nutritional OR fruit OR fruits OR vegetable OR vegetables) AND (MH "Fathers+" OR MH "Father-Child Relations") OR TI (father OR fathers OR dads) Limit 10 years human English

PsychINFO:

DE (Nutrition OR "Energy Drink" OR Diets OR Food OR "Fast Food" OR "Food Preparation" OR "Food Safety" OR "Food Preferences" OR "Food Refusal" OR "Beverages (Nonalcoholic)" OR "Energy Drink" OR "Eating Attitudes" OR "Eating Behavior" OR "Binge Eating" OR "Bottle Feeding" OR "Breast Feeding" OR "Dietary Restraint" OR "Food Refusal" OR Weaning OR "Feeding Disorders" OR "Food Intake") TI food OR eating OR eat OR diet OR feeding OR feed OR nutrition OR nutritional OR fruit OR fruits OR vegetable OR vegetables TI father OR fathers OR

dads DE "Fathers" OR DE "Adolescent Fathers" OR DE "Single Fathers" Limiters - Published Date: 20080101-; English; Population Group: Human Search modes - Find all my search terms

SCOPUS:

TITLE (food OR diet OR nutrition OR eating OR feeding OR beverages OR eat OR feed OR nutritional OR fruit OR vegetables) AND TITLE (father OR fathers OR dad OR dads) AND (LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008)) AND (LIMIT-TO (LANGUAGE , "English ")) AND (LIMIT-TO (EXACTKEYWORD , "Human "))

Database Search Results

PubMed/Medline, a database created by the United States National Library of Medicine (NLM), resulted in **959 citations** using the search strategy listed in Appendix 1.

Embase, a biomedical database through Elsevier, resulted in **1,049 citations** using the following search strategy listed above.

CINAHL, or Cumulative Index of Nursing and Allied Health Literature, created by EBSCO Information Services, resulted in **130 citations** using the search strategy listed above.

PsychINFO, a psychology database created by American Psychological Association, resulted in **115 citations** using the search strategy listed above.

SCOPUS, the largest database of peer-reviewed literature created by Elsevier, resulted in **69 citations** using the search strategy listed above.

This literature review resulted in fifteen peer-reviewed articles that met the inclusion and exclusion criteria. (See table 1). There is evidence of SCT constructs in the fifteen eligible research studies for this review. However, only five of these studies state a theoretical foundation. SCT constructs include role modeling which is within self-efficacy (cognitive),

observational and normative beliefs (environmental), and as an element of behavioral skills and intentions (behavioral). The associated SCT variables such as intentions, social and home environments, knowledge, skills, attitudes, observational, norms, personal agency/self-efficacy, collective efficacy, and reinforcement reveal the potential health implications of a father's influence on their children's dietary intake and the use of SCT as an important framework for behavior change. The eligible studies explore the dietary practices of fathers based on their own perspectives, attitudes, parenting style, and involvement with food preparation and interactions with their children. These practices lay the groundwork for what children establish as their own health behaviors.

Cross-sectional Designs

Father's FPPs are unique compared to mother's FPPs as shown in a study by Branscum et al. The authors focused on the differences between father (n=117) and mother (n=167) study subjects in monitoring the intake of SSB in their 7-12-year-old children. Fathers were less likely to monitor SSB intake for their children with less skill and intention to manage their children's intake. The authors associate the lower skill and intention of SSB monitoring in fathers with their historic secondary role as primary meal planners and providers. They note that this trend is changing with increased interaction and feeding responsibility of fathers in current times. This places the need for nutrition education and public health interventions to include and focus on the impact of a father's role in their child's dietary intake and behaviors.

Father's dietary practices serve as a guide for children's eating behaviors. A study by Hall et al. revealed evidence of father role modeling of dietary intake. A dietary intake assessment for a cross-section of father-child subjects who were a priority population for the Healthy Dads, Healthy Kids research by Morgan et al. revealed positive correlations between

father and child dietary intakes. Results included moderate to strong associations for the intake of fruit, cookies, and potato chips. There were no associations between father and child for ice cream, chocolate, or French fries. This study emphasizes the potential role father's play in reinforcing healthy or unhealthy dietary patterns for their children. Exploration of the father-child relationship as it pertains to dietary intake and health is necessary to determine appropriate tools to promote healthy behaviors among this population.

Penilla et al. found evidence of the weight association between father and child among Mexican American families. The FPPs of fathers in this study directly related to their children's weight status, independent of the FPPs of the mothers. Negative FPPs such as controlling behaviors by the fathers were associated with their children's weight status. Increased weight status was found in children whose fathers restricted food the most. Decreased weight status was found in children whose fathers used food as a reward or punishment. The authors related this to undermining the children's regulation of hunger and satiety. Positive FPPs and feeding interactions were not associated with their children's weight status. Nutrition education interventions should involve fathers and include teaching positive FPPs to promote healthy weight and eating behaviors.

A cross-sectional dietary intake assessment of European families in the "Dietary Patterns of European Children and Their Parents in Association with Family Food Environment: Results from the 'I.Family Study' by Hebestreit et al. (2017) revealed children's dietary intake was highest in foods categorized as sweets and fats, including SSB when the fathers consumed these foods. The authors state this agrees with previous studies finding fathers mainly influence non-core food types.

The environment is a component of the complex system influencing health behaviors including dietary intake. Interaction between role modeling and the environment is revealed in a study looking at use and frequency of children dining in fast food (FF) and full service (FS) restaurants by McIntosh et al. (2011). Children who dined in FS restaurants had fathers who frequented these restaurants. This association of FS restaurant frequency was not significant between children and their mothers in this study. Standard work schedules for both parents, flexible work schedules for fathers, and a greater perception of control at work in fathers equated to greater frequency of children dining at FS restaurants. Fathers who valued family dinners as an important ritual had children who ate less frequently at FF restaurants. More time spent traveling in a car was associated with increased use of FF and FS restaurants. Restaurant meal portions are ample and often 2-4 times more than the recommended food serving amounts an individual should consume. Dining in restaurants also exposes an individual to higher amounts of calories, refined carbohydrates, and fat with more opportunity to consume fried foods and less opportunity for healthy fresh fruit and vegetable options (Glanz, 2004). It is important to consider nutrition education that enables fathers to use the environment as a tool for a formula of healthy dining strategies plus quick, easy, healthy meal planning, and grocery store navigation with an emphasis on family dinners at home to create new norms for health promotion.

The home food environment is a predictive factor of fruit, vegetable, and SSB intake in a study by Harris et al. Study subjects were 102 African American males, 23-68 years old. Results indicated child dietary intake was predicted by the fathers' dietary intake, but not through modeling between the father and child. Access to healthy food choices in the home resulted in a lower intake of SSB but availability was not found to affect intake of fruits and vegetables. The

data was self-reported, and the sample size was small (n=102) and included only African American males, which limits the reliability and generalizability of the results. However, these results indicate the environment and a father's dietary intake as potential factors to be explored in future interventions that promote the availability of healthy food choices and limit unhealthy food choices in the home.

Pulley et al. found similar FPPs between mothers and fathers concerning younger children. However, FPPs in fathers differed from mothers in their older children with fathers having a stronger obligation to ensure healthy dietary intake. Older male siblings felt the most pressure from their fathers related to FPPs.

Qualitative Designs

In a qualitative study by Owen et al., British fathers (n=29) discussed their views and involvement on FPPs. The fathers ranged in their viewpoints of being regular cooks in their families or sharing the responsibility with their wives or help with the cooking or not cooking at all. All the men expressed a shared role in shopping for food with only four fathers stating they rarely helped with food shopping due to long work hours. Fathers strongly expressed that they aim to have close interaction with their children and that their children should be able to choose what foods they would like to have from the store to eat. The fathers did not impart health advice on the way they chose foods for their children but wanted to ensure their children had enough to eat.

Father's FPPs combined with environmental components such as traditional gender norms are expressed in 109 interviews from 44 families in "Dining with dads: Fathers' influences on family food practices" by Fielding-Singh. Members of 41 families stated the dietary behaviors

of fathers were less healthy than the mothers, 2 families agreed the fathers and mothers' diets were equally healthy and 1 family stated the fathers' dietary behaviors were healthier.

Perceptions from fathers and other family members, including their adolescent children, of the fathers' diets included frequent consumption of fast food and processed, less healthy foods with little interest in health. Fathers, mothers, and their adolescent children agreed that fathers spent less time cooking with mothers and children stating this could be due to the fathers' poor eating habits and lack of healthy eating knowledge. This was related to choosing unhealthy and quick food items for convenience or due to the lack of fathers' nutrition knowledge, shopping, and cooking skills. Mothers expressed concern about the fathers' lack of interest in healthy eating and worry about poor role modeling for their children. Adolescent children stated an advantage to their fathers' lack of healthy food options as it gave them a way to consume their cravings for off-limit foods like chips, cookies, and fast food prohibited by their mother. Family members acknowledge traditional gender roles as a foundation for the dietary habits, health beliefs, and domestic duty of cooking and meal clean-up of the fathers and mothers. The authors' state modern roles of fathers have more interaction with their children but are lagging in the responsibility of healthy food provisioning. Fathers today appear to have more interaction with their children but lack the knowledge and skill to provide and plan healthy meals.

Traditional gender roles may contribute to this dilemma.

A study by Khandpur et al. interviewed 40 fathers resulting in a finding of 20 FPPs. These included responsive practices such as having food rules, making healthy foods available and scheduling mealtimes. Unresponsive practices found included letting a child choose the types of food to eat and using food as a reward. These practices varied based on whether the fathers had a college education or lived in the same household. Those with a college education

were more likely to feed on a schedule and model healthy food practices and less likely to let the child choose the types of food based on the child's preferences, educate children about food, and use distractions to get children to eat. Fathers who did not live in the same household were more likely to let the child choose foods based on the child's preferences, monitor, and encourage food intake in their children. Nutrition education is an important intervention in FPP for fathers to encourage responsive practices that enable children to establish healthy eating patterns and behaviors.

Mixed Methods Designs

Focus groups of Latino fathers (n=28) by Lindsey et al. revealed positive expressions on the importance of ensuring a healthy dietary intake of their young children (2-8 years old), their families and themselves. However, food-related behaviors indicate dining out and take out practices, which is associated to childhood obesity in Latino children. These fathers expressed more involvement with promoting their children's PA versus dietary intake, despite fathers reporting their activity levels as sedentary. Promoting PA and setting screen time limits for their children appeared as a low priority for fathers. These areas are important for future studies, increasing the nutrition component that involves nutrition education on culturally appropriate healthy eating, physical activity strategies, dining out strategies plus easy, healthy snack and meal planning.

A correlation between fathers' and their children's weight status was found in a study of 51 multi-ethnic fathers with children 8-12 years old. This study by Snethen et al. explored dietary and PA behaviors in fathers. About one-third of the fathers stated they were solely responsible or shared the role of grocery shopping and preparing family meals. The majority of fathers in this study reported perceiving themselves and their children as normal weight, even

though 68% of the fathers were overweight or obese and fathers underestimated their children's weight. Fast food dining and unhealthy snacking were prevalent among the subjects. The authors' state a child's flavor preferences are created with dietary intake based on the consumption of these high calorie foods as the norm. The authors suggest healthy behaviors should be promoted as a norm to reduce screen time by including frequent PA that a father and child can do together, such as walking. Special consideration of a father's role and influence on their children's dietary intake and behaviors is a necessary component to consider for interventions that promote health and prevent obesity.

Randomized Control Trial Designs

As discussed in "The Dietary Outcomes of the Healthy Dads Healthy Kids Randomised Controlled Trial" by Burrows, et al. overweight fathers and their 5-12 year old children were prioritized to find if dietary intakes could improve. The intervention based on the constructs of the Social Cognitive Theory (SCT) involved eight sessions within 3 months. Five sessions were with the fathers only and three PA sessions were with the fathers and children. Sessions with the fathers included Australian food guideline recommendations, encouraging fathers to improve their children's dietary intake through modeling desired behaviors. Children were encouraged to improve their father's dietary and PA lifestyle behaviors through modeling desired behaviors. This intervention resulted in smaller portion size measurements in a variety of foods for fathers and children's daily calorie intake decreased. This study reveals that role modeling can encourage healthy behavior changes.

Interventions prioritizing fathers may improve their FPPs as shown in the "Impact of the 'Healthy Dads, Healthy Kids' lifestyle programme on the activity- and diet-related parenting practices of fathers and mothers" by Lloyd et al. and "The 'Healthy Dads, Healthy Kids'

community randomized controlled trial: A community-based healthy lifestyle program for fathers and their children” by Morgan et al. This intervention resulted in significant improvement of fathers’ weight, waist circumference, diet, and physical activity. Fathers improved their limit setting and reinforcement in their FPP. Additionally, significant improvement occurred in children’s PA and Body Mass Index (BMI).

Results of this literature review exploring a father’s role in their children’s dietary intake indicates there is limited research completed in this area. Much of the research on this topic is limited to observational, cross-sectional, or qualitative methods and most lack a theoretical foundation. In the last few years, research expanded to include randomized control trials (RCT) on fathers and children, with interventions focusing on physical activity and healthy diet components. As the father’s role in their child’s dietary intake is complex, it is important to utilize a variety of study designs such as MM research designs in order to provide an intensive exploration and understanding of this area. MM designs such as the sequential explanatory, allow for a voice from the priority population in the qualitative strand to explain the numerical data from the quantitative strand.

SCT constructs are revealed through a father’s FPPs, which encompass cognitive elements such as role modeling and knowledge; environmental elements such as norms and observations; and the behavioral elements of behavioral skills and intentions. These FPPs encompassing SCT have the potential to improve both the father’s and children’s health and healthy food intake as seen throughout the research in this literature review.

The environmental construct consisting of norms is seen through culturally appropriate considerations in promoting healthy dietary habits and strategies for healthy restaurant dining

as suggested by Lindsey et al. and McIntosh et al. Specific FPPs of fathers that have positive reinforcement on their children's eating should be highlighted as a necessary element according to Khandpur et al., Morgan et al., and Branscum et al. Healthy eating strategies are an important focus, discouraging pressure to eat or food rewards revealed as common strategies fathers employ, according to Khandpur et al. and Pulley et al. Management of SSB is an important dietary factor of nutrition education as shown in the studies by Hebestreit et al. and Harris et al. Quantitative and Mixed Methods designs are lacking in this area of research and these methods go beyond a commonly used cross-sectional design that makes up the majority of these studies.

These studies highlight the lack of research in the area of a father's impact on their child's dietary intake. There is great potential to explore this vast emerging concept of a father's influence on their children's health, as roles appear to be transitioning with more interaction and household responsibilities of fathers, including meal planning and preparation. Davison et al. conducted a systematic review of parenting and childhood obesity related observational studies with a focus on fathers as a separate entity resulted in only 1% of the studies including only fathers compared to 36% including only mothers. Fathers were included in about 50% of the studies with 10% reporting separate results for fathers. Mean sample sizes for fathers were 139 versus a mean sample size of mothers at 672. Fathers equated to 17% of parent participants in the eligible studies of this literature review. There is a need to include fathers as a priority population in order to promote health and prevent disease in nutrition education and health interventions. This should employ a theoretical foundation such as SCT and dynamic research methods such as MM designs.

Our youth establish health habits and dietary intake with influences by role models and the environment. As fathers interact and eat with their children, their health and eating

practices serve as role modeling. Fathers play a role in establishing norms for their children, whether these norms are healthy, unhealthy, or somewhere in between. It is time to further explore, recognize and increase the representation of the effect of this unique priority population in research. A variety of research designs with a theoretical foundation, and an increased age span of children should be included, considering the majority of studies are cross-sectional, lack a theoretical foundation and focus on children younger than 6 years of age. Further research should also involve all populations of fathers from varying socioeconomic levels, ethnicities, and geographic areas. This is necessary to promote children's health and halt the trend of childhood obesity affecting 1 in 3 or 23 million youth, (Odgen, 2010) plus the associated cardiovascular disease, type 2 diabetes, asthma, and psychosocial problems afflicting children (CDC, 2017).

| Table 1. Literature Review Summary | | | | | | | | | |
|---|--|-------------------------|------------------------|--|------------------------|--|-------------------------------|---|---|
| Authors | Title | Publication Date | Location / Year | Aim & Research Questions | Study Design | Subjects & Study Setting | Theoretical Foundation | SCT Variables | Outcomes |
| Branscum, Paul et.al | Differences in How Mothers and Fathers Monitor Sugar-Sweetened Beverages for Their Young Children (7-12 Years) | February 1, 2018 | Norman, OK | Evaluate differences between how mothers and fathers monitor their children's sugar-sweetened beverages (SSBs; 7-12 years) using constructs from the integrated behavioral model (IBM) | Cross-sectional design | Parents of elementary school children (7-12 years old) | Integrated behavioral model | intentions, home environment, social environment, skills, attitudes, injunctive norms, descriptive norms, and personal agency | This study provides preliminary evidence that mothers and fathers monitor their children's SSB intake differently, and factors that determine monitoring SSB intake of children differ between mothers and fathers. |

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|---|--|------------------|--|--|--|--|---|--|--|
| Burrows, Morgan, Lubans, Callister, Oakely, Bray, Collins | Dietary Outcomes of the Healthy Dads Healthy Kids Randomised Controlled Trial | April 3, 2012 | Fathers were recruited from the Hunter region, New South Wales, Australia, in August/September 2008 | To determine whether dietary intakes of fathers and children can be improved, following an intervention targeting fathers | A two-arm randomised controlled trial | Overweight and obese fathers (n=50, 21-65 years, body mass index [mean standard deviation] 33.34.1) and their children (5-12 years) | Family Systems Theory, Social Cognitive Theory | Self- efficacy, Collective- efficacy, Observational- efficacy, Normative , social, observational, behavior skills, intentions, reinforcement | Fathers significantly reduced portion size (P<0.03) but not energy intakes, whereas children reduced energy intakes (kJ) (P<0.02). There is an opportunity to target fathers to improve child intakes. |
| Fielding- Singh, Priya | Dining with dad: Fathers' influences on family food practices | June 16, 2017 | San Francisco 2015-2016 | Examines an overlooked contributor to family diet: fathers. | Purposive sampling qualitative interviews | 42 mothers, 53 adolescents, and 14 fathers from 44 families | N/A | Observational, knowledge , normative beliefs | Fathers' personal dietary preferences and their investment in adolescents' diets are tied to the food |

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| | | | | | | | | | that is purchased, cooked, and consumed. Fathers also teach adolescents about food, diet, and health through their own food practices. |
| Hall, Laura et.al | Children's Intake of Fruit and Selected Energy-Dense Nutrient-Poor Foods Is Associated with Fathers' Intake | July 1, 2017 | New South Wales, Australia / 2008 | determine whether, in overweight fathers participating in the Healthy Dads, Healthy Kids trial (20), an association exists between father– | cross-sectional analysis of baseline data from the Healthy Dads, Healthy Kids randomized controlled trial | 53 overweight fathers and their children | N/A | Self-efficacy, Collective-efficacy, Observational-efficacy, Normative, social, observational, behavior skills, intentions, | Both positive and negative aspects of a child's eating habits appear to be related to his or her father's eating habits. |

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| | | | | child dietary intakes. | | | | reinforce ment | |
| Harris, Toni S | Paternal modeling, household availability, and paternal intake as predictors of fruit, vegetable, and sweetened beverage consumption among African American children | November 11 2014 | Southeastern US | Investigate how paternal dietary practices of African American fathers influence their children's consumption of fruits, vegetables, and sugar sweetened beverages | Survey sample of father | 102 African American fathers ages 23-68 recruited from elementary schools, daycares, fitness centers, and churches | N/A | Observational, knowledge, normative beliefs | Child fruit and vegetable consumption was only predicted by parental intake. Child sweetened beverage consumption, however, was predicted by paternal intake and household availability. |

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|-------------------|--|-------------------|--|---|-----------------|--|-----|---|--|
| Hebestreit, Antje | Dietary Patterns of European Children and Their Parents in Association with Family Food Environment: Results from the I.Family Study | February 10, 2017 | Sweden, Germany, Hungary, Italy, Cyprus, Spain, Belgium, and Estonia / 2013-2014 | Determine whether an association exists between children's and parental dietary patterns (DP), and whether the number of shared meals or soft drink availability during meals strengthens this association. | Cross-sectional | 1662 child-mother and 789 child-father dyads | N/A | Observational, knowledge, normative beliefs | Fathers' influence on the child's food choices was highest for the foods of the Sweet and Fat DP including all types of sugar and sweets, unhealthy fats and oils, unhealthy beverages, and unhealthy milk and dairy products. |
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|---|---|-------------------|-----|---|--|------------|-----|---|--|
| Khandpur, Charles, Blaine, Blake, Davison | Diversity in fathers' food parenting practices: A qualitative exploration within a heterogeneous sample | February 27, 2016 | USA | Fathers' FPPs Identified, FPPs described based on education & residential situation | Semi-structured qualitative interviews | 40 fathers | N/A | Observational, knowledge, normative beliefs | Common unresponsive FPPs were letting child dictate preferences (70%), incentivizing food consumption (60%) and pressuring the child to eat (35). Compared to residential fathers, more non-residential fathers monitored (60% vs. 40%) or encouraged (60% vs. 36%) child food intake and let child dictate preferences (87% vs. |
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| | | | | | | | | | 60%). Fathers used an extensive variety of FPPs, similar to those identified in mothers. |
| Lindsay, Ana Cristina, et. al | A qualitative study conducted in the USA exploring Latino fathers' beliefs, attitudes and practices related to their young children's beliefs, attitudes and | August 1, 2017 | Rhode Island / 2016 | study was to expand on the current existing research and examine Latino fathers' beliefs, attitudes and practices related to their young children's eating | Community-based mixed methods, focus group discussions | Latino WIC participants with children between 2 and 8 | N/A | Observational, knowledge, normative beliefs | Fathers expressed positive beliefs and attitudes about the importance of healthy eating for their young children, themselves, and their families. Nevertheless, the majority reported familial practices |

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| | practices related to their young children's eating, physical activity, and sedentary behaviours | | | | | | | | including eating out, getting take-out, etc. that have been linked to increased obesity risk among Latino children. Fathers were more involved and engaged in children's PA than eating and feeding. |
| Lloyd, Lubans, Plotnikoff, Morgan | Impact of the 'Healthy Dads, Healthy Kids' lifestyle programme on the activity- and diet- | May 21, 2014 | New South Wales, Australia | Evaluate the impact of the 'Healthy Dads, Healthy Kids' programme on fathers' and | RCT | Fathers and children | Family Systems Theory and Social Cognitive Theory | Self-efficacy, Collective-efficacy, Observational-efficacy, Normative, social, observational, | The Healthy Dads, Healthy Kids programme had a positive impact on some parenting practices for |

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|----------------------|--|---------------|--|---|-----------------|--------------|---|---|---|
| | related parenting practices of fathers and mothers | | | mothers' activity- and diet-related parenting practices | | | | behavior skills, intentions, reinforcement | fathers but not mothers. |
| McIntosh, Alex et.al | Determinants of Children's Use of and Time Spent in Fast-food and Full-service Restaurants | March 1, 2011 | | purpose of this study was to identify determinants of children's use of, and time spent in fast-food (FF) and full-service (FS) restaurants | Cross-sectional | 312 families | Household production model / role strain theory | Observational, knowledge, normative beliefs | When both parents have a standard schedule, father has a flexible schedule or he feels that he has control at work, children use FS restaurants more. |

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|--|--|-------------------|--------------------------|--|---------------------------------------|--|--|--|--|
| Morgan, Collins, Plotnikoff, Callister, Burrows, Fletcher, Okely, Young, Miller, Lloyd, Cook, Cruikshank, Saunders, Lubans | The 'Healthy Dads, Healthy Kids' community randomized controlled trial: A community-based healthy lifestyle program for fathers and their children | December 29, 2013 | Hunter Region, Australia | To evaluate the effectiveness of the 'Healthy Dads, Healthy Kids (HDHK)' program when delivered by trained facilitators in community settings. | A two-arm randomized controlled trial | 93 overweight/obese fathers (mean [SD] age = 40.3 [5.3] years; BMI = 32.5 [3.8] kg/m ²) and their primary school-aged children (n = 132) | Family Systems Theory, Social Cognitive Theory | Self-efficacy, Collective-efficacy, Observational-efficacy, Normative, social, observational, behavior skills, intentions, reinforcement | Significant between-group differences for fathers' weight (P < .001, d = 0.24), with HDHK fathers losing more weight (-3.3 kg; 95%CI, -4.3, -2.4) than control fathers (0.1 kg; 95%CI, -0.9, 1.0). Significant treatment effects (P < .05) were also found for fathers' waist (d = 0.41), BMI (d = 0.26), resting heart rate (d = 0.59), energy intake |
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|---------------------------------|---|--------------|------------------|---|-------------------------------------|--|-----|---|--|
| | | | | | | | | | (d = 0.49) and PA(d = 0.46) and for children's physical activity (d = 0.50) and adiposity (d = 0.07). |
| Owen, Metcalfe, Dryden, Shipton | 'If they don't eat it, it's not a proper meal': Images of risk and choice in fathers' accounts of family food practices | July 5, 2010 | Rural Lancashire | Investigate the perspectives of fathers and primary-school-aged children on food practices, and through this to contribute to understandings of contempor | In-depth semi-structured interviews | Father's age early 30s to early 60s with in-depth semi-structured interviews | N/A | Observational, knowledge, normative beliefs | Fathers viewed children as entitled to personal food preferences, drawing on notions of individual choice, 'modern' childhood, and the democratized family; accounts of shopping and eating routines |

| | | | | | | | | | |
|--|---|------------------|-----|---|---|--|-----|--|---|
| | | | | ary fatherhood | | | | | emphasized choice and negotiation as fundamental to 'healthy' emotional development. |
| Penilla, Tschann , Deardorff, Flores, Pasch, Butte, Gregorich, Greenspan, Martinez, Ozer | Fathers' feeding practices and children's weight status in Mexican American families | June 15, 2017 | USA | Examined the association s between fathers' feeding practices and child weight status, conditional on mothers' feeding practices, | Examined the cross- sectional associatio ns of fathers' feeding practices and children's weight status, after accountin g for the associatio ns of mothers' eating practices | Cross- sectional study, present study included the 174 mother- father pairs who provided parental feeding practices responses | N/A | Observatio nal, knowledge , normative beliefs | This study found that fathers' feeding practices contributed uniquely to children's weight status. Findings suggest that when both fathers and mothers are involved in child feeding, fathers' feeding practices, in addition to |

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|---------------|---|--------------|----------------|--|---|---|-----|---|--|
| | | | | | and children's weight status. | | | | mothers', matter in terms of children' weight status. It is important to include fathers, and not just others, in future family-based research and interventions aimed at preventing obesity among school-aged children. |
| Pulley, Carol | Parental child feeding practices: how do perceptions of | May 10, 2014 | North Carolina | Examine maternal and paternal use of child feeding practices | Questionnaire and dietary intake recall | 77 American families - 1 mother, 1 father, 2 s children ages 6-12 | N/A | Observational, knowledge, normative beliefs | Mothers reported using higher levels of monitoring and responsibility |

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|----------------------|---|--------------|-----------------|---|---------------------------------|--|-----|---|---|
| | mother, father, sibling, and self vary? | | | from the perspective of both parents and two children from the same family. | | | | | than fathers. In addition, fathers and children reported higher levels of paternal pressure related to feeding compared with mothers. |
| Snethen, Julia et.al | Dietary and Physical Activity Patterns: Examining Fathers' Perspectives | July 1, 2008 | Midwestern city | The purpose of this study was to explore fathers' perspectives of their own and their children's dietary intake and activity patterns, family | Mixed methods descriptive study | 51 fathers of 8-12 year old children who responded to flyers | N/A | Observational, knowledge, normative beliefs | An association was found between fathers' and children's weight status. Half the children snacked without parental guidance |

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|--|--|--|--|---|--|--|--|--|--|
| | | | | routines, and barriers to effective weight manageme nt. | | | | | |
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Chapter 3: Methodology

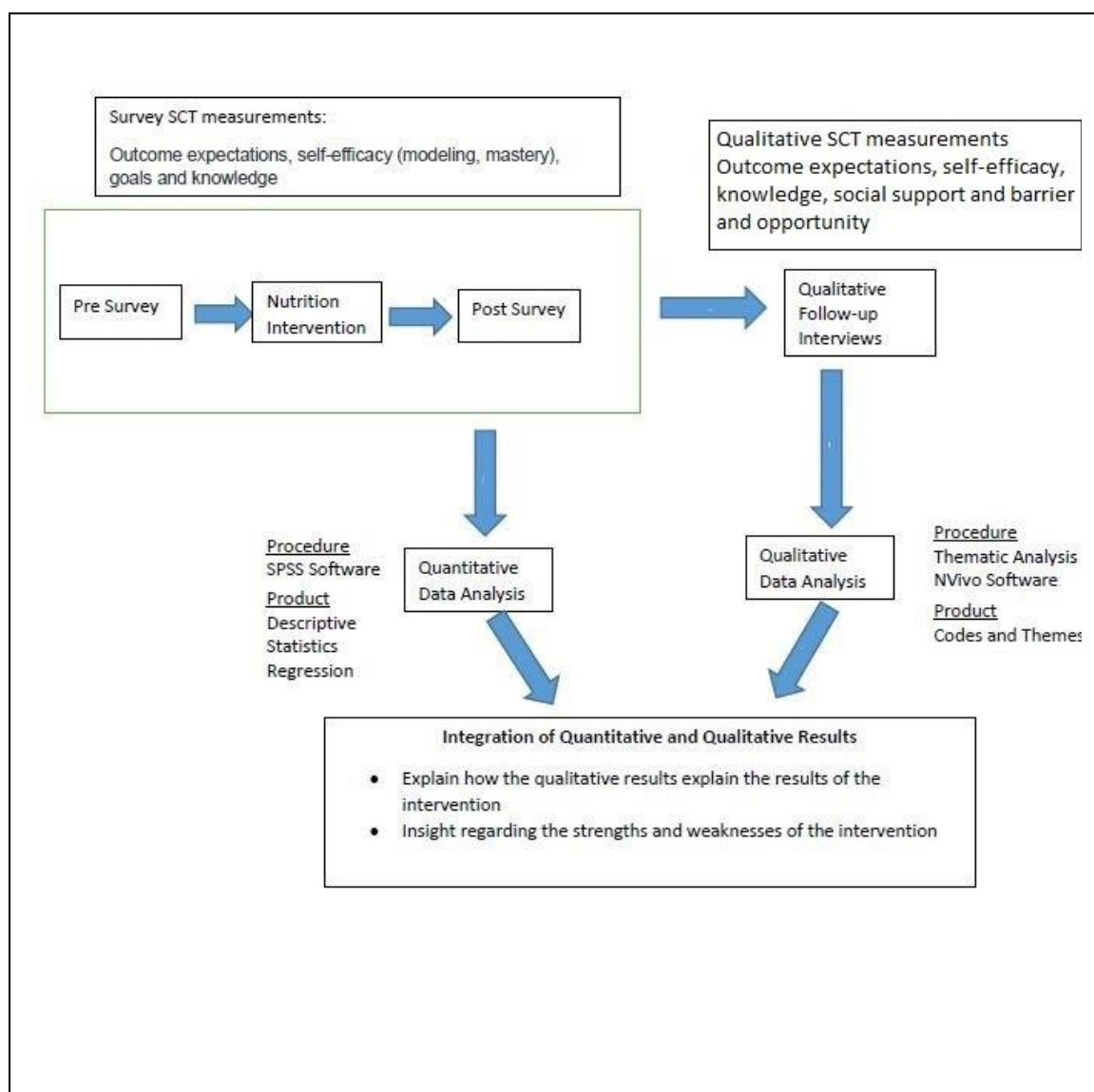
Theoretical Foundation

The constructs of Bandura's SCT was the foundation for this research study. SCT is established as the basis of research on children's food preference development by behavioral psychology health professionals. Modeling is recognized as a strong leverage on behavior outcomes. This is associated with children's food preference as an outcome of both modeling and food exposure repetition (Edelstein, 2015). The SCT constructs applied to the nutrition and PA education sessions of this intervention were the framework to guide the goals of healthy behavior change and as a lens to view the foundation and results of this research study.

The Cognitive aspects include self-efficacy: modeling, mastery and verbal persuasion. Theoretically, one-way healthy behaviors may become integrated through the fathers' nutrition and health choices serving as a positive role model for their children. The participants' children have the benefit of healthier eating habits through observation and social modeling carried through by the fathers from the intervention. Collective efficacy provides the potential opportunity for the group of fathers to create goals and work together. Outcome expectations are the positive and negative outcome possibilities, and the likelihood and value of the potential outcomes. Knowledge informs participants of the risks and benefits, which is necessary for behavior change. The application of environmental aspects includes providing and exploring opportunities for observational learning, normative beliefs, social supports, barriers, behavioral skills, intentions, and reinforcement. The behavioral construct variables involve adapting behavioral skills and intentions through short-term and long-term goal setting. Achieving goals addresses reinforcement of the nutrition and healthy lifestyle behaviors.

This research study employed a modified explanatory sequential mixed methods (MM) study design (Figure 1). The modification is the addition of an intervention as the educational component between the pre and post surveys. Quantitative data was collected and analyzed in the first phase of the study. Qualitative data was collected and analyzed in the second phase in order to help explain the quantitative results. This was accomplished through detailed qualitative data from extreme case participant interviews.

Figure 1. Explanatory Sequential Mixed Methods Design with Intervention Variant



The population of this study was fathers with school-aged children between the ages of 6 and 18. The setting for this research was Omaha, Nebraska. Permissions for this study included approval by the authorities at the Omaha technology company, the University of Nebraska Medical Center Institutional Review Board (IRB), and consent from the participants. Data was collected via hardcopy for pre and post surveys and through field notes for follow up interviews.

The intervention population included an in-person group (n=10) and an online group (n=12). The intervention was first delivered to the ten in-person participants with the sessions recorded by a videographer employed by the tech company where the nutrition and PA education sessions were held. These recorded sessions were then posted online for twelve additional recruited participants to view.

The nutrition and PA education sessions encompassed the healthy lifestyle change topics covered in the evidence based 'Eating Smart, Being Active' curriculum by Baker et al. through Colorado State University (Baker, 2017). These include: "Welcome to Eating Smart, Being Active", "Get Moving!", "Plan, Shop, \$ave", "Fruits & Veggies: Half your Plate", "Make Half your Grains Whole", "Go Lean with Protein", "Build Strong Bones", "Make a Change", and "Celebrate! Eat Smart and Be Active". This current nutrition and PA education intervention instructed on appropriate food types and portions, nutrition information on macronutrients (carbohydrates, protein, and fat) and micronutrients (vitamins and minerals), strategies to overcome barriers to healthy eating, shopping strategies, food safety, and the recommendation to use the ESBA app for PA exercises and recipes.

The 'Eating Smart, Being Active' curriculum was designed for limited resource, low literacy adult learners, based on the 2015-2020 DGA, MyPlate, and the 2008 Physical Activity Guidelines for Americans. Activities include verbal and hands-on learning. Lessons encompassed

physical activity, nutrition, healthy lifestyle choices, food preparation, food safety, and food resource management (meal planning, calculating food unit price). This is an evidence-based curriculum, reviewed by experts located across several States involved in the areas of adult health education, nutrition, the Expanded Food and Nutrition Education Program (EFNEP) and the Supplemental Nutrition Assistance Program Education (SNAP-Ed).

SCT concepts are the foundation for the ESBA curriculum as confirmed by the experts who initially reviewed the program (Baker, 2017). Research conducted on this program resulted in improved behavior change outcomes compared to the less successful behavior change outcomes of prior EFNEP curricula in five states. Additionally, research established the pre- and post-test scores from participants revealed significant, positive behavior improvement in food resource management, nutrition, food safety, and physical activity. Participants who received this curriculum increased fruit & vegetable intakes (Baker, 2017).

The ESBA curriculum was modified for this current nutrition and PA education intervention based on available resources including time, facility limitations, budget constraints, and the opportunity to add an online delivery component (Table 2). The time modification involved the tech organization requesting to hold the sessions during the 1-hour lunch period. The nutrition and PA education intervention was modified into (4) 1-hour sessions instead of the original (7) 1 to 1.5-hour sessions. Modifications due to facility constraints created an emphasis on the ESBA mobile app to demonstrate PA exercises and recipe instruction instead of demonstrating these activities in person as outlined in the original curriculum. The facility did not have an available kitchen to use for cooking lessons, and there was inadequate space in the conference room to demonstrate and involve participants in PA exercises. Additionally, budget constraints did not allow for ingredients, appliances, and utensils needed to carry out cooking

instruction. The shorter 1-hour sessions were adequate to cover the material in the sessions due to the modification of showing PA and recipe examples on the ESBA mobile app instead of an in-person demonstration of the PA and cooking activities. Evidence-based information and take-home handouts were added to the intervention sessions. These handouts included information from the USDA, the Midwest Dairy Council (MDC), and the National Center for Educational Statistics (NCES) Health & Nutrition Education. Other modifications included the use of food models as a tool to help participants visualize food portions, a website created by the PI to deliver the nutrition and PA education intervention sessions online, interactive discussion activities, and supplemental MyPlate teaching tools.

Table 2. ESBA Curriculum Adaptations

| Original ESBA Curriculum | Adaptations to Original ESBA Curriculum |
|---|--|
| 7 Sessions – 1 to 1.5 Hours Each | 4 Sessions – 1 Hour Each |
| In Person Delivery | In Person and Online Delivery |
| Cooking Lessons | Emphasis on ESBA Mobile App Recipes |
| Physical Activity Demonstrations | Emphasis on ESBA Mobile App PA Exercise Video Clips |
| Low Literacy Level, Basic Concepts | In-depth Discussion on ESBA Topics |
| Limited Child Feeding Guidelines – Only ‘Tips for Infants and Children’ in the Build Strong Bones Session | Evidence-based Discussion and Handouts on Nutrition/Feeding Strategies for Children |
| One Handout per Session | Additional Related Evidence-based Handouts: <ul style="list-style-type: none"> • ‘Dietary Guidelines for Americans (DGA)’ (USDA) • ‘Physical Activity Guidelines’ (Health and Human Services – HHS) • ‘Be A Healthy Role Model for Children’ (USDA) • ‘Healthy Tips for Picky Eaters’ (USDA) • ‘Smart Shopping for Veggies and Fruits’ (USDA) • ‘Got Your Dairy Today?’ (USDA) |

| | |
|--|---|
| | <ul style="list-style-type: none"> • 'Choosing Whole-Grain Foods' (USDA) • 'Vary Your Protein Routine' (USDA) • 'A Healthy S.T.A.R.T. For A Healthier You' (NCES) • 'Strong Bones for Your Kids' (MDC) • 'Right-Size Your Portions' (NCES) • 'Beverages 101 – Make Better Choices' (NCES) • 'The DASH Eating Plan' (MDC) • 'Phrases That Help and Hinder' (USDA) |
| MyPlate Picture Diagram | MyPlate Teaching Tools <ul style="list-style-type: none"> • MyPlate plastic demonstration plate • MyPlate paper plates for participants to take home • NCES MyPlate take home handout |
| No Food Models | Use of Food Models as tangible teaching tools, discussion |
| No Interactive Discussion Activities in Sessions | Added Interactive Discussion Activities in Sessions <ul style="list-style-type: none"> • Session 1: <ul style="list-style-type: none"> ○ Group Participant Introductions ○ Make a Meal Healthier activity • Session 2: <ul style="list-style-type: none"> ○ Food Models – Pass around & discuss • Session 3: <ul style="list-style-type: none"> ○ Food Models – Pass around & discuss • Session 4: <ul style="list-style-type: none"> ○ Menu Planning Activity ○ Food Shopping Plan Activity ○ Food Models – Pass around & discuss |

The PI is a Registered Dietitian Nutritionist (RDN) who delivered the nutrition and PA education sessions. A recent systematic review and meta-analysis shows delivery of nutrition education programs by RDNs are more effective than nutrition education programs led by non-RDNs (Sun, 2017).

Quantitative Data Collection

The quantitative survey tool was developed by the Expanded Food and Nutrition Education Program (EFNEP) (Appendix 2). ESBA is part of the nutrition education curricula used by EFNEP. EFNEP developed this survey to explore SNAP benefits for improving diet quality versus merely reducing hunger. The survey encompasses food types and frequency, physical activity, food safety, meal planning and food shopping behaviors. Content and construct validity were established through field testing and feedback from an expert panel (Baker, nd).

The validated survey (Appendix 2) is appropriate, aligning with this research study to associate the fathers' nutrition outcome expectations and self-efficacy pre and post nutrition and PA education intervention. The data captured from these surveys represent the foundation of dietary behavior, in an effort to explore health related lifestyle and dietary patterns.

Qualitative Data Collection

The qualitative follow-up interviews explored the effectiveness of this nutrition and PA education intervention. This qualitative phase explains the statistics from the first quantitative phase of the study through the exploration of participants' viewpoints of the intervention. The interview protocol for this qualitative interview was drafted based upon the research questions.

Qualitative Survey Questions:

1. How was this intervention helpful in learning about healthy eating?
2. How was this intervention helpful in learning about feeding children healthfully?
3. How was this intervention unhelpful in learning about healthy eating?
4. How was this intervention unhelpful in learning about feeding children healthfully?
5. Why do you think it is important to learn about healthy eating?
6. Why do you think it is important to learn about feeding children healthfully?
7. Tell me what a highlight of the intervention was for you.
8. Tell me what you did not like about the intervention.

Participants for the qualitative interviews were selected through extreme case sampling, which is a method of selecting the most deviant data points from the mean. This method was employed in an effort to glean data on the most successful and least successful behavior change cases from the intervention. There were 8 participants who scored in the extremes of the quantitative survey. Four participants comprised the greatest amount of change (max) and four participants comprised the least amount of change (min). These extreme cases were identified by taking the absolute value of the pre- and post-survey scores and adding them together for the twenty survey questions. For example, if a participant scored a 1 (Rarely) on the pre-survey question asking, “How many times a day do you eat vegetables?” then scored a 4 (2 times a day) on the post-survey, the absolute value of the change (1-4) equals 3. Scores from all the survey questions were added up for each participant to determine the min and max. These eight participants fit within the recommendation of 4-10 participants for qualitative interviews (Creswell, 2011).

The qualitative interviews with the eight participants were conducted via telephone over the course of a week by the PI. Detailed notes were taken during the telephone interviews, resulting in 14 pages of notes. Individual interview responses were manually entered and transformed into a series of coded response categories to identify themes in order to quantify the responses utilizing NVivo software program (Driscoll, 2007). Themes are prevalent ideas throughout the respondent’s answers that are not connected to any single key word. Identifying themes is a detailed and systematic process that begins with reviewing the interview data until it becomes familiar. Meaningful themes are searched for throughout the dataset and refined by combining related ideas and describing these findings. Thematic analysis was based on the descriptive and topic coding steps outlined by Richards and Morse’s *Qualitative Methods* (Richards, Morse, 2013). The PI organized the text within NVIVO, selecting passages based on

prevalence of ideas or experiences and placing them into refined code categories in order to identify themes.

The application of SCT constructs to question numbers 1, 3, 5, 7 and 8 which ask how the fathers perceived the intervention to be either helpful or unhelpful in learning about healthy eating and its importance, highlights, and what they did not like about the intervention assesses the cognitive constructs of self-efficacy, outcome expectations, and knowledge; the environmental construct of observational learning; and the behavioral construct of behavioral skills. Self-efficacy is assessed through the individual's answer on what they found either helpful or unhelpful as it relates to their confidence level of the intervention. Outcome expectations are assessed through the individual's self-evaluation of either a positive or negative outcome on what they found either helpful or unhelpful in learning about healthy eating. Knowledge, observational learning, and behavioral skill constructs are assessed through what they found helpful as this means they processed information that they can use through the skills learned in the intervention.

The application of SCT constructs to question numbers 2, 4, and 6 asking how the fathers perceive the intervention to be either helpful or unhelpful in learning about how to feed their children healthfully and its importance assesses the same cognitive constructs and reasons as questions 1, 3, 5, 7, and 8 above, with the addition of social support, and barrier and opportunity variables within the environmental construct. The social support variable within the environmental construct is assessed through asking what they found helpful. This could serve as encouragement in using the learned information to feed their children healthfully. Barrier and opportunity variables within the environmental construct are assessed as they directly relate to

the information, they found helpful or unhelpful and applying this information to feed their children healthfully. Table 3 contains the qualitative questions and the SCT variables observed.

Table 3. Qualitative Interview Questions and SCT Variables

| Qualitative Interview Questions | Potential Social Cognitive Theory Variable Assessed |
|--|---|
| 1. How was this intervention helpful in learning about healthy eating? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 2. How was this intervention helpful in learning about feeding children healthfully? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 3. How was this intervention unhelpful in learning about healthy eating? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 4. How was this intervention unhelpful in learning about feeding children healthfully? | <ul style="list-style-type: none"> • Outcome Expectations • Observational Learning |
| 5. Why do you think it is important to learn about healthy eating? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 6. Why do you think it is important to learn about feeding children healthfully? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Observational Learning |
| 7. Tell me what a highlight of the intervention was for you. | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 8. Tell me what you did not like about the intervention. | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |

Delivery Preference Survey

A second survey (Appendix B) was created as an additional study to the dissertation. The focus of this survey was to explore factors to consider in order to increase participation in the delivery of the nutrition education intervention. The survey was based on the difficulty of recruiting participants for this nutrition and PA education intervention with recruitment efforts that lasted approximately one year. There was a total of 10 fathers recruited for the in-person sessions, and then another 12 fathers were recruited for an online option that opened up based on the nutrition and PA education sessions being recorded for future use of the wellness library at a local tech company.

This survey was created in Qualtrics and distributed by Qualtrics via coordination and services provided through the University of Nebraska Lincolns Bureau of Sociological Research. The survey had a response from 522 fathers Nationwide. The respondents were based on a list of survey participants garnered by Qualtrics. The questions are designed upon SCT constructs with a focus on knowledge, likelihood, and associated benefits of attending the nutrition program sessions. The current Covid-19 pandemic was integrated into the questions as a consideration for survey participants' preferences for attending this type of nutrition education program. Demographic basics were also included in the survey. The data collected from this survey was intended to explore efficient ways to recruit this population based on their preferences.

Recruitment

Participants were sought out through several avenues including a manufacturing facility, a healthcare facility, a rural Nebraska County Health Department, a rural Fire Department, a school system, an online community bulletin board, social media accounts, a

newspaper ad, local employers, and word of mouth. Recruitment began in November 2018 and ended in January 2020.

The recruitment resulted in a total of 22 participants. There were 13 participants who were employed by a local agricultural tech company. There were 2 participants recruited by study advertisement through a rural community. An additional participant was recruited through an online community bulletin board. The remaining 6 participants were recruited through word of mouth. Participants received incentives including an ESBA water bottle, a Visa gift card, and an ESBA certificate of completion.

Statistical Methods

The statistical sample size calculation based on the Z-score of 1.96 from a standard statistical Z-score table, plus a 95% confidence interval (CI) and a standard deviation (SD) of 0.5 as selected by the PI for this research study resulted in a necessary sample size of 385 participants for accurate and generalizable statistical results. A 2-sided paired t-test was calculated in SPSS for all of the participants (n=22). A 2-sided paired t-test was also calculated on each question for the in-person group and the online group separately.

The statistical analysis measured the father's change in food-related behaviors; the fathers' experiences of the intervention; and how the father's perspectives support the results of this nutrition education intervention on fathers, as stated in the quantitative, qualitative, and mixed methods research questions. Measurements included the fathers' change in knowledge and food-related behaviors. A paired t-test examined significant change between the pre and post questionnaire.

Dissemination

Dissemination of the results will be provided to the participants, the tech company wellness directors, the ESBA authors, the Elkhorn Logan Valley Public Health Department (ELVPHD) who use and introduced me to the ESBA curriculum, and the UNMC College of Public Health (COPH) where the PI is a PhD candidate.

Chapter 4: Results

Quantitative

There were twenty-two participants (n=22) that received the nutrition and PA education intervention. The in-person group consisted of ten participants (n=10). The online group consisted of twelve participants (n=12).

There was a total of 20 survey questions. For all of the participants, the pre- and post-survey comparisons showed healthy improvements for seventeen of the questions. One of the questions regarding participation in federally funded food supplement programs such as Women, Infants, Children (WIC) and Supplement Nutrition Assistance Program (SNAP), had zero change pre- and post-survey. Two of the questions had a negative health impact, neither were significant changes. One of these was an increase in soda intake with a slight change in the mean from 1.59 to 1.68. The other was a decrease in washing surfaces used for cutting raw meat and seafood with a slight change in the mean from 5.82 to 5.89.

There were three out of twenty questions that resulted in statistically significant change for the in-person group. There were four out of twenty questions that resulted in statistically significant change for the online group. There were six out of twenty questions that resulted in statistically significant change for all participants combined. Of these six questions with statistically significant change in the combined group, four of these same questions were the statistically significant questions from the online group. Table 4 contains the results of the paired t-test for each group.

Table 4. 2-sided Paired T Test for In Person, Online and both combined

| | In Person | | | | Online | | | | Combined | | | |
|--|-----------|-----------|---------|-----------|----------|-----------|---------|-----------|----------|-----------|---------|-----------|
| | PRE Mean | POST Mean | P Value | Std. Dev. | PRE Mean | POST Mean | P Value | Std. Dev. | PRE Mean | POST Mean | P Value | Std. Dev. |
| <u>1. How many times a day do you eat fruit?</u> | 3.00 | 3.20 | 0.555 | 1.033 | 3.00 | 3.75 | 0.005 | 0.754 | 3.00 | 3.50 | 0.018 | 0.913 |
| - | | | | | | | | | | | | |
| <u>2. How many times a day do you eat vegetables?</u> | 3.40 | 3.70 | 0.081 | 0.483 | 3.50 | 3.92 | 0.096 | 0.793 | 3.45 | 3.82 | 0.017 | 0.658 |
| - | | | | | | | | | | | | |
| <u>3. Over the last week, how many days did you eat red and orange vegetables?</u> | 3.10 | 3.60 | 0.343 | 1.581 | 3.25 | 3.75 | 0.389 | 1.931 | 3.18 | 3.68 | 0.192 | 1.739 |
| - | | | | | | | | | | | | |
| <u>4. Over the last week, how many days did you eat dark green vegetables?</u> | 3.80 | 4.00 | 0.591 | 1.135 | 4.08 | 5.08 | 0.060 | 1.651 | 3.95 | 4.59 | 0.054 | 1.465 |
| - | | | | | | | | | | | | |
| <u>5. How often do you drink regular sodas (not diet)?</u> | 1.30 | 1.40 | 0.343 | 0.316 | 1.83 | 1.92 | 0.674 | 0.669 | 1.59 | 1.68 | 0.427 | 0.526 |
| - | | | | | | | | | | | | |
| <u>6. How often do you drink fruit punch, fruit drinks, sweet tea or sports drinks?</u> | 1.50 | 1.10 | 0.037 | 0.516 | 1.83 | 1.75 | 0.674 | 0.669 | 1.68 | 1.45 | 0.096 | 0.612 |
| - | | | | | | | | | | | | |
| <u>7. In the past week, how many days did you exercise for at least 30 minutes?</u> | 4.50 | 4.20 | 0.576 | 1.636 | 3.50 | 4.17 | 0.054 | 1.073 | 3.95 | 4.18 | 0.459 | 1.412 |

| | | | | | | | | | | | | |
|--|------|------|-------|-------|------|------|-------|-------|------|------|-------|-------|
| <u>8. In the past week, how many days did you do workouts to build and strengthen your muscles?</u> | 1.90 | 2.60 | 0.132 | 1.337 | 2.58 | 3.67 | 0.008 | 1.165 | 2.27 | 3.18 | 0.002 | 1.231 |
| <u>9. How often do you make small changes on purpose to be more active?</u> | 3.10 | 3.40 | 0.193 | 0.675 | 2.67 | 3.42 | 0.002 | 0.622 | 2.86 | 3.41 | 0.001 | 0.671 |
| <u>10. How often do you wash your hands with soap and running water before preparing food?</u> | 5.20 | 5.30 | 0.591 | 0.568 | 5.33 | 5.92 | 0.012 | 0.669 | 5.27 | 5.64 | 0.017 | 0.628 |
| <u>11. After cutting raw meat or seafood, how often do you wash all items and surfaces that came in contact with these foods?</u> | 5.80 | 5.40 | 0.423 | 1.506 | 5.83 | 5.75 | 0.586 | 0.515 | 5.82 | 5.59 | 0.329 | 1.066 |
| <u>12. How often do you thaw frozen food on the counter or in the sink at room temperature?</u> | 1.70 | 1.70 | 1.000 | 0.667 | 3.08 | 2.58 | 0.139 | 1.087 | 2.45 | 2.18 | 0.186 | 0.935 |

| | In Person | | | | Online | | | | Combined | | | |
|--|-------------|--------------|------------|--------------|-------------|--------------|------------|--------------|-------------|--------------|------------|--------------|
| | PRE Mean | POST Mean | P Value | Std. Dev. | PRE Mean | POST Mean | P Value | Std. Dev. | PRE Mean | POST Mean | P Value | Std. Dev. |
| <u>13. How often do you use a meat thermometer to see if meat is cooked to a safe temperature?</u> | 2.60 | 3.00 | 0.104 | 0.699 | 2.42 | 3.00 | 0.067 | 0.996 | 2.50 | 3.00 | 0.013 | 0.859 |
| <u>14. In the past month, how often did you eat less than you wanted so there was more food for your family?</u> | 2.40 | 1.80 | 0.024 | 0.699 | 1.92 | 2.08 | 0.658 | 1.267 | 2.14 | 1.95 | 0.446 | 1.097 |
| <u>15. In the past month, how often did you not have money or another way to get enough food for your family (such as SNAP, WIC, or a food pantry)?</u> | 1.10 | 1.10 | N/A | N/A | 1.00 | 1.00 | N/A | N/A | 1.05 | 1.05 | N/A | N/A |
| <u>16. How many days a week do you cook dinner (your main meal) at home?</u> | 5.90 | 6.00 | 0.678 | 0.738 | 5.75 | 6.08 | 0.339 | 1.155 | 5.82 | 6.05 | 0.285 | 0.973 |

| | | | | | | | | | | | | |
|--|------|------|-------|-------|------|------|-----------|-----------|------|------|-------|-----------|
| <u>17. How often do you compare food prices to save money?</u> | 3.60 | 4.20 | 0.024 | 0.699 | 3.75 | 3.92 | 0.55 1 | 0.93 7 | 3.68 | 4.05 | 0.057 | 0.8 48 |
| - | | | | | | | | | | | | |
| <u>18. How often do you plan your meals before you shop for groceries?</u> | 3.60 | 3.70 | 0.780 | 1.101 | 3.83 | 4.33 | 0.05 3 | 0.79 8 | 3.73 | 4.05 | 0.129 | 0.9 45 |
| | | | | | | | | | | | | |
| <u>19. How often do you look in the refrigerator or cupboard to see what you need before you go shopping?</u> | 4.20 | 4.10 | 0.758 | 0.994 | 4.58 | 4.75 | 0.43 8 | 0.71 8 | 4.41 | 4.45 | 0.803 | 0.8 44 |
| | | | | | | | | | | | | |
| <u>20. How often do you make a list before going shopping?</u> | 4.30 | 3.90 | 0.223 | 0.966 | 4.50 | 5.00 | 0.13 9 | 1.08 7 | 4.41 | 4.50 | 0.704 | 1.1 09 |

Combined group

The first statistically significant survey question was “How many times a day do you eat fruit?” The pre-survey mean was 3.0. The post-survey mean was 3.5 with $p=0.018$. This revealed an increased fruit intake post-intervention. The answer with a value of 3 was “One time a day”. The answer with a value of 4 was “Two times a day”. This indicated a positive change with an increase of fruit consumption moving from once a day towards twice a day.

The second statistically significant survey question was “How many times a day do you eat vegetables?” The pre-survey mean was 3.45. The post-survey mean was 3.82 with $p=0.017$.

This revealed an increased vegetable intake post-intervention. The answer with a value of 3 was “One time a day”. The answer with a value of 4 was “Two times a day”. This indicated a positive change with an increase in vegetable consumption moving from once a day to twice a day.

The third statistically significant survey question was “In the past week, how many days did you do workouts to build and strengthen your muscles?” The pre-survey mean was 2.27. The post-survey mean was 3.18 with $p=0.002$. This revealed an increase in workouts to build and strengthen muscles (physical activity) post-intervention. The answer with a value of 2 was “One day”. The answer with a value of 4 was “Three days”. This indicated a positive change with an increase in workouts to build and strengthen muscles moving from one day towards three days weekly.

The fourth statistically significant survey question was “How often do you make small changes on purpose to be more active?” The pre-survey mean was 2.86. The post-survey mean was 3.41 with $p=0.001$. This revealed an increase in making small changes to be more active post-intervention. The answer with a value of 2 was “Rarely”. The answer with a value of 4 was “Often”. This indicated a positive change with an increase in making small changes to be more active moving from the response of rarely to the response of often.

The fifth statistically significant survey question was “How often do you wash your hands with soap and running water before preparing food?” The pre-survey mean was 5.27. The post-survey mean was 5.64 with $p=0.017$. This revealed an increase in handwashing prior to food preparation post-intervention. The answer with a value of 5 was “Usually”. The answer with a value of 6 was “Always”. This indicated a positive change with an increase in handwashing prior to food preparation moving from the response of usually to the response of always.

The sixth statistically significant survey question was “How often do you use a meat thermometer to see if meat is cooked to a safe temperature?” The pre-survey mean was 2.5. The post-survey mean was 3.0 with $p=0.013$. This revealed an increased use of a meat thermometer to gauge proper cooking temperature of meat post-intervention. The answer with a value of 2 was “Rarely”. The answer with a value of 3 was “Sometimes”. This indicated a positive change with an increase in using a meat thermometer to gauge proper cooking temperature of meat from the response of rarely to the response of sometimes.

Online Group

There were four questions that resulted in statistically significant improvements in the online participant group ($n=12$). The first survey question was “How many times a day do you eat fruit?” The pre-survey mean was 3.0. The post-survey mean was 3.75 with $p=0.005$. This revealed an increased fruit intake post-intervention. The answer with a value of 3 was “One time a day”. The answer with a value of 4 was “Two times a day”. This indicated a positive change with an increase in daily fruit intake moving from one time daily to two times daily.

The second survey question was “In the past week, how many days did you work out to build and strengthen your muscles?” The pre-survey mean was 2.58. The post-survey mean was 3.67 with $p=0.008$. This revealed an increase in work out days to build and strengthen muscles post-intervention. The answer with a value of 2 was “One day”. The answer with a value of 4 was “Three days”. This indicated a positive change with an increase in days working out to build and strengthen muscles moving from one day weekly to three days weekly.

The third survey question was “How often do you make small changes on purpose to be more active?” The pre-survey mean was 2.67. The post-survey mean was 3.42 with $p=0.002$. This revealed an increase in purposeful small changes to be more active post-intervention. The

answer with a value of 2 was “Rarely”. The answer with a value of 4 was “Often”. This indicated a positive change with an increase in making small changes on purpose to be more active moving from the response of rarely to the response of often.

The fourth survey question was “How often do you wash your hands with soap and running water before preparing food?” The pre-survey mean was 5.33. The post-survey mean was 5.92 with $p=0.012$. This revealed an increase of hand washing post-intervention. The answer with a value of 5 was “Usually”. The answer with a value of 6 was “Always”. This indicated a positive change with an increase in hand washing with soap and water before preparing food moving from the response of usually to the response of always.

In Person Group

There were three questions that resulted in statistically significant improvements in the in-person participant group ($n=10$). The first survey question was “How often do you drink fruit punch, fruit drinks, sweet tea, or sports drinks?” The pre-survey mean was 1.5. The post-survey mean was 1.1 with $p=0.037$. This revealed an improvement through a decreased intake of fruit punch, fruit drinks, sweet tea, or sports drinks. The answer with a value of 2 was “1-3 times a week”. The answer with a value of 1 was “Never”. This indicated a positive change with a decrease in consumption of punch, fruit drinks, sweet tea, or sports drinks moving from 1-3 times a week to never during the week.

The second survey question was “In the past month, how often did you eat less than you wanted so there was more food for your family?” The pre-survey mean was 2.4. The post-survey mean was 1.8 with $p=0.024$. This revealed a decrease of participants forgoing food so there was more for their family, an association with food availability. The answer with a value 3 was “Sometimes”. The answer with a value of 1 was “Never”. This indicated a decrease in

participants forgoing food so there was more for their family moving from the response of sometimes to the response of never.

The third survey question was “How often do you compare food prices to save money?” The pre-survey mean was 3.6. The post-survey mean was 4.2 with $p=0.024$. This revealed an increase in food price comparison to save money. The answer with a value of 3 was “Sometimes”. The answer with a value of 5 was “Usually”. This indicated an increase in food price comparisons to save money moving from the response of sometimes to the response of usually.

SCT Constructs in Relation to Significant Results

SCT constructs were related to the significant results. The significant increase in fruit intake within the combined and the online groups and the significant increase in vegetable intake within the combined group was evident through self-efficacy, outcome expectations – positive outcome, observational learning, and knowledge and behavioral skills. Self-efficacy was achieved through the intervention by delivering strategies for small dietary changes, offering encouragement, addressing concerns, and providing easy to understand messages that repeatedly highlighted the health benefits of consuming the recommended daily servings of fruits and vegetables. Outcome expectations with a positive outcome were achieved through the intervention describing the health benefits of increased fruit and vegetable intake to meet the recommended daily servings, identifying perceived barriers, and empowering change. Knowledge and behavioral skills were achieved through handouts, discussion of the various features provided by the ESBA mobile app, and the addition of food models to provide a tangible example of recommended portion sizes. Observational learning was a part of increased

knowledge and behavioral skills with viewing, touching, sharing, and discussion of the food models as the recommended portion sizes.

The significant increase in workout time within the combined and online groups was evident through self-efficacy, and knowledge and behavioral skills. Self-efficacy was achieved through the intervention delivering strategies for small physical activity changes, offering encouragement, addressing concerns, and providing easy to understand messages that repeatedly highlighted the health benefits of increased physical activity. Knowledge and behavioral skills were achieved through handouts, and discussion of the exercise features within the ESBA mobile app.

The significant increase in how often participants implement small healthy lifestyle changes within the combined and online groups was evident through self-efficacy, and outcome expectations – positive outcome. Self-efficacy was achieved through the intervention delivering strategies for small healthy changes, offering encouragement, addressing concerns, and providing easy to understand messages that repeatedly highlighted the health benefits of small healthy lifestyle changes. Outcome expectations with a positive outcome were achieved through the intervention describing the health benefits that small healthy lifestyle changes can make a difference by adding up to an improved health status.

The significant increase in participant hand washing frequency and technique within the combined and online groups, and the use of food thermometers within the combined group related to food safety was evident through self-efficacy, and outcome expectations – positive outcome, and social normative behavior. Self-efficacy was achieved through the intervention delivering strategies for appropriate technique and frequency, offering encouragement, addressing concerns, and providing easy to understand messages that repeatedly highlighted

the health benefits of appropriate frequency and technique of hand washing and food thermometers. Outcome expectations with a positive outcome were achieved through the intervention describing the health benefits of food safety, namely decreasing the risk of foodborne illness. Social normative behavior was achieved through highlighting the message that food safety is socially expected and necessary.

The significant decrease in frequency of fruit punch, fruit drink, sweet tea, and sports drink intake within the in-person group was evident through self-efficacy, outcome expectations – positive outcome, observational learning, and knowledge and behavioral skills. Self-efficacy was achieved through the intervention by delivering strategies for small dietary changes, offering encouragement, addressing concerns, and providing easy to understand messages that repeatedly highlighted the health benefits of limiting added sugars to no more than 10% of daily calorie intake. Outcome expectations with a positive outcome were achieved through the intervention describing the health benefits of limiting sugar intake to meet the recommendation of no more than 10% of daily calorie intake, identifying perceived barriers, and empowering change. Knowledge and behavioral skills were achieved through handouts, and the addition of food models in the form of sugar tubes. The sugar tubes contained various amounts of sugar based on different beverages plus a comparison of reasonable daily amounts for a normal range of calorie intakes in order to provide a tangible example of recommended portion sizes. Observational learning was a part of increased knowledge and behavioral skills with viewing, touching, sharing, and discussion of the food models as the recommended portion sizes.

The significant decrease of participants forgoing food so there is more food for their family and frequency of food price comparison shopping within the in-person group was evident through self-efficacy, outcome expectations – positive outcome, and knowledge & skills. Self-

efficacy was achieved through the intervention by delivering strategies for food menu and shopping strategies, offering encouragement, addressing concerns, and providing easy to understand messages that repeatedly highlighted the benefits of menu planning and food shopping for convenience, health, and price saving considerations. Outcome expectations with a positive outcome were achieved through the intervention describing the benefits of menu planning and food shopping for convenience, health, and price saving. Knowledge and behavioral skills were achieved through handouts, unit pricing instruction, menu planning strategies, ESBA mobile app features, and nutrition/PA education session videos to view as a reference. Table 5 contains each significant question and SCT variables observed.

Table 5. Quantitative results based on SCT Variables

| Question resulting in significant change | Study Group | SCT Variables |
|---|--|--|
| How many times a day do you eat fruit? | <ul style="list-style-type: none"> • Combined • Online | <ul style="list-style-type: none"> • Behavior • Self-Efficacy |
| How many times a day do you eat vegetables? | <ul style="list-style-type: none"> • Combined | <ul style="list-style-type: none"> • Behavior • Self-Efficacy |
| In the past week, how many days did you do workouts to build and strengthen your muscles? | <ul style="list-style-type: none"> • Combined • Online | <ul style="list-style-type: none"> • Behavior • Self-Efficacy |
| How often do you make small changes on purpose to be more active? | <ul style="list-style-type: none"> • Combined • Online | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| How often do you wash your hands with soap and running water before preparing food? | <ul style="list-style-type: none"> • Combined • Online | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| How often do you use a meat thermometer to see if meat is cooked to a safe temperature? | <ul style="list-style-type: none"> • Combined | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| How often do you drink fruit punch, fruit drinks, sweet tea or sports drinks? | <ul style="list-style-type: none"> • In-person | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |

| | | |
|---|---|--|
| In the past month, how often did you eat less than you wanted so there was more food for your family? | <ul style="list-style-type: none"> • In-person | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| How often do you compare food prices to save money? | <ul style="list-style-type: none"> • In-person | <ul style="list-style-type: none"> • Knowledge • Behavior |

Qualitative

There were eight participants (n=8) selected to complete qualitative interviews. These participants were those with the most (n=4) and the least (n=4) change pre- and post-survey. In the group with the most change, two were from the in-person group and two were from the online group. In the group with the least change, two were from the in-person group and two were from the online group.

The qualitative interview answers were categorized into eight themes from the study participant's answers to the qualitative interview questions. These themes were: intervention outcome, health benefits, healthy eating, misinformation, nutrition education, online delivery, opinion, and role modeling. The PI utilized NVIVO software to organize and facilitate the coding of the themes. Themes were identified through looking at patterns in the participant's answers. Each theme has a specific number of supporting quotes labeled as references.

Overall, these eight participants expressed that they learned about healthy eating from the intervention. Intervention outcomes due to this nutrition and PA education intervention include: increased knowledge and understanding; improved dietary intake; positive behavioral intentions and goals; improved weight status; and improved health habits.

The qualitative research questions were answered and described by the participants through interviews in how their knowledge and behaviors of diet, physical activity, and food

safety changed, providing the human element to the research data. The descriptive data shows how this nutrition and PA intervention positively impacted their lifestyle. Fathers expressed a desire to learn, and a willingness to take action in order to better not only their health, but also the health of their families, so that they can all be together for a long time.

Major Theme: Intervention Outcome (References = 22)

1.1 “We now eat more greens after the nutrition sessions, and we were not eating colored vegetables – it stood out to eat more colored vegetables. We are now throwing in more veggies with all our meals.”

1.2 “After the nutrition sessions, I pay more attention to the food labels for fat, sugar, calories, and balancing our diet... I learned what a portion size looks like. It has helped me and my wife eat healthier and what I put on our plates.”

1.3 “Still kept the information I learned from the sessions in the back of my mind...It helps to stay focused on eating healthy foods.”

1.4 “I have lost 18 pounds since the nutrition sessions.”

1.5 “A highlight is now I am back to eating healthier. I am now paying attention to what I would be eating ahead of time not just eating whatever then going or rushing onto the next thing in my daily life.”

Major Theme: Health Benefits (References = 7)

2.1 “To live a longer life for my kids.”

2.2 “Not getting any younger, hope to remain healthy in my 50s, 60s, and 70s. Eating healthy plays a big role.”

2.3 “Keeping kids healthy prevents chronic disease and reduces doctor visits and ill health.”

2.4 “Because childhood obesity, adult obesity, and chronic disease plague the population.”

Major Theme: Healthy Eating (References = 5)

3.1 “I am thinking more about my eating, maybe I have made some small changes.”

3.2 “Dispelling myths like the clean plate club and learning these strategies do not help to develop healthy eating patterns in children.”

3.3 “MyPlate information helped me to learn that half the plate should be fruits and vegetables. It made it easier to know how much I should be eating.”

Major Theme: Dispelling Misinformation (References = 7)

4.1 “I have tried all these diets over the years, like Keto most recently.”

4.2 “When I grew up there was the fat craze. Now there is new nutrition and health information that has changed with time... This helped reformulate what is accurate these days.”

4.3 “This helped me learn what is healthy to eat and how to eat healthy. Most of the time I didn’t realize what was actually healthy versus the false narrative of what I/people in general think is healthy.”

Major Theme: Nutrition Education (References = 19)

5.1 “Seeing what 18 teaspoons of sugar looked like in one can of Coke put what I was consuming into perspective.”

5.2 “Made me realize how much I was doing wrong when it came to healthy eating and healthy habits.”

5.3 “Provided a basis of understanding – here’s where you start to eat healthy.”

5.4 “This nutrition intervention really opened my eyes to how much fruit and vegetables I was not eating. I am now making a concerted effort to eat more fruits and vegetables. MyPlate helped a lot.”

5.5 “The thing that I liked, that sticks in my mind are the food models as a sample of what a food portion should be – to visually see that was helpful.”

Major Theme: Online Delivery (References = 2)

6.1 “I am introverted as a person so not a problem for me to watch and learn online. It is my preference.”

6.2 “I liked watching the videos online. I was able to watch them on my schedule, budget my time, they were on my own time and pace.”

Major Theme: Opinion (References = 4)

7.1 “Unhealthy eating is why all Americans are fat – we are eating too much cereal and Pop Tarts where foreigners overseas are eating cut up fruit and coffee – that is why they don’t have all the overweight problems Americans have.”

7.2 “Children changing their habits is hard to do, they have their own mindset.”

7.3 “It is a heck of a lot harder to learn and change as an adult if eating poorly for 10-15 years.”

Major Theme: Role Modeling (References = 17)

8.1 “Children develop their habits to take all the way through life. It is important to teach good habits early on.”

8.2 “I don’t feed them as much as their mom does who stays at home with them.”

8.3 “It encourages kids as leave for high school and college through how the kids see me eating.”

8.4 “I was clueless as a kid; my parents did not teach me about any healthy eating habits. I am at least trying to do better as a parent.”

8.5 “The healthier I eat, the better eating habits my kids will have too.”

SCT Constructs in Relation to Identified Themes

The identified themes revealed in the participant’s interview responses are associated to SCT constructs. The cognitive variables of self-efficacy, modeling, mastery, and verbal persuasion allowed participants to learn and to become confident in their ability to incorporate healthy nutrition and lifestyle changes. This was demonstrated within the themes when participants expressed thoughts such as “We now eat more greens after the nutrition sessions...” and “The healthier I eat, the better eating habits my kids will have too.”

The cognitive construct of outcome expectations with a positive outcome allowed participants to find value and believe the changes they made in their nutrition and lifestyle habits would be likely. This was demonstrated within the themes when participants expressed thoughts such as “I have lost 18 pounds since the nutrition sessions” and “...hope to remain healthy in my 50s, 60s, and 70s. Eating healthy plays a big role.”

The cognitive construct of knowledge, a pre-condition for change, allowed participants to learn about the role of nutrition and lifestyle habits and the associated risks and benefits. This was demonstrated within the themes when participants expressed thoughts such as “Made me realize how much I was doing wrong when it came to healthy eating and healthy habits” and “Seeing what 18 teaspoons of sugar looked like in one can of Coke put what I was consuming into perspective.”

The behavioral construct of SCT allowed participants to practice behavioral skills, and intentions with goals as evidenced by what they learned from the nutrition and PA education

intervention. This was demonstrated within the themes when participants expressed thoughts such as “I am now making a concerted effort to eat more fruits and vegetables” and “...now I am back to eating healthier. I am now paying attention to what I would be eating ahead of time not just eating whatever then going or rushing onto the next thing in my daily life.” Table 6 contains all of the qualitative interview responses from the 8 participants for each question.

Table 6. Qualitative Responses

| 1. How was this intervention helpful in learning about healthy eating? | Group |
|--|--------------|
| This helped me learn what is healthy to eat and how to eat healthy. Most of the time I didn't realize what was actually healthy versus the false narrative of what I/people in general think is healthy. | In-person |
| Reiterated good techniques and information that I am now doing in my regular daily life. Eating more fruits and vegetables, incorporating a protein with meals for balance. | Online |
| Still kept the information I learned from the sessions in the back of my mind. It is always good to get new information. It helps to stay focused on eating healthy foods. The information presented helped. | In-person |
| It helped me to realize that we try to prepare healthy foods. | Online |
| The learning made me think about eating more fruit and vegetables. I was cooking last night; my family was out of town and I thought to add some vegetables to the meal I was making based on what I learned. | Online |
| The lessons opened up my eyes to portions and the amount of fruits and vegetables we should be eating. | In-person |
| Mostly as a bit of a refresher and more as far as strengthening portion sizing knowledge. | In-person |
| Focus more on right things to eat, watching foods I eat now. I have lost 18 pounds since the nutrition sessions. | Online |
| 2. How was this intervention helpful in learning about feeding children healthfully? | |
| When I grew up there was the fat craze. Now there is new nutrition and health information that has changed with time. You always want your kids to do better than you did. This helped reformulate what is accurate these days. For example, seeing what 18 teaspoons of sugar looked like in one can of Coke put what I was consuming into perspective from these sessions. | In-person |
| The healthier I eat, the better eating habits my kids will have too. | Online |
| Same with talking about adult. It helps with the struggle of getting kids to like what we feed them. My 11-year-old has been set in her ways. | In-person |

| | |
|---|-----------|
| Realizing we try to eat healthy and it is a challenge to get kids to eat healthy as well. | Online |
| Not as much, I don't feed them as much as their mom does who stays at home with them. Our 6-year-old is a picky eater. | Online |
| MyPlate information helped me to learn that half the plate should be fruits and vegetables. It made it easier to know how much I should be eating. | In-person |
| A lot of the same as my answer to number 1... understanding importance of how to teach kids how to eat properly, dispelling myths like the clean plate club and learning these strategies do not help to develop healthy eating patterns in children. | In-person |
| Not so much, kids are 16 now and do what they want. | Online |
| 3. How was this intervention unhelpful in learning about healthy eating? | |
| Made me realize how much I was doing wrong when it came to healthy eating and healthy habits. | In-person |
| Not unhelpful at all. No downfall. | Online |
| Nothing unhelpful. | In-person |
| No, I think it's a good thing, especially all we can get in to eat healthy food as much as possible. | Online |
| No, it was all pretty good. I can't think of anything unhelpful. | Online |
| I don't know... I can't think of anything unhelpful. I found it helpful and I enjoyed all the content. | In-person |
| I don't think there was necessarily anything bad. I have had a lack of follow through – my eating hasn't changed a lot but I am thinking more about my eating, maybe I have made some small changes. There was nothing in the nutrition education that was wrong. | In-person |
| Don't think anything was unhelpful. | Online |
| 4. How was this intervention unhelpful in learning about feeding children healthfully? | |
| Other than advice on getting kids to eat what you want them to... my wife stays at home with the kids so it was a good opportunity for me to expand my knowledge base on nutrition and healthy eating. | In-person |
| Not unhelpful | Online |
| Nothing unhelpful. Children changing their habits is hard to do, they have their own mindset. | In-person |
| I don't think so – it was all positive stuff about things we should do to eat healthy. Unhealthy eating is why all Americans are fat – we are eating too much cereal and Pop Tarts where foreigners overseas are eating cut up fruit and coffee – that is why they don't have all the overweight problems Americans have. | Online |
| I don't think I figured out my picky eater and why she eats bread only plus oranges and fruit. | Online |
| Same answer as number 3... nothing but helpful, even having a child who is a picky eater. | In-person |

| | |
|---|-----------|
| Pretty much the same as answer number 3... maybe more strategies on how to specifically work with my kids. We make the food and often they don't want to eat it. Some strategies were covered in the lessons and handouts. | In-person |
| Don't think anything was unhelpful. | Online |
| 5. Why do you think it is important to learn about healthy eating? | |
| Lifetime impact, drag it along with you – heart disease, Diabetes, much easier to fix in the near term than to go back on years of poor diet to fix. | In-person |
| Because childhood obesity, adult obesity, and chronic disease plague the population. I work in the fire service and there would be less chronic disease and lessen the burden on the health system if we would work on eating more fruits and vegetables and eating all good stuff. | Online |
| It is important if not following, have to have an idea of what healthy eating looks like. | In-person |
| To live a longer life for my kids. | Online |
| I was probably neglecting my diet too much. I need to pay closer attention. | Online |
| I think there is a trend with overweight and obesity, learning how to eat healthy is important to prevent this trend. | In-person |
| Something that – this question is kind of hard to answer. Food groups taught growing up but then not enforced in the lunchroom growing up. You were on your own to learn and do. It is better these days with having healthier foods offered in the school lunchroom. | In-person |
| Not getting any younger, hope to remain healthy in my 50s, 60s, and 70s. Eating healthy plays a big role. It encourages kids as they leave for high school and college through how the kids see me eating. | Online |
| 6. Why do you think it is important to learn about feeding children healthfully? | |
| As a parent, you do not want your kids to make the same mistakes you did – this includes eating habits. | In-person |
| Because childhood obesity, adult obesity, and chronic disease plague the population. I work in the fire service and there would be less chronic disease and lessen the burden on the health system if we would work on eating more fruits and vegetables and eating all good stuff. | Online |
| Children develop their habits to take all the way through life. It is important to teach good habits early on. | In-person |
| For kids to stay healthy and not be obese. | Online |
| Because children are smart today. I was clueless as a kid; my parents did not teach me about any healthy eating habits. I am at least trying to do better as a parent. | Online |
| Starting healthy eating early is crucial for wellbeing as well as for helping children learn decisions that they will make as an adult. | In-person |
| Because it is a heck of a lot hard to learn and change as an adult if eating poorly for 10-15 years. | In-person |
| Don't have a weight pandemic, keeping kids healthy prevents chronic disease and reduces doctor visits and ill health. | Online |
| 7. Tell me what a highlight of the intervention was for you? | |

| | |
|---|-----------|
| Provided a basis of understanding – here’s where you start to eat healthy. As a kid, you (I) just ate whatever, grew up with the Food Pyramid that highlighted bread as the most of what you should eat. Not now. | In-person |
| A highlight is now I am back to eating healthier. I am now paying attention to what I would be eating ahead of time not just eating whatever then going or rushing onto the next thing in my daily life. | Online |
| Most surprising part was what serving sizes should be, that is the one thing that stuck with me. I am guilty about going over on portion sizes. I now have an idea on what is based on nutrition facts for a better understanding of what I put in my body and what is a balanced plate and diet. | In-person |
| Eating more colored and green vegetables. We now eat more greens after the nutrition sessions, and we were not eating colored vegetables – it stood out to eat more colored vegetables. We are now throwing in more veggies with all our meals. Hopefully, the kids will learn to like them more. | Online |
| I remember you kept saying everything fit in moderation in a diet as a theme. I kept thinking I probably need to substitute and eat more fruit instead of too much candy. | Online |
| This nutrition intervention really opened my eyes to how much fruit and vegetables I was not eating. I am now making a concerted effort to eat more fruits and vegetables. MyPlate helped a lot. | In-person |
| The thing that I liked, that sticks in my mind are the food models as a sample of what a food portion should be – to visually see that was helpful. | In-person |
| I have been the primary cook, and food supplier. After the nutrition sessions, I pay more attention to the food labels for fat, sugar, calories, and balancing our diet. I learned more about food safety and washing hands, cleaning surfaces. I learned what a portion size looks like. It has helped me and my wife eat healthier and what I put on our plates. | Online |
| 8. Tell me what you did not like about the intervention? | |
| I thought it was great having filled in the gaps of my knowledge of healthy eating. It was eye opening, encouraging. I thoroughly enjoyed it. | In-person |
| Maybe more helpful in person sessions to see, handle the food models | Online |
| Can’t think of anything I did not like. The topics were interesting, including the nutrition information about eggs I learned. I don’t think anything was bad. | In-person |
| Nothing, it was informative. I am now serious about healthy eating. I have tried all these diets over the years, like Keto most recently. I think we need to just eat healthy. We just need to be smart about eating. | Online |
| I liked watching the videos online. I was able to watch them on my schedule, budget my time, they were on my own time and pace. | Online |
| I don’t know. I thought it was well presented. I learned a lot. I think you (the primary investigator) did a great job. Maybe add more information about picky eaters or develop it more to add other lifestyles like vegetarian, which wouldn’t really be helpful to me but in general. I really enjoyed the presentations. I am still using the principles; it has left a lasting impression. | In-person |
| No, I can’t think of anything I didn’t like. I think it was pretty much what I expected. Fairly familiar with the stuff, maybe more along the lines of – it was very classroom oriented, hands on activities would help with recipes. | In-person |

| | |
|--|--------|
| I can't really think of anything I didn't like. I am introverted as a person so not a problem for me to watch and learn online. It is my preference. | Online |
|--|--------|

Study Survey Questions and SCT Constructs

The EFNEP quantitative survey tool questions and the qualitative interview questions used in this study were based on a pragmatic approach. They were not necessarily based on SCT constructs. The following two tables map the quantitative and qualitative questions to SCT constructs. The following tables include recommendations to make a stronger quantitative evaluation tool and a stronger qualitative interview tool by revising the questions to be based on SCT constructs.

Table 7. Quantitative Questions and SCT Constructs

| Original EFNEP Survey Quantitative Question | Suggested question revision to improve application of SCT | Social Cognitive Theory Variable Assessed |
|--|--|--|
| 1. How many times a day do you eat fruit? | No suggested revision. | • Behavior |
| 2. How many times a day do you eat vegetables? | No suggested revision. | • Behavior |
| 3. Over the last week, how many days did you eat red and orange vegetables? | No suggested revision. | • Behavior |
| 4. Over the last week, how many days did you eat dark green vegetables? | No suggested revision. | • Behavior |
| 5. How often do you drink regular sodas (not diet)? | No suggested revision. | • Behavior |
| 6. How often do you drink fruit punch, fruit drinks, sweet tea or sports drinks? | No suggested revision. | • Behavior |
| 7. In the past week, how many days did you exercise for at least 30 minutes? | No suggested revision. | • Behavior |
| 8. In the past week, how many days did you do workouts to build and strengthen your muscles? | No suggested revision. | • Behavior |

| | | |
|--|---|---|
| 9. How often do you make small changes on purpose to be more active? | How likely are you to make small changes on purpose to be more active? | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| 10. How often do you wash your hands with soap and running water before preparing food? | How likely are you to wash your hands with soap and running water before preparing food? | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| 11. After cutting raw meat or seafood, how often do you wash all items and surfaces that came in contact with these foods? | How likely are you to wash your hands after cutting raw meat or seafood and surfaces that came into contact with these raw foods? | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| 12. How often do you thaw frozen food on the counter or in the sink at room temperature? | How likely are you to thaw frozen food on the counter or in the sink at room temperature? | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| 13. How often do you use a meat thermometer to see if meat is cooked to a safe temperature? | How likely are you to use a meat thermometer to see if meat is cooked to a safe temperature? | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| 14. In the past month, how often did you eat less than you wanted so there was more food for your family? | In the past month, how likely were you to eat less than you wanted so there was more food for your family? | <ul style="list-style-type: none"> • Behavior • Outcome Expectations |
| 15. In the past month, how often did you not have money or another way to get enough food for your family (such as SNAP, WIC, or a food pantry)? | In the past month, how likely were you to have enough money or resources (SNAP, WIC, Food Pantry) to feed your family? | <ul style="list-style-type: none"> • Behavior • Barrier and Opportunity |
| 16. How many days a week do you cook dinner (your main meal) at home? | No suggested revision. | <ul style="list-style-type: none"> • Behavior |
| 17. How often do you compare food prices to save money? | How likely are you to compare food prices to save money? | <ul style="list-style-type: none"> • Self-Efficacy • Knowledge |
| 18. How often do you plan your meals before you shop for groceries? | How likely are you to plan your meals before you shop for groceries? | <ul style="list-style-type: none"> • Self-Efficacy • Knowledge |
| 19. How often do you look in the refrigerator or cupboard | How likely are you to look in your refrigerator or pantry to see what food | <ul style="list-style-type: none"> • Self-Efficacy • Knowledge |

| | | |
|---|---|--|
| to see what you need before you go shopping? | items you need before you go shopping? | |
| 20. How often do you make a list before going shopping? | How likely are you to make a grocery list before going food shopping? | <ul style="list-style-type: none"> • Self-Efficacy • Knowledge |

Table 8. Qualitative Questions and SCT Constructs

| Qualitative Interview Questions | Suggested question revision to improve application of SCT | SCT Constructs |
|--|--|---|
| 1. How was this intervention helpful in learning about healthy eating? | How did you benefit from learning about healthy eating in this nutrition program? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 2. How was this intervention helpful in learning about feeding children healthfully? | How did you benefit from learning about feeding children healthfully in this nutrition program? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 3. How was this intervention unhelpful in learning about healthy eating? | How was this nutrition program not beneficial in learning about healthy eating? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 4. How was this intervention unhelpful in learning about feeding children healthfully? | How was this nutrition program not beneficial in learning about feeding children healthfully? | <ul style="list-style-type: none"> • Outcome Expectations • Observational Learning |
| 5. Why do you think it is important to learn about healthy eating? | How confident are you that it is important to increase your knowledge about healthy eating? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 6. Why do you think it is important to learn about feeding children healthfully? | How confident are you that it is important to increase your knowledge about feeding your children healthfully? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Observational Learning |
| 7. Tell me what a highlight of the intervention was for you. | What did you find beneficial from this nutrition program? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |
| 8. Tell me what you did not like about the intervention. | How was this nutrition program not beneficial to you? | <ul style="list-style-type: none"> • Outcome Expectations • Knowledge • Behavior |

Preferences Survey Results

The final survey was created to explore the nutrition and PA education delivery preferences of the priority population of fathers. The survey questions were framed using the constructs of SCT to gather data on self-efficacy, outcome expectations, and knowledge. These questions aimed to examine preference to increase participation in nutrition and PA education interventions.

Online Preference

| | Always Prefer | Only During COVID-19 | Without COVID-19 | Never prefer |
|---------------|----------------------|-----------------------------|-------------------------|---------------------|
| Online | 292 (56.0%) | 182 (34.9%) | 26 (5.0%) | 21 (4.0%) |

| | Not at all (1) | Slightly (2) | Neutral (3) | Mostly (4) | Very/Completely (5) | Mean |
|----------------|-----------------------|---------------------|--------------------|-------------------|----------------------------|-------------|
| How Confident | 8 (2.5%) | 41 (12.9%) | 36 (11.3%) | 105 (33.0%) | 128 (40.3%) | 3.96 |
| How Likely | 7 (2.2%) | 34 (10.7%) | 39 (12.3%) | 91 (28.6%) | 147 (46.2%) | 4.06 |
| How Beneficial | 6 (1.9%) | 36 (11.3%) | 33 (10.4%) | 100 (31.4%) | 143 (46.0%) | 4.06 |

For the participants (n=318) that selected **online** deliver as their preference (“I would always prefer this delivery method” or “If COVID-19 were not an issue, I would prefer this method”), the mean was 3.96 with an SD of 1.122. Out of this group, 40.3% said they were “completely confident” and 33.0% said they were “mostly confident” to how confident they were to participate in the program. For the question of how likely they would benefit from the program, the mean was 4.06 with an SD of 1.100. Out of this group, 46.2% said “Very Likely” and 28.6% said “Mostly Likely”. For the question of how beneficial the program would be for their

family, the mean was 4.06 with an SD of 1.084. Out of this group, 45.0% said “Very Beneficial” and 31.4% said “Mostly Beneficial”.

In-Person Preference

| | Always Prefer | Only During COVID-19 | Without COVID-19 | Never prefer |
|------------------|----------------------|-----------------------------|-------------------------|---------------------|
| In-Person | 164 (31.7%) | 122 (23.6%) | 156 (30.1%) | 76 (14.7%) |

| | Not at all (1) | Slightly (2) | Neutral (3) | Mostly (4) | Very/Completely (5) | Mean |
|----------------|-----------------------|---------------------|--------------------|-------------------|----------------------------|-------------|
| How Confident | 10 (3.1%) | 40 (12.5%) | 51 (15.9%) | 102 (31.9%) | 117 (36.6%) | 3.86 |
| How Likely | 7 (2.2%) | 45 (14.1%) | 46 (14.4%) | 87 (27.2%) | 135 (42.2%) | 3.93 |
| How Beneficial | 8 (2.5%) | 53 (16.6%) | 34 (10.6%) | 92 (28.7%) | 133 (41.6%) | 3.90 |

For the participants (n=320) that selected **In-Person** deliver as their preference (“I would always prefer this delivery method” or “If COVID-19 were not an issue, I would prefer this method”), the mean was 3.86 with an SD of 1.136. Out of this group, 36.6% said they were “completely confident” and 31.9% said they were “mostly confident” to how confident they were to participate in the program. For the question of how likely they would benefit from the program, the mean was 3.93 with an SD of 1.151. Out of this group, 42.2% said “Very Likely” and 27.2% said “Mostly Likely”. For the question of how beneficial the program would be for their family, the mean was 3.90 with an SD of 1.185. Out of this group, 41.6% said “Very Beneficial” and 28.7% said “Mostly Beneficial”.

Hybrid Preference

| | Always Prefer | Only During COVID-19 | Without COVID-19 | Never prefer |
|--|----------------------|-----------------------------|-------------------------|---------------------|
|--|----------------------|-----------------------------|-------------------------|---------------------|

| | | | | |
|-----------------------------|-------------|-------------|-------------|------------|
| Online and In-Person | 192 (37.0%) | 127 (24.5%) | 134 (25.8%) | 66 (12.7%) |
|-----------------------------|-------------|-------------|-------------|------------|

| | Not at all (1) | Slightly (2) | Neutral (3) | Mostly (4) | Very/Completely (5) | Mean |
|----------------|---------------------------|-------------------------|--------------------|-------------------|--------------------------------|-------------|
| How Confident | 12 (3.7%) | 37 (11.3%) | 50 (15.3%) | 100 (30.7%) | 127 (39.0%) | 3.90 |
| How Likely | 6 (1.8%) | 45 (13.8%) | 40 (12.3%) | 89 (27.3%) | 146 (44.8%) | 3.99 |
| How Beneficial | 6 (1.8%) | 49 (15.0%) | 32 (9.8%) | 100 (30.7%) | 139 (42.6%) | 3.97 |

For the participants (n=326) that selected **Online and In-Person** deliver as their preference (“I would always prefer this delivery method” or “If COVID-19 were not an issue, I would prefer this method”, the mean was 3.90 with an SD of 1.15. Out of this group, 39.0% said they were “completely confident” and 30.7% said they were “mostly confident” to how confident they were to participate in the program. For the question of how likely they would benefit from the program, the mean was 3.99 with an SD of 1.137. Out of this group, 44.8% said “Very Likely” and 27.3% said “Mostly Likely”. For the question of how beneficial the program would be for their family, the mean was 3.97 with an SD of 1.138. Out of this group, 42.6% said “Very Beneficial” and 30.7% said “Mostly Beneficial”.

There was a difference in the SCT constructs of self-efficacy and outcome expectations based on the delivery preferences of online, in person, and hybrid. The survey study respondents that indicated a preference for hybrid delivery had the highest levels of confidence (85.4%), likelihood (82%), and perceived benefits (84.4%). Online and in person delivery preferences had lower levels of confidence, likelihood, and perceived benefits. Online and in person delivery preferences were similar in confidence of attending at 76.4% for online delivery and 79.3% for in person delivery; likelihood of perceived benefit for online delivery was 77.7%

and 78.6% for in person delivery; and beneficial for the study survey participant or their family was 80.5% for online delivery and 80.4% for in person delivery.

All Delivery Preferences

Over half of survey study respondents (56%) preferred online program delivery always.

Over 90% (90.9%) of survey respondents always preferred online or online only during the Covid-19 pandemic.

| | Not at all | Slightly | Neutral | Mostly | Very/Completely | Mean |
|----------------|------------|------------|------------|-------------|-----------------|------|
| How Confident | 19 (3.7%) | 71 (13.6%) | 88 (16.9%) | 173 (33.3%) | 169 (32.5%) | 3.77 |
| How Likely | 17 (3.3%) | 79 (15.2%) | 75 (14.4%) | 154 (29.6%) | 195 (37.5%) | 3.83 |
| How Beneficial | 14 (2.7%) | 85 (16.3%) | 64 (12.3%) | 166 (31.9%) | 191 (36.7%) | 3.84 |

Over 65% (65.7%) of study respondents were either mostly or very confident that they would participate in this nutrition and PA education intervention program. Approximately 67% (67.1%) of study respondents responded that they were mostly or very likely to benefit from the program. Approximately 68% (68.6%) responded that this program would be beneficial to them or their family. These SCT constructs of self-efficacy and outcome expectations are based on each study respondent's program delivery preference.

Frequency Preferences

| | |
|-------------------------|-------------|
| Sessions 2 times a week | 241 (46.3%) |
| Sessions 1 time a week | 226 (43.3%) |
| Sessions every 2 weeks | 54 (10.4%) |

Most survey study respondents indicated a preference of program sessions occurring once a week or twice a week. A preference for sessions twice a week was slightly greater at

46.3% versus a preference for a once-a-week session at 43.3%. The preference for sessions occurring every two weeks was low at approximately 10%.

| | Not at all | Slightly | Neutral | Mostly | Very/Completely | Mean |
|----------------|-------------------|-----------------|----------------|---------------|------------------------|-------------|
| How Confident | 14 (2.7%) | 86 (16.5%) | 61 (11.7%) | 191 (36.7%) | 169 (32.4%) | 3.8 |
| How Likely | 19 (3.7%) | 68 (13.1%) | 64 (12.3%) | 174 (33.5%) | 195 (37.5%) | 3.88 |
| How Beneficial | 16 (3.1%) | 71 (13.6%) | 64 (12.3%) | 174 (33.4%) | 196 (37.5%) | 3.89 |

Over 69% (69.1%) of study respondents were either mostly or very confident that they would participate in this nutrition and PA education intervention program. There was a total of 71% of study respondents who responded that they were mostly or very likely to benefit from the program. Approximately 70% (70.9%) responded that this program would be beneficial to them or their family. These SCT constructs of self-efficacy and outcome expectations are based on each study respondents' program session frequency preference.

Duration Preferences

| | |
|-----------------------------|-------------|
| 6 sessions for 2 hours each | 289 (55.8%) |
| 12 Session for 1 hour each | 229 (44.2%) |

Most survey study respondents indicated a preference of program duration entailing 6 sessions for 2 hours each. The preference for 6 sessions for 2 hours each was greater at 55.8% versus a preference for 12 sessions for 1 hour each at 44.2%.

| | Not at all | Slightly | Neutral | Mostly | Very/Completely | Mean |
|----------------|-------------------|-----------------|----------------|---------------|------------------------|-------------|
| How Confident | 25 (4.8%) | 68 (13.1%) | 78 (15.0%) | 187 (35.9%) | 163 (31.3%) | 3.76 |
| How Likely | 17 (3.3%) | 85 (16.3%) | 70 (16.3%) | 160 (30.7%) | 189 (36.3%) | 3.80 |
| How Beneficial | 19 (3.6%) | 78 (15.0%) | 67 (12.9%) | 160 (30.7%) | 197 (37.8%) | 3.84 |

Over 67% (67.2%) of study respondents were either mostly or very confident that they would participate in this nutrition and PA education intervention program. There was a total of 67% of study respondents who indicated that they were mostly or very likely to benefit from the program. Approximately 68% (68.5%) indicated that this program would be beneficial to them or their family. These SCT constructs of self-efficacy and outcome expectations are based on each study respondents' program session duration preference.

Type of Learning

| | |
|-------------------|-------------|
| In classroom | 197 (37.7%) |
| Reading materials | 203 (38.9%) |
| Watching Videos | 260 (49.8%) |
| Online classroom | 221 (42.3%) |

It appears that there may not be a great variation in types of learning styles. However, most survey study respondents indicated a preference for watching videos (49.8%), an online classroom setting (42.3%), and reading materials (38.9%). This combination is indicative of an online delivery platform and remote learning. In classroom learning style was the least selected at 37.7%.

Delivery Preference by Race

| | White | Black | Indian | Asian | Other | Hispanic |
|-----------|--------------|--------------|---------------|--------------|--------------|-----------------|
| Online | 252 (44.3%) | 27 (46.6%) | 1 (100%) | 9 (60%) | 3 (60%) | 39 (50.0%) |
| In Person | 144 (25.3%) | 17 (29.3%) | 0 | 2 (13.3%) | 1 (20%) | 25 (32.1%) |

| | | | | | | |
|--------|----------------|------------|---|-----------|---------|---------------|
| Hybrid | 173 (30.4%) | 14 (24.1%) | 0 | 4 (26.7%) | 1 (20%) | 22 (28.2%) |
|--------|----------------|------------|---|-----------|---------|---------------|

Most survey study respondents by race selected a preference for online program delivery. The secondary preference was hybrid program delivery for Asian and White. Whereas the secondary preference for Hispanic and Black was in person program delivery.

Delivery Preference by Education

| | Some High School | High School | Associates | Bachelors | Masters | PhD | Trade |
|-----------|------------------|-------------|------------|------------|-------------|------------|----------|
| Online | 8 (2.7%) | 37 (12.7%) | 25 (8.6%) | 79 (27.1%) | 113 (38.7%) | 25 (8.6%) | 5 (1.7%) |
| In Person | 6 (3.7%) | 14 (8.5%) | 11 (6.7%) | 43 (26.2%) | 66 (40.2%) | 22 (13.4%) | 2 (1.2%) |
| Hybrid | 8 (4.2%) | 17 (8.9%) | 9 (4.7%) | 48 (25.0%) | 83 (43.2%) | 25 (13.0%) | 2 (1.0%) |

Most survey study respondents with a High School, Associates, Bachelors, and Master's level education preferred online program delivery. Subsequently, survey study respondents with some High School, PhD, and Trade education were closely even among the delivery preference of online, in person, and hybrid.

The survey results indicate most fathers will always prefer or prefer during COVID-19 an online delivery of a nutrition and PA education program. The respondents also prefer to have the frequency of sessions occurring once a week or twice a week. This supports the hypothesis that most fathers prefer online programs, especially during the COVID-19 pandemic. Overall, SCT constructs of self-efficacy and outcome expectations reveal high levels of confidence, likelihood, and perceived benefits, regardless of the delivery preference.

Chapter 5: Discussion

This intervention provides new insight and a clearer understanding of fathers and their role in healthy habits within their family unit. The results from this nutrition and PA education intervention suggest a combined significant change toward healthy lifestyle habits of fathers. These results include improved eating habits, incorporating food safety measures, and increased physical activity. Improved eating habits involved an increase in fruit and vegetable intake and a decrease in fruit beverages, sweet tea, and sports drinks. Improved food safety measures included using a meat thermometer and increased thorough hand washing. Physical activity increased through small changes to become more active such as taking the stairs, and parking further away. These were all strategies taught in this nutrition and PA intervention.

SCT is the foundation for this research with implications of children learning health habits through modeling from their family members, including fathers. This study specifically addresses fathers who are an under researched role model of healthy habits for their children. These positive health changes in the study participants have the potential to make an impact on their children's health habits based on the SCT constructs.

Reciprocal determinism is the interaction between the main SCT constructs of cognition, behavior, and environment. This intervention addressed the cognitive, environmental, and behavioral SCT variables primarily through knowledge, outcome expectations, self-efficacy, intentions (goals), observation, barriers and opportunities, and behavioral skills. This dynamic interaction has the potential to impact the entire family's dietary intake and health habits.

The cognitive construct variable of knowledge is a precondition for change. Knowledge is based on the risks and benefits of health practices that participants learned through the sessions. The statistically significant quantitative result of increased fruit intake demonstrates knowledge. This is explained in the qualitative data through a participant's expression: "The lessons opened up my eyes to portions and the amount of fruits and vegetables we should be eating."

The cognitive construct variable of outcome expectations, either positive or negative, are based on physical, social, or self-evaluation. This translates into the individual's perspective on the likelihood and value of making a change in their behavior. The statistically significant quantitative result of decreased intake of fruit punch, fruit drinks, sweet tea, or sports drinks demonstrates outcome expectations. This is explained in the qualitative data through a participant's expression: "...seeing what 18 teaspoons of sugar looked like in one can of Coke put what I was consuming into perspective from these sessions."

The cognitive construct variable of self-efficacy is how confident an individual feels in their ability to carry out a behavior or task. This is based on modeling, mastery, and verbal persuasion. The nutrition and PA education intervention positively impacted self-efficacy. The statistically significant quantitative result of increased hand washing before food preparation demonstrates self-efficacy. This is explained in the qualitative data through a participant's expression: "I learned more about food safety and washing hands, cleaning surfaces."

The behavioral construct variable of Intentions and goals involve commitment to planning and taking action. When the benefits of a behavior outweigh the barriers and self-efficacy is in place, then action can be formed through an intention or goal. The statistically significant quantitative result of an increased daily vegetable intake demonstrates behavioral

change based on setting goals. This is explained in the qualitative data through a participant's expression: "Eating more colored and green vegetables. We now eat more greens after the nutrition sessions, and we were not eating colored vegetables – it stood out to eat more colored vegetables. We are now throwing in more veggies with all our meals. Hopefully, the kids will learn to like them more."

The modified curriculum resulted in positive changes. Even though each PA and recipe were not demonstrated as originally designed, more emphasis was placed on the ESBA app as a substitute for classroom demonstration. The modification of adding food models as a teaching tool helped participants visualize food portions with comments from the qualitative interviews stating that they were helpful. This reveals that modification of the ESBA curriculum yielded successful results and has the potential to improve healthy habits. Modifications may be appropriate and necessary with resource constraints such as time, budget, and facility layout, or when utilizing an online delivery method.

The addition of an online delivery method was an unexpected development in the research study. The sessions were recorded by a videographer for use in the tech organization's employee wellness library. The online delivery occurred with the PI's decision to use the recorded nutrition and PA education sessions in order to reach additional participants online, allowing new participants to view on their own time. Online participants commented that it was convenient to watch the videos at their own pace, at suitable times. The noted difference was the inability to handle the food models for the online participants. Online delivery should be a consideration in providing nutrition and PA education. This is evidenced by the delivery preference survey which found most fathers prefer an online program delivery platform.

The statistically significant online results differed from the statistically significant in person results. All of the online statistically significant questions, including daily fruit intake, workout frequency, small changes to increase activity, and hand washing frequency, fell within the overall six statistically significant results from the combined group of all participants. However, none of the in-person statistically significant questions, including sweet/fruit drink frequency, food availability, and food price comparison to save money fell within the overall six statistically significant results from the combined group. This research does not answer the question as to why there were different statistically significant differences between the in-person and online groups. Further research could explore the different delivery methods of the online platform versus the in-person platform. The in-person study subjects all had a similar type of job at the same company versus the online study subjects had greater variation in their jobs, and geographic location. More research can help explore this area.

The extreme case sampling selection for the qualitative interviews was anticipated to provide an exploration into the variation on the most successful and least successful behavior change cases from the intervention. However, the qualitative interview responses showed common answers that the intervention was helpful. There were not any distinguishable differences in answers between the two extreme case sample participants.

This mixed methods nutrition and PA intervention study reinforces the evidence-based foundation including SCT, the ESBA curriculum, mixed methods research methodology, and nutrition and PA education delivery by a Registered Dietitian health professional. The data adds important information on the never explored population of fathers with the ESBA curriculum, finding that this is a successful program for the population of fathers. The father participants have the potential to influence their children's dietary intake and health habits through

modeling their learned knowledge and changed behaviors resulting from this study. The implications have the potential to positively impact the concerning trend in childhood overweight and obesity conditions, along with the associated disability and cost of this chronic disease. There were challenges in recruiting an adequate number of fathers in this study. The additional survey to gather data on fathers' delivery preferences revealed nutrition and PA education interventions should include online delivery methods. This is especially important during a pandemic, such as COVID-19. It is even more critical for individuals, including fathers, to ensure optimal nutrition intake to achieve and maintain health.

Recommendations

Recommendations include recruiting a larger sample size of fathers. This was a limitation in the current research study. Resources such as a single researcher, time, and funding were a barrier to recruiting beyond the approximate year time that this study advertised for participants. The delivery preference survey revealed most fathers preferred an online program delivery, 1-2 program sessions a week, and 6 sessions for 2 hours each. If this nutrition and PA education program is utilized in the future, these findings should be incorporated for greater participation. Provided the preference for online delivery, a companion website would be a recommended addition. This could include expansion on the nutrition and PA education with newsletters, activities, and educational materials. Additionally, adding components for the entire family including child appropriate activities and materials would be beneficial. This could even include video cooking tutorials.

Modification to the curriculum in the future should include highlighting healthy eating strategies for children. Interview comments included the concern about children being 'picky' eaters. This coincidentally associates with a child's environment and vicarious learning as a

construct of SCT. Parents can set the stage for a child's successful eating pattern by adopting healthy eating behaviors themselves.

Using food models as an added teaching tool element in the ESBA curriculum could be a helpful addition. The fathers expressed how the food models helped to provide a tangible tool to visualize and understand proper portion sizes of various foods. This was seen during the nutrition education sessions with their reactions such as surprise between the difference in what they thought a portion size should be and an actual recommendation portion size of various foods. They also showed delight and commentary as they investigated each food model and passed the food models around in the intervention sessions.

Finally, including collection and analysis of demographic data could help expand on additional details impacting health behaviors of this population. This includes exploring factors potentially associated with lifestyle behaviors such as fathers' ages, children's ages, ethnicity, income, education, and geographic location.

Limitations

This study was limited by a small sample size of fathers. SCT, ESBA, and mix methods studies on the population of fathers related to nutrition and health behavior and their potential impact on their children should include larger sample sizes for greater generalizability. However, a smaller sample size is not as much of a concern for qualitative research as the qualitative data in this MM study was descriptive of the research questions.

Selection bias is an additional limitation. Fathers who participated may have been interested in learning about health and ready to change their behaviors. The participants were not selected through a randomized process; therefore, these participants may not be representative of the population of fathers analyzed.

Collected data from the qualitative interviews was self-reported by the participants. This information could have inherent bias through exaggeration or poor memory recall.

The EFNEP quantitative survey tool questions and the qualitative interview questions used in this study were based on a pragmatic approach. They were not necessarily based on SCT constructs. Revising the quantitative survey and the qualitative interview questions based on SCT constructs would make stronger survey tools.

Conclusion

The creators of the ESBA curriculum stated this has never been implemented within the population of fathers. This research study reveals the ESBA curriculum as delivered by an experienced Registered Dietitian to be successful in producing a positive change in the healthy lifestyle habits of fathers. Fathers play an important role in sculpting a child's environment to establish health habits.

The results of this current study confirm the curriculum foundation of SCT concepts as originally noted by the experts who reviewed the ESBA program. This current study also confirmed the original research findings on this curriculum which established the pre- and post-test scores from participants to result in significant, positive behavior improvement in food resource management, nutrition, food safety, and physical activity. This reveals the ESBA curriculum, even with slight modifications, can be applied with successful, consistent results to the population of fathers.

This study also shows that the ESBA curriculum can be delivered successfully online. Online delivery offers an additional avenue of participation. Study participants expressed it was convenient and even preferred this method of learning in some cases. Operating within an online environment is needed in our high-tech world. It is especially important during this

unprecedented time of a pandemic as we distance ourselves from groups including classroom settings. The qualitative interviews were carried out remotely over the phone during the COVID-19 pandemic. The online delivery would have been the only option if the pandemic occurred during the delivery of the nutrition education sessions.

More research is needed to explore the role of fathers in their children's dietary intake with larger groups of fathers utilizing multiple avenues of delivery.

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Appendix

Appendix A. Question Frequencies for Each Group and Combined

| <u>1. How many times a day do you eat fruit?</u> (1) I rarely eat fruit (2) Less than 1 time a day (a couple times a week) (3) 1 time a day (4) 2 times a day (5) 3 times a day (6) 4 or more times a day | In Person | | Online | | Combined | |
|--|-----------|-----------|-----------|-----------|------------|------------|
| | Pre | Post | Pre | Post | Pre | Post |
| | 0 (0%) | 2 (20.0%) | 0 (0%) | 0 (0%) | 0 (0%) | 2 (9.1%) |
| | 4 (40.0%) | 3 (30.0%) | 6 (50.0%) | 2 (16.7%) | 10 (45.5%) | 5 (22.7%) |
| | 3 (30.0%) | 0 (0%) | 3 (25.0%) | 4 (33.3%) | 6 (27.3%) | 4 (18.2%) |
| | 2 (20.0%) | 2 (20.0%) | 1 (8.3%) | 3 (25.0%) | 3 (13.6%) | 5 (22.7%) |
| | 1 (10.0%) | 2 (20.0%) | 1 (8.3%) | 1 (8.3%) | 2 (9.7%) | 3 (13.6%) |
| <u>2. How many times a day do you eat vegetables?</u> (1) I rarely eat vegetables (2) Less than 1 time a day (a couple times a week) (3) 1 time a day (4) 2 times a day (5) 3 times a day (6) 4 or more times a day | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 1 (10.0%) | 1 (10.0%) | 2 (16.7%) | 0 (0%) | 1 (4.5%) | 1 (4.5%) |
| | 0 (0%) | 0 (0%) | 0 (0%) | 2 (16.7%) | 2 (9.1%) | 2 (9.1%) |
| | 4 (40.0%) | 3 (30.0%) | 3 (25.0%) | 1 (8.3%) | 7 (31.8%) | 4 (18.2%) |
| | 4 (40.0%) | 4 (40.0%) | 6 (50.0%) | 6 (50.0%) | 10 (45.5%) | 10 (45.5%) |
| | 1 (10.0%) | 1 (10.0%) | 1 (8.3%) | 2 (16.7%) | 2 (9.1%) | 3 (13.6%) |
| <u>3. Over the last week, how many days did you eat red and orange vegetables?</u> (1) I did not eat red and orange vegetables (2) 1 day a week (3) 2 days a week (4) 3 days a week (5) 4 days a week (6) 5 days a week (7) 6 or 7 days a week | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 2 (20.0%) | 1 (10.0%) | 6 (50.0%) | 2 (16.7%) | 8 (36.4%) | 3 (13.6%) |
| | 1 (10.0%) | 1 (10.0%) | 0 (0%) | 3 (25.0%) | 1 (4.5%) | 4 (18.2%) |
| | 3 (30.0%) | 3 (30.0%) | 0 (0%) | 0 (0%) | 3 (13.6%) | 3 (13.6%) |
| | 3 (30.0%) | 1 (10.0%) | 1 (8.3%) | 2 (16.7%) | 4 (18.2%) | 3 (13.6%) |
| | 0 (0%) | 4 (40.0%) | 2 (16.7%) | 3 (25.0%) | 2 (9.1%) | 7 (31.8%) |
| <u>4. Over the last week, how many days did you eat dark green vegetables?</u> (1) I did not eat dark green vegetables (2) 1 day a week (3) 2 days a week (4) 3 days a week (5) 4 days a week (6) 5 days a week (7) 6 or 7 days a week | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 1 (10.0%) | 1 (10.0%) | 1 (8.3%) | 0 (0%) | 2 (9.1%) | 1 (4.5%) |
| | 1 (10.0%) | 1 (10.0%) | 1 (8.3%) | 1 (8.3%) | 2 (9.1%) | 2 (9.1%) |
| | 2 (20.0%) | 1 (10.0%) | 3 (25.0%) | 3 (25.0%) | 5 (22.7%) | 4 (18.2%) |
| | 4 (40.0%) | 4 (40.0%) | 2 (16.7%) | 0 (0%) | 6 (27.3%) | 4 (18.2%) |
| | 0 (0%) | 1 (10.0%) | 2 (16.7%) | 3 (25.0%) | 2 (9.1%) | 4 (18.2%) |
| <u>5. How often do you drink regular sodas (not diet)?</u> (1) Never (2) 1 – 3 times a week (3) 4 – 6 times a week (4) 1 time a day (5) 2 times a day | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 7 (70.0%) | 7 (70.0%) | 4 (33.3%) | 5 (41.7%) | 11 (50%) | 12 (54.5%) |
| | 3 (30.0%) | 2 (20.0%) | 7 (58.3%) | 5 (41.7%) | 10 (45.5%) | 7 (31.8%) |
| | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| | 0 (0%) | 1 (10.0%) | 0 (0%) | 0 (0%) | 0 (0%) | 1 (4.5%) |
| | 0 (0%) | 0 (0%) | 1 (8.3%) | 2 (16.7%) | 1 (4.5%) | 2 (9.1%) |

| | | | | | | |
|--|------------------|-------------|---------------|-------------|-----------------|-------------|
| (6) 3 times a day | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| (7) 4 or more times a day | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| <u>6. How often do you drink fruit punch, fruit drinks, sweet tea, or sports drinks?</u> | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| (1) Never | 5 (50.0%) | 9 (90.0%) | 3 (25.0%) | 4 (33.3%) | 8 (36.4%) | 13 (59.1%) |
| (2) 1 – 3 times a week | 5 (50.0%) | 1 (10.0%) | 8 (66.7%) | 7 (58.3%) | 13 (59.1%) | 8 (36.4%) |
| (3) 4 – 6 times a week | 0 (0%) | 0 (0%) | 1 (8.3%) | 1 (8.3%) | 1 (4.5%) | 1 (4.5%) |
| (4) 1 time a day | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| (5) 2 times a day | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| (6) 3 times a day | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| (7) 4 or more times a day | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| <u>7. In the past week, how many days did you exercise for at least 30 minutes?</u> | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| (1) 0 days | 0 (0%) | 1 (10.0%) | 4 (33.3%) | 1 (8.3%) | 4 (18.2%) | 2 (9.1%) |
| (2) 1 day | 3 (30.0%) | 0 (0%) | 2 (16.7%) | 2 (16.7%) | 5 (22.7%) | 2 (9.1%) |
| (3) 2 days | 1 (10.0%) | 4 (40.0%) | 0 (0%) | 3 (25.0%) | 1 (4.5%) | 7 (31.8%) |
| (4) 3 days | 0 (0%) | 2 (20.0%) | 3 (25.0%) | 1 (8.3%) | 3 (13.6%) | 3 (13.6%) |
| (5) 4 days | 2 (20.0%) | 0 (0%) | 0 (0%) | 2 (16.7%) | 2 (9.1%) | 2 (9.1%) |
| (6) 5 days | 2 (20.0%) | 1 (10.0%) | 0 (0%) | 0 (0%) | 2 (9.1%) | 1 (4.5%) |
| (7) 6 days | 2 (20.0%) | 1 (10.0%) | 2 (16.7%) | 2 (16.7%) | 4 (18.2%) | 3 (13.6%) |
| (8) 7 days | 0 (0%) | 1 (10.0%) | 1 (8.3%) | 1 (8.3%) | 1 (4.5%) | 2 (9.1%) |
| <u>8. In the past week, how many days did you do workouts to build and strengthen your muscles?</u> | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| (1) 0 days | 7 (70.0%) | 4 (40.0%) | 6 (50.0%) | 2 (16.7%) | 13 (59.1%) | 6 (27.3%) |
| (2) 1 day | 1 (10.0%) | 1 (10.0%) | 2 (16.7%) | 1 (8.3%) | 3 (13.6%) | 2 (9.1%) |
| (3) 2 days | 0 (0%) | 2 (20.0%) | 2 (16.7%) | 4 (33.3%) | 2 (9.1%) | 6 (27.3%) |
| (4) 3 days | 1 (10.0%) | 1 (10.0%) | 0 (0%) | 2 (16.7%) | 1 (4.5%) | 3 (13.6%) |
| (5) 4 days | 0 (0%) | 2 (20.0%) | 0 (0%) | 1 (8.3%) | 0 (0%) | 3 (13.6%) |
| (6) 5 days | 1 (10.0%) | 0 (0%) | 0 (0%) | 0 (0%) | 1 (4.5%) | 0 (0%) |
| (7) 6 days | 0 (0%) | 0 (0%) | 1 (8.3%) | 1 (8.3%) | 1 (4.5%) | 1 (4.5%) |
| (8) 7 days | 0 (0%) | 0 (0%) | 1 (8.3%) | 1 (8.3%) | 1 (4.5%) | 1 (4.5%) |
| <u>9. How often do you make small changes on purpose to be more active?</u> | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| (1) Never | 2 (20.0%) | 0 (0%) | 4 (33.3%) | 1 (8.3%) | 6 (27.3%) | 1 (4.5%) |
| (2) Rarely (about 20% of the time) | 1 (10.0%) | 2 (20.0%) | 1 (8.3%) | 2 (16.7%) | 2 (9.1%) | 4 (18.2%) |
| (3) Sometimes (about 40% of the time) | 4 (40.0%) | 5 (50.0%) | 3 (25.0%) | 4 (33.3%) | 7 (31.8%) | 9 (40.9%) |
| (4) Often (about 60% of the time) | 1 (10.0%) | 0 (0%) | 3 (25.0%) | 2 (16.7%) | 4 (18.2%) | 2 (9.1%) |
| (5) Usually (about 80% of the time) | 1 (10.0%) | 3 (30.0%) | 1 (8.3%) | 2 (16.7%) | 2 (9.1%) | 5 (22.7%) |
| (6) Always | 1 (10.0%) | 0 (0%) | 0 (0%) | 1 (8.3%) | 1 (4.5%) | 1 (4.5%) |
| <u>10. How often do you wash your hands with soap and running water before preparing food?</u> | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |

| | | | | | | |
|--|------------------|-------------|---------------|-------------|-----------------|-------------|
| (1) Never | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| (2) Rarely (about 20% of the time) | 1 (10.0%) | 1 (10.0%) | 0 (0%) | 0 (0%) | 1 (4.5%) | 1 (4.5%) |
| (3) Sometimes (about 40% of the time) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| (4) Often (about 60% of the time) | 0 (0%) | 0 (0%) | 2 (16.7%) | 0 (0%) | 2 (9.1%) | 0 (0%) |
| (5) Usually (about 80% of the time) | 4 (40.0%) | 3 (30%) | 4 (33.3%) | 1 (8.3%) | 8 (36.4%) | 4 (18.2%) |
| (6) Always | 5 (50.0%) | 6 (60.0%) | 6 (50.0%) | 11 (91.7%) | 11 (50.0%) | 17 (77.3%) |
| <u>11. After cutting raw meat or seafood, how often do you wash all items and surfaces that came in contact with these foods?</u> | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| (1) Never | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| (2) Rarely (about 20% of the time) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| (3) Sometimes (about 40% of the time) | 0 (0%) | 2 (20.0%) | 0 (0%) | 0 (0%) | 0 (0%) | 2 (9.1%) |
| (4) Often (about 60% of the time) | 1 (10.0%) | 0 (0%) | 0 (0%) | 1 (8.3%) | 1 (4.5%) | 1 (4.5%) |
| (5) Usually (about 80% of the time) | 0 (0%) | 0 (0%) | 2 (16.7%) | 1 (8.3%) | 2 (9.1%) | 1 (4.5%) |
| (6) Always | 9 (90.0%) | 8 (80.0%) | 10 (83.3%) | 10 (83.3%) | 19 (86.4%) | 18 (81.8%) |
| <u>12. How often do you thaw frozen food on the counter or in the sink at room temperature?</u> | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| (1) Never | 5 (50.0%) | 7 (70.0%) | 2 (16.7%) | 4 (33.3%) | 7 (31.8%) | 11 (50.0%) |
| (2) Rarely (about 20% of the time) | 3 (30.0%) | 0 (0%) | 3 (25.0%) | 2 (16.7%) | 6 (27.3%) | 2 (9.1%) |
| (3) Sometimes (about 40% of the time) | 2 (20.0%) | 2 (20.0%) | 3 (25.0%) | 2 (16.7%) | 5 (22.7%) | 4 (18.2%) |
| (4) Often (about 60% of the time) | 0 (0%) | 1 (10.0%) | 1 (8.3%) | 3 (25.0%) | 1 (4.5%) | 4 (18.2%) |
| (5) Usually (about 80% of the time) | 0 (0%) | 0 (0%) | 2 (16.7%) | 1 (8.3%) | 2 (9.1%) | 1 (4.5%) |
| (6) Always | 0 (0%) | 0 (0%) | 1 (8.3%) | 0 (0%) | 1 (4.5%) | 0 (0%) |
| <u>13. How often do you use a meat thermometer to see if meat is cooked to a safe temperature?</u> | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| (1) Never | 3 (30.0%) | 1 (10.0%) | 4 (33.3%) | 1 (8.3%) | 7 (31.8%) | 2 (9.1%) |
| (2) Rarely (about 20% of the time) | 3 (30.0%) | 5 (50.0%) | 3 (25.0%) | 6 (50.0%) | 6 (27.3%) | 11 (50.0%) |
| (3) Sometimes (about 40% of the time) | 2 (20.0%) | 0 (0%) | 1 (8.3%) | 1 (8.3%) | 1 (4.5%) | 3 (13.6%) |
| (4) Often (about 60% of the time) | 0 (0%) | 2 (20.0%) | 4 (33.3%) | 1 (8.3%) | 4 (18.2%) | 3 (13.6%) |
| (5) Usually (about 80% of the time) | 1 (10.0%) | 1 (10.0%) | 0 (0%) | 2 (16.7%) | 1 (4.5%) | 3 (13.6%) |
| (6) Always | 1 (10.0%) | 1 (10.0%) | 0 (0%) | 1 (8.3%) | 1 (4.5%) | 2 (9.1%) |
| <u>14. In the past month, how often did you eat less than you wanted so there was more food for your family?</u> | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| (1) Never | 3 (30.0%) | 5 (50.0%) | 4 (33.3%) | 5 (41.7%) | 7 (31.8%) | 10 (45.5%) |
| (2) Rarely (about 20% of the time) | 3 (30.0%) | 4 (40.0%) | 6 (50.0%) | 3 (25.0%) | 9 (40.9%) | 7 (31.8%) |
| (3) Sometimes (about 40% of the time) | 3 (30.0%) | 0 (0%) | 1 (8.3%) | 3 (25.0%) | 4 (18.2%) | 3 (13.6%) |
| (4) Often (about 60% of the time) | 0 (0%) | 0 (0%) | 1 (8.3%) | 0 (0%) | 1 (4.5%) | 0 (0%) |
| (5) Usually (about 80% of the time) | 0 (0%) | 1 (10.0%) | 0 (0%) | 1 (8.3%) | 0 (0%) | 2 (9.1%) |
| (6) Always | 1 (10.0%) | 0 (0%) | 0 (0%) | 0 (0%) | 1 (4.5%) | 0 (0%) |
| <u>15. In the past month, how often did you not have</u> | | | | | | |

| | | | | | | |
|--|------------------|-------------|---------------|-------------|-----------------|-------------|
| <u>money or another way to get enough food for your family (such as SNAP, WIC, or a food pantry)?</u> (1) Never (2) Rarely (about 20% of the time) (3) Sometimes (about 40% of the time) (4) Often (about 60% of the time) (5) Usually (about 80% of the time) (6) Always | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 9 (90.0%) | 9 (90.0%) | 12 (100%) | 12 (100%) | 21 (95.5%) | 21 (95.5%) |
| | 1 (10.0%) | 1 (10.0%) | 0 (0%) | 0 (0%) | 1 (4.5%) | 1 (4.5%) |
| | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| <u>16. How many days a week do you cook dinner (your main meal) at home?</u> (1) I rarely cook dinner at home (2) 1 day a week (3) 2 days a week (4) 3 days a week (5) 4 days a week (6) 5 days a week (7) 6 or 7 days a week | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 0 (0%) | 0 (0%) | 1 (8.3%) | 0 (0%) | 1 (4.5%) | 0 (0%) |
| | 0 (0%) | 0 (0%) | 0 (0%) | 1 (8.3%) | 0 (0%) | 1 (4.5%) |
| | 1 (10.0%) | 0 (0%) | 1 (8.3%) | 0 (0%) | 2 (9.1%) | 0 (0%) |
| | 0 (0%) | 1 (10.0%) | 0 (0%) | 0 (0%) | 0 (0%) | 1 (4.5%) |
| <u>17. How often do you compare food prices to save money?</u> (1) Never (2) Rarely (about 20% of the time) (3) Sometimes (about 40% of the time) (4) Often (about 60% of the time) (5) Usually (about 80% of the time) (6) Always | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| | 2 (20.0%) | 0 (0%) | 2 (16.7%) | 1 (8.3%) | 4 (18.2%) | 1 (4.5%) |
| | 2 (20.0%) | 3 (30.0%) | 5 (41.7%) | 4 (33.3%) | 7 (31.8%) | 7 (31.8%) |
| | 4 (40.0%) | 3 (30.0%) | 1 (8.3%) | 4 (33.3%) | 5 (22.7%) | 7 (31.8%) |
| <u>18. How often do you plan your meals before you shop for groceries?</u> (1) Never (2) Rarely (about 20% of the time) (3) Sometimes (about 40% of the time) (4) Often (about 60% of the time) (5) Usually (about 80% of the time) (6) Always | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 0 (0%) | 0 (0%) | 1 (8.3%) | 0 (0%) | 1 (4.5%) | 0 (0%) |
| | 2 (20.0%) | 2 (20.0%) | 2 (16.7%) | 1 (8.3%) | 4 (18.2%) | 3 (13.6%) |
| | 3 (30.0%) | 2 (20.0%) | 2 (16.7%) | 4 (33.3%) | 5 (22.7%) | 6 (27.3%) |
| | 2 (20.0%) | 3 (30.0%) | 2 (16.7%) | 1 (8.3%) | 4 (18.2%) | 4 (18.2%) |
| <u>19. How often do you look in the refrigerator or cupboard to see what you need before you go shopping?</u> (1) Never (2) Rarely (about 20% of the time) (3) Sometimes (about 40% of the time) (4) Often (about 60% of the time) (5) Usually (about 80% of the time) (6) Always | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| | 2 (20.0%) | 1 (10.0%) | 1 (8.3%) | 1 (8.3%) | 3 (13.6%) | 2 (9.1%) |
| | 0 (0%) | 3 (30.0%) | 2 (16.7%) | 1 (8.3%) | 2 (9.1%) | 4 (18.2%) |
| | 3 (30.0%) | 1 (10.0%) | 0 (0%) | 1 (8.3%) | 3 (13.6%) | 2 (9.1%) |
| | In Person | | Online | | Combined | |
| | Pre | Post | Pre | Post | Pre | Post |
| | 4 (40.0%) | 4 (40.0%) | 7 (58.3%) | 6 (50.0%) | 11 (50.0%) | 10 (45.5%) |
| | 1 (10.0%) | 1 (10.0%) | 2 (16.7%) | 3 (25.0%) | 3 (13.6%) | 4 (18.2%) |
| | | | | | | |
| | | | | | | |

| <u>20. How often do you make a list before going shopping?</u> | In Person | | Online | | Combined | |
|---|------------------|-------------|---------------|-------------|-----------------|-------------|
| | Pre | Post | Pre | Post | Pre | Post |
| (1) Never | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| (2) Rarely (about 20% of the time) | 2 (20.0%) | 3 (30.0%) | 1 (8.3%) | 1 (8.3%) | 3 (13.6%) | 4 (18.2%) |
| (3) Sometimes (about 40% of the time) | 0 (0%) | 0 (0%) | 2 (16.7%) | 1 (8.3%) | 2 (9.1%) | 1 (4.5%) |
| (4) Often (about 60% of the time) | 2 (20.0%) | 3 (30.0%) | 2 (16.7%) | 2 (16.7%) | 4 (18.2%) | 5 (22.7%) |
| (5) Usually (about 80% of the time) | 5 (50.0%) | 3 (30.0%) | 4 (33.3%) | 1 (8.3%) | 9 (40.9%) | 4 (18.2%) |
| (6) Always | 1 (10.0%) | 1 (10.0%) | 3 (25.0%) | 7 (58.3%) | 4 (18.2%) | 8 (36.4%) |

Appendix B. Pre and Post Quantitative Survey



NAME

☐ ENTRY ☐ EXIT

DATE

/ /

Expanded Food and Nutrition Education Program Food & Physical Activity Questionnaire

Please mark the response that **best** describes how you **usually** do things.

1. How many **times a day** do you eat fruit?

Examples of **fruits** are apples, bananas, oranges, grapes, raisins, melon and berries. Include fresh, frozen, dried, or canned fruit. **Do not include juice.**

- ☐ I rarely eat fruit
- ☐ Less than 1 time a day (a couple times a week)
- ☐ 1 time a day
- ☐ 2 times a day
- ☐ 3 times a day
- ☐ 4 or more times a day

2. How many **times a day** do you eat vegetables?

Examples of **vegetables** are green salad, corn, green beans, carrots, potatoes, greens, and squash. Include fresh, canned and frozen vegetables. **Do not count french fries, potato chips or rice.**

- ☐ I rarely eat vegetables
- ☐ Less than 1 time a day (a couple times a week)
- ☐ 1 time a day
- ☐ 2 times a day
- ☐ 3 times a day
- ☐ 4 or more times a day

3. Over the last week, **how many days** did you eat red and orange vegetables?

Examples of **red or orange vegetables** are tomatoes, red peppers, carrots, sweet potatoes, winter squash, and pumpkin.

- ☐ I did not eat red and orange vegetables
- ☐ 1 day a week
- ☐ 2 days a week
- ☐ 3 days a week
- ☐ 4 days a week
- ☐ 5 days a week
- ☐ 6 or 7 days a week

4. Over the last week, **how many days** did you eat dark green vegetables?

Examples of **dark green vegetables** are broccoli, spinach, dark green lettuce, turnip greens, or mustard greens.

- ☐ I did not eat dark green vegetables
- ☐ 1 day a week
- ☐ 2 days a week
- ☐ 3 days a week
- ☐ 4 days a week
- ☐ 5 days a week
- ☐ 6 or 7 days a week

5. How often do you drink regular sodas (not diet)?

- ☐ Never
- ☐ 1–3 times a week
- ☐ 4–6 times a week
- ☐ 1 time a day
- ☐ 2 times a day
- ☐ 3 times a day
- ☐ 4 or more times a day

6. How often do you drink fruit punch, fruit drinks, sweet tea or sports drinks?

- ☐ Never
- ☐ 1–3 times a week
- ☐ 4–6 times a week
- ☐ 1 time a day
- ☐ 2 times a day
- ☐ 3 times a day
- ☐ 4 or more times a day

There is more on the next page ➔
EFNEP-20Q-AUG17-PP1

7. In the past week, how many days did you exercise for at least 30 minutes?

This includes things like jogging, playing soccer, and doing fitness or dance classes, or exercise videos. This 30 minutes could be all at once or 10 minutes or more at a time. Do not count housework, taking care of your kids, or walking from place to place.

- | | |
|---------------------------------|---------------------------------|
| <input type="checkbox"/> 0 days | <input type="checkbox"/> 4 days |
| <input type="checkbox"/> 1 day | <input type="checkbox"/> 5 days |
| <input type="checkbox"/> 2 days | <input type="checkbox"/> 6 days |
| <input type="checkbox"/> 3 days | <input type="checkbox"/> 7 days |

8. In the past week, how many days did you do workouts to build and strengthen your muscles?

This includes things like lifting weights and doing push-ups, sit-ups or planks.

- | | |
|---------------------------------|---------------------------------|
| <input type="checkbox"/> 0 days | <input type="checkbox"/> 4 days |
| <input type="checkbox"/> 1 day | <input type="checkbox"/> 5 days |
| <input type="checkbox"/> 2 days | <input type="checkbox"/> 6 days |
| <input type="checkbox"/> 3 days | <input type="checkbox"/> 7 days |

9. How often do you make small changes on purpose to be more active?

This includes things like walking instead of driving, getting off the bus one stop early, doing a few minutes of exercise, or moving around instead of sitting while watching TV.

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

10. How often do you wash your hands with soap and running water before preparing food?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

11. After cutting raw meat or seafood, how often do you wash all items and surfaces that came in contact with these foods?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

12. How often do you thaw frozen food on the counter or in the sink at room temperature?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

13. How often do you use a meat thermometer to see if meat is cooked to a safe temperature?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

14. In the past month, how often did you eat less than you wanted so there was more food for your family?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

15. In the past month, how often did you not have money or another way to get enough food for your family (such as SNAP, WIC, or a food pantry)?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

16. How many days a week do you cook dinner (your main meal) at home?

- ☐ I rarely cook dinner at home
- ☐ 1 day a week
- ☐ 2 days a week
- ☐ 3 days a week
- ☐ 4 days a week
- ☐ 5 days a week
- ☐ 6 or 7 days a week

17. How often do you compare food prices to save money?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

18. How often do you plan your meals before you shop for groceries?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

19. How often do you look in the refrigerator or cupboard to see what you need before you go shopping?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

20. How often do you make a list before going shopping?

- ☐ Never
- ☐ Rarely (about 20% of the time)
- ☐ Sometimes (about 40% of the time)
- ☐ Often (about 60% of the time)
- ☐ Usually (about 80% of the time)
- ☐ Always

Appendix C: Delivery Preferences Survey**Mission Nutrition**

We are conducting a survey on delivery preferences for a nutrition education program. There are a number of different ways the program could be delivered, but the content would be as described regardless of delivery methods. We have a brief description of the program on the next page. We would like to hear from you to help us plan the best way to deliver this program. Please read the description of the program components, then take the brief survey about how the education program could be delivered. The survey should take about 5 minutes or less. Please check the box next to each answer you choose and click the submit button after taking the survey

Q1 The program is delivered as an online program that can be done on your own time.

- ☐ I would always prefer this delivery method. (1)
 - ☐ I would prefer this delivery method during COVID-19. (2)
 - ☐ If COVID-19 were not an issue, I would prefer this method. (3)
 - ☐ I would never prefer this delivery method. (4)
-

Q2 The program is delivered as an in-person program that includes hands on activities.

- ☐ I would always prefer this delivery method. (1)
 - ☐ I would prefer this delivery method during COVID-19. (2)
 - ☐ If COVID-19 were not an issue, I would prefer this method. (3)
 - ☐ I would never prefer this delivery method. (4)
-

Q3 The program is delivered online with some in-person sessions that include hands on activities.

- ☐ I would always prefer this delivery method. (1)
 - ☐ I would prefer this delivery method during COVID-19. (2)
 - ☐ If COVID-19 were not an issue, I would prefer this method. (3)
 - ☐ I would never prefer this delivery method. (4)
-

From the program delivery method(s) you preferred the most above, please answer the following questions:

Q4 How confident are you that you would participate in a program using your preferred delivery method?

- ☐ Not at all confident (1)
- ☐ Slightly confident (2)
- ☐ Neutral (3)
- ☐ Mostly confident (4)
- ☐ Completely confident (5)

Q5 How likely is it that you would benefit from a program like this?

- ☐ Not at all likely (1)
 - ☐ Slightly likely (2)
 - ☐ Neutral (3)
 - ☐ Mostly likely (4)
 - ☐ Very likely (5)
-

Q6 How beneficial do you think this program would be for you and your family?

- ☐ Not at all beneficial (1)
 - ☐ Slightly beneficial (2)
 - ☐ Neutral (3)
 - ☐ Mostly beneficial (4)
 - ☐ Very beneficial (5)
-

Q7 What number and duration of sessions would you prefer:

- ☐ There are 6 sessions; each will be 2 hours. (1)
 - ☐ There are 12 sessions; each will be 1 hour. (2)
-

From the number of sessions you preferred in question 7, please answer the following questions:

Q8 How confident are you that you would attend all of the program sessions?

- ☐ Not at all confident (1)
 - ☐ Slightly confident (2)
 - ☐ Neutral (3)
 - ☐ Mostly confident (4)
 - ☐ Completely confident (5)
-

Q9 How likely is it that you would benefit from a program like this?

- ☐ Not at all likely (1)
 - ☐ Slightly likely (2)
 - ☐ Neutral (3)
 - ☐ Mostly likely (4)
 - ☐ Very likely (5)
-

Q10 How beneficial do you think this program would be for you and your family?

- ☐ Not at all beneficial (1)
 - ☐ Slightly beneficial (2)
 - ☐ Neutral (3)
 - ☐ Mostly beneficial (4)
 - ☐ Very beneficial (5)
-

Q11 What frequency of sessions would you prefer?

- ☐ The sessions occur 2 times a week. (1)
 - ☐ The sessions occur once a week. (2)
 - ☐ The sessions occur every two weeks. (3)
-

From the frequency you preferred in question 11, please answer the following questions:

Q12 How confident are you that you would you attend all of the program sessions?

- ☐ Not at all confident (1)
 - ☐ Slightly confident (2)
 - ☐ Neutral (3)
 - ☐ Mostly confident (4)
 - ☐ Completely confident (5)
-

Q13 How likely is it that you would benefit from a program like this?

☐ Not at all likely (1)

☐ Slightly likely (2)

☐ Neutral (3)

☐ Mostly likely (4)

☐ Very likely (5)

Q14 How beneficial do you think this program would be for you and your family?

☐ Not at all beneficial (1)

☐ Slightly beneficial (2)

☐ Neutral (3)

☐ Mostly beneficial (4)

☐ Very beneficial (5)

General Questions

Q15 What is your current level of knowledge about Nutrition and diet?

- ☐ Not at all knowledgeable (1)
- ☐ Slightly knowledgeable (2)
- ☐ Neutral (3)
- ☐ Mostly knowledgeable (4)
- ☐ Very knowledgeable (5)
-

Q16 What is your current level of knowledge about Physical Activity?

- ☐ Not at all knowledgeable (1)
- ☐ Slightly knowledgeable (2)
- ☐ Neutral (3)
- ☐ Mostly knowledgeable (4)
- ☐ Very knowledgeable (5)
-

Q17 How confident are you in your knowledge about healthy lifestyle factors such as nutrition, diet, and physical activity?

- ☐ Not at all confident (1)
 - ☐ Slightly confident (2)
 - ☐ Neutral (3)
 - ☐ Mostly confident (4)
 - ☐ Completely confident (5)
-

Q18 How likely is it that you would make healthy changes to your diet and physical activity if you learned more about these topics?

- ☐ Not at all likely (1)
 - ☐ Slightly likely (2)
 - ☐ Neutral (3)
 - ☐ Mostly likely (4)
 - ☐ Very likely (5)
-

Demographics

Q19 What is your gender?

- ☐ Male (1)
- ☐ Female (2)
- ☐ Non-binary / third gender (3)
- ☐ Prefer not to say (4)
-

Q20 What is your age?

- ☐ < 31 years old (1)
- ☐ 31 - 45 years old (2)
- ☐ 46 – 55 years old (3)
- ☐ > 56 (4)
- ☐ Prefer not to answer (5)
-

Q21 Are you of Hispanic, Latino, or Spanish origin?

- ☐ Yes (1)
- ☐ No (2)
-

Q22 What is your race?

- ☐ White (1)
- ☐ Black or African American (2)
- ☐ American Indian or Alaska Native (3)
- ☐ Asian (4)
- ☐ Native Hawaiian or Pacific Islander (5)
- ☐ Other (6)
-

Q23 Do you have any children under the age of 18?

- ☐ Yes (1)
- ☐ No (2)
-

Q24 What is your highest education level?

- ☐ Some High School (1)
 - ☐ High School Diploma (2)
 - ☐ Associate's Degree (3)
 - ☐ Bachelor's Degree (4)
 - ☐ Master's Degree (5)
 - ☐ Ph.D. or higher (6)
 - ☐ Trade School (7)
 - ☐ Prefer not to say (8)
-

Q25 Do you work from home?

- ☐ Yes, before COVID-19 (1)
 - ☐ Yes, only during COVID-19 (2)
 - ☐ No (3)
-

Q26 What is your confidence level using a computer?

- ☐ Not at all confident (1)
 - ☐ Slightly confident (2)
 - ☐ Neutral (3)
 - ☐ Mostly confident (4)
 - ☐ Completely confident (5)
-

Q27 What type of learning do you prefer? (check all that apply)

- ☐ In a classroom environment (1)
- ☐ Reading materials (2)
- ☐ Watching videos (3)
- ☐ Online classroom environment (4)