PARENT FEEDING STRATEGIES AND THEIR ASSOCIATION WITH PRESCHOOLERS' WEIGHT STATUS AND DIET QUALITY IN LOW INCOME FAMILIES

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ABSTRACT

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The purpose of the Eat Healthy study (EH), A Parent's Guide to Raising a Healthy Eater, was to improve parent feeding strategies, as well as the preschooler's diet quality and weight status. Paraprofessional educators delivered 1-6 lessons to 152 Supplemental Nutrition Assistance Program Education (SNAP-Ed) eligible parents in four Michigan counties using a combination of home visits and phone calls. They collected demographic, anthropometric, Parent Feeding Behavior Questionnaire (PFBQ) and Block Kids Food Screener (BKFS) data at baseline and at a 3-month follow-up. Data were analyzed to compare control and intervention groups for parental feeding strategies, children's weight and diet quality at baseline and follow-up to examine associations. At the 3-month follow up, the EH study succeeded in improving three of eight parent feeding strategies: high control, high contingency and, mealtime behaviors using a valid and reliable instrument. The parents became less controlling, used less contingency and rewarding, and improved mealtime strategies such as no TV at meals and eating family meals. The EH was also successful in improving the diet quality of the preschoolers by increasing nutrient dense foods and decreasing energy dense foods. However the EH did not improve the weight status of the preschooler.

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KEY TO ABBREVIATIONS

BKFS: Block Kids Food Screener

BMI: Body Mass Index

DGA: Dietary Guidelines for Americans

EH: *Eat Healthy: Your Kids are Watching: A Parent Guide to Raising a Healthy Eater*

GEE: Generalized Estimating Equation

PFBQ: Parent Feeding Behavior Questionnaire

SNAP–Ed: Supplemental Nutrition Assistance Program Education

WIC: Special Supplemental Nutrition Program for Women, Infants and Children (WIC)

CHAPTER I. INTRODUCTION

Problem Statement and Rationale

Preschool children in families with limited resources have poor quality diets and a high rate of obesity that appear to relate, in part, to poor parental feeding strategies, but we do not know the degree to which such strategies can be improved. Childhood obesity has tripled in the last three decades in the United States (Ogden et al., 2010; Ogden and Carroll, 2012; Ogden et al., 2014) and women and children of low socio-economic status demonstrate poor diet quality and higher rates of obesity and chronic diseases compared to those with middle income (Darman & Drewnowski; 2008, & May et al., 2013). Low intakes of nutrient-dense foods such as fruits and vegetables, low fat dairy products, and whole grains, and high intake of energy dense, low-nutrient foods like sweets, snack chips, and sweet beverages are the main dietary issues for low income families (Kranz, 2006; Power et al. 2006; Nicklas & Hayes, 2008).

Healthy food environments play a major role in the diet quality of young children (Anderson & Whitaker, 2010) and parents play a central part in teaching their young children how to become healthy eaters (Fisher & Birch, 2007). Parents are role models during early childhood, model eating behaviors and food selection for their children, serve as the primary determinant of the food environment in providing the foods and the food structures in the home (Scaglioni & Salvioni, 2008).

Parenting practices are, by definition, behaviors or strategies that parents use to get their children to do something specific; in the case of feeding strategies, this is to impact children's food choices and consumption. Parental strategies are embedded within the general parental style definition (Baumrind, 1989; Ventura & Birch, 2008), but are not synonymous with styles.

Some consider parenting style to be an inherent trait and not easily changed, whereas behavioral strategies can be altered (Hughes et al., 2005; Hughes et al., 2008). Many research studies in predominantly white middle income families have found that parental food restriction or pressure to eat, are feeding strategies which negatively relate to children's self-regulation and satiety (Fisher, 2002). Food restriction, a highly controlled feeding strategy, has been associated with children being overweight (Clark, 2007). On the other hand, parents with permissive feeding style such as indulgent or uninvolved had children with low intakes of nutritionally dense foods like fruits, vegetables and low fat dairy (Hoerr et al., 2009). Furthermore, permissive parenting styles have also been associated with increased obesity in children (Rhee et al., 2006).

So far, several studies have attempted to change parents' feeding strategies in order to address obesity in toddlers, preschoolers or older children (Dicken et al.,2014 ; Lent et al, 2011; Horodynsi et al., 2011; Ostbye et al., 2011; West et al.,2010; Harvey-Berino et al., 2003). Although difficult to compare, it appears that interventions using both in-home and group lessons have been effective in improving some parent feeding strategies associated with improved child diet quality and lower child BMI Z-scores for those considered overweight or obese. Only one study, however, showed reduction in obese children's BMI Z-score, and this was for middle income parents (West et al., 2005). The feeding strategies most frequently targeted appeared to be parents providing healthy foods in the household, role modeling, offering food choices within limits, and less restrictive feeding.

In 2007, no evidence-based interventions were available for use with low-income families of preschoolers such as those in the Head Start program. In addition, almost all research with parent feeding strategies was done on white middle-income families (Birch 2001, Fisher et al., 1999; Fisher, 2002). Therefore, researchers in mid-Michigan conducted studies to determine

which parental feeding strategies were most associated with good diet quality and healthy weight status in children (Murashima et al., 2011; Murashima et al., 2012). From these findings, intervention materials appropriate for low income and low literacy audiences were developed and pilot tested (Reznar, 2012; Reznar et al., 2014). Following revisions to the materials, a random clinical trial was conducted 2013-14 with 152 low income parents of preschoolers who received an intervention called, **Eat Healthy (EH), Your Kids are Watching: A Parent Guide to Raising a Healthy Eater.**

Eat Healthy (EH), Your Kids are Watching: A Parent Guide to Raising a Healthy Eater was designed for low-income parents of preschool children to help them improve their feeding strategies. The materials target those feeding strategies found most associated with normal weight status of the preschooler (Murashima, 2012). These strategies included availability of healthy foods, parent modeling of healthy foods, encouragement to try new foods, mealtime structures, and regular timing of meals and snacks. The disadvantages of negative feeding strategies such as highly controlling feeding behaviors using contingency (reward and punishment), availability of unhealthy foods, and parent modeling of unhealthy foods were also included in the lessons. EH consists of five lessons and 2-3 minute videos that were delivered to Supplemental Nutrition Assistance Program Education (SNAP-Ed) eligible parents of preschool children age (2½-5 years). Educators taught EH to parents in four Michigan counties using a combination of home visits and phone calls. The lesson topics were: 1) Kids are what they eat**;** 2) Be a good role model**;** 3) Ways to praise at meals; 4) Making mealtime family time and fun**;** 5) Learning to eat healthy. EH comprised the intervention from which this secondary data analysis was conducted to determine the intervention's efficacy to improve parent feeding strategies and child diet quality and weight status.

To achieve this goal, the following research questions and hypotheses were addressed:

Research Questions and Hypotheses (See operational definitions that follow the hypotheses.)

<u>At baseline</u>

Research question 1.1: What is the relationship between *parent feeding strategies and child weight status and BMI* percentiles **at baseline**?

Ho 1.1a: Preschoolers in low-income families whose parents have negative feeding strategies will be overweight /obese.

Ho1.1b: Preschoolers in low-income families whose parents have positive feeding strategies will be less overweight /obese.

Question 1.2 What is the relationship between *parent feeding strategies and diet quality* of their preschoolers?

Ho 1.2a: Preschoolers in low-income families whose parents have negative feeding strategies will have poor diet quality.

Ho 1.2b: Preschoolers whose parents have positive feeding strategies will have improved diet quality.

<u>At the post- intervention</u>

Research question 2: What impact does a six-week parent intervention, focusing on child feeding have on parent feeding strategies of preschoolers compared to parents who do not participate?

Ho 2.1: Feeding strategies of parents in the EH intervention group will improve compared to the control group, comparing the baseline and the post–test.

<u>At the 3-month follow-up</u> (after the end of the intervention)

Research Question 3: What impact does a six-week parent intervention focusing on child feeding have on: (a) parent feeding strategies of preschoolers; (b) the preschoolers' diet quality; and (c) preschoolers' weight status as compared to their baseline measurements?

Ho 3.1: There will be an improvement in positive parent feeding strategies, and a decline in negative feeding strategies.

Ho 3.2: There will be an improvement in dietary indicators reflecting good diet quality and a decline in those reflecting poor diet quality**.**

Ho 3.3: There will be fewer overweight and obese preschoolers (BMI of ≥85 percentile), and/or a decline in average BMI percentiles for those who are overweight and or obese.

Operational Definitions

Preschooler's BMI percentile

Body Mass Index (BMI=wt in kg/ht in m^2) in percentiles by age and gender according to CDC's growth charts for children. (www: cdc.gov)

This variable can be continuous or categorized as follows:

Underweight = 0-4.99th percentile

Normal weight = 5-84.99th percentile

Overweight =85-94.99th percentile

Obese =95-100th percentile

Parental BMI

This variable can be continuous or categorized as follows: (World Health Organization- http://apps.who.int/bmi/index.)

Underweight = 0-18.49

Normal Weight =18.5-24.99

Overweight = 25-29.99

Obese 1: 30-34.99

Obese 2: 35-39.99

Obese 3: 40-49.99

Obese 4: 50-100

Parental feeding strategies

Derived from the 29-item Likert Scaled Parental Feeding Behavior Questionnaire (PFBQ) (See **Appendix A**) scored as 1= never, 2=rarely, 3=sometimes, 4=most of the time, 5=always, where high scores indicated a more positive behavior for each construct (Murashima et al., 2012; Reznar et al., 2014). The PFBQ was administered at baseline, post-test, and at a 3-month follow-up.

These items comprised six multi-items and two single-item constructs as follows, with the first four considered negative feeding strategies and the last four considered positive feeding strategies.

1) **High Control** feeding strategies= parents score ≥4 for three items such as, "I beg my child to eat dinner";

2) **High Contingency** feeding strategies= parents score ≥4 for four items such as, "I warn my child that I will take a food away if the child doesn't eat , for example, "If you don't finish your vegetables, you won't get dessert";
3) **Permissive feeding time=** parents score ≥4 for three items such as, "I allow my child to eat whenever he or she is hungry";
4) **Indulgent mealtime behavior=** parents score ≥4 for five items such as, "I allow my child to play and watch TV during meals";
5) **Healthy Availability and Modeling=**parents scored ≥4 for five items such as, "I keep sweets, candy or salty snacks where my child can reach them" (reverse scored);
6) **Child-centered feeding** = parents scored ≥4 for six items such as, " I say something positive about the food";
7) **Milk modeling=**parents scored ≥4 for one item, " I drink milk in front of my child";
8) **Fruit and vegetable modeling=**parent scored ≥4 for one item, "I eat fruits and vegetables in front of my child."

Diet Quality

The diet quality indices were developed from parental responses to the Block Kids Food Screener (**See Appendix D**) for the preschooler's food intake the previous week. Parents completed this screener twice—both at baseline and at the 3 month follow-up. Diet quality indices can be categorized as those reflecting a nutritionally balanced diet versus one that is energy-dense.

Rather than a composite score for diet quality like the Healthy Eating Index-2005, a series of sentinel indicators were used. For example, a preschooler with **poor diet quality** might consume 2% or whole milk, sweetened beverages, more than 6 fl oz of fruit juice a day,

sweetened cereals, and few fruits or vegetables. On the other hand, **high diet quality** for a preschooler might include: nonfat or 1% fat milk, frequent vegetable consumption, 1-2 cups vegetables per day, and 1-2 cups of fruits per day. Indicators of good diet quality (by frequency or cup equiv) included fruits, vegetables and low fat milk. Likewise, energy-dense diet indicators were for frequency of sugary beverages, sweets, snack chips, etc.

CHAPTER II. LITERATURE REVIEW

This literature review covers several topics relevant to this research such as: children's diet quality, child obesity, the home food environment and parent feeding strategies and styles. The review will conclude with the evaluation of intervention studies that attempted to improve parent feeding behaviors, the children's diet quality and/or weight status. For purposes of this study, young children are those less than five years of age, preschoolers are those ages 3-5 years, and toddlers, 1-3 years of age. The focus group of this study was families with limited resources who had a child from 2½-5 years of age.

Diet Quality

The diet quality of children age 2-5 years is of great concern because rapid physical growth and development occur during this stage (Savage et al., 2007). The National Health and Nutrition Examination Survey (NHANES) revealed that the nutrients in the diets of most children 2-5 years of age were below what is recommended. Using the Healthy Eating Index-2010 to evaluate dietary intake for children ages 2-17 years showed that all scores were below the standards, except for dairy and protein which were close to 100%. The diet of the children was low in whole grains, dark greens and green vegetables (Center for Nutrition Policy and Promotion, 2013). Other research on young children from low income families, found that they were consuming low amounts of dairy, fruits and vegetables (Hoerr et al., 2008, Patrick et al., 2005).

The 2010 Dietary Guidelines for Americans (DGA), recommendations for preschool children are to maintain calorie intake at 1000 Kcal for those ages 2-3 years and at 1200-1400 Kcal for children ages 4-8 years. This recommendation was based on sedentary lifestyle of less

than 30 minutes of daily physical activity. The DGA also recommended that children 2-3 years old consume 3 oz grain, 2 oz lean meat, 1 cup fruits and 1 cup vegetables per day. Children ages 4-8 years should consume 4-5 oz grain, 3 oz lean meat, 1-1½ cups fruits, and 1½ cups vegetables per day. For both ages, the DGA recommended 2 cups of fat free or low fat milk (≤1%) per day (Dietary Guidelines for Americans, 2010). (See **Tables 1** and **2).**

Table 1. Dietary Guidelines for Young Children for Energy and Food Groups, DGA (2010)

Category	**2-3 years of age requirements**	**4-8 years of age requirements**
Total calories	1000 Kcal	1200 -1400 Kcal
Grains	3 oz.	4-5 oz.
Lean meat	2 oz.	3 oz.
Fruits	1 cup	1-1 ½ cup
Vegetables	1 cup	1 ½ cup
Low fat milk	2 cups	2 cups

Table 2. Dietary Guidelines for Micronutrients by Young Children, DGA (2010)

Component	**Recommendation**	
	1-3 years of age	**4-8 years of age**
Fiber(g/d)	19	25
Cholesterol (mg/d)	<300	<300
Vitamin A(mcg RAE/d)	210	275
Vitamin E (mg/d)	5	6
Total Folate	120	160
Calcium (mg/d)	500	800
Magnesium (mg/d)	65	110
Phosphorous (mg/d)	380	405
Iron (mg/d)	3.0	4.0
Zinc (mg/d)	2.4	4.0
Potassium (mg/d)	3000	3800

Krebs-Smith et al. (2010) using national dietary data found that the majority of the United States' children did not meet the recommendations for food groups, except for grains, fat, meat, sugar, and beans. The same researchers evaluated the top dietary sources of energy, solid fats, and added sugars among 2-18 year olds in the United States. Top food sources for these

three were grain desserts, pizza and sugar sweetened beverages including soda and fruit drinks. The same study reported that 40% of total energy consumption was from empty calories implying that poor diet quality was high in energy-dense foods and low in nutrient-dense foods.

Only a few studies have examined children's diet quality in combination with parental feeding strategies among low income families. Murashima et al. (2012) and Hoerr et al. (2009) studied low income families and found that diet quality of Head Start children ages 3-5 years with highly controlling parents was better than when the children had parents who used indulgent feeding practices. They also found that non directive feeding control (such as praising and encouraging to eat) was associated with heathier diet intake of the preschoolers. A cross-sectional study of low socio- economic status families in Israel with slightly older children age 5-6 years old found that encouragement and parental modeling of healthy eating were associated with an increase of fruits and vegetables, reflecting a better diet quality (Entin et al.; 2008). Parental food restriction was associated with consumption of low nutrient-density foods like sweets. Improving the diet quality of children from low income families is very important and relevant to this study on the effectiveness of the EH curriculum.

Obesity

Childhood obesity rates in the United States have tripled in the last three decades. Approximately 32% of children and adolescents ages 2-19 years are overweight or obese, with 17% of children obese (Ogden et al., 2012& Ogden et al., 2014). Today nearly one in three children is overweight or obese. In 2009-2010, the prevalence of obesity was 12.1% among US children 2-5 years of age with especially high rates among African Americans (18.9%) and Hispanics (16.2%) (Ogden et al., 2012). In Michigan, the numbers decreased from 13.9% in

2009 to 13.3% in 2011 (May et al., 2013). Women and children in low income families are experiencing higher rates of obesity and chronic diseases compared to higher socio-economic groups (Williams et al., 2008). In general, low socioeconomic status is related to high rates of obesity (Darman & Drewnowski, 2008). To help decrease the obesity among children, some investigators recommend addressing parent feeding strategies and the home food environment (Scaglioni & Salvioni, 2008).

Home Environment

Parents provide environments for their children's early experiences with food and eating (Birch & Davison, 2001). The home food environment includes two factors. First, is the physical environment such as availability and accessibility of food. The second is the behavioral environment such as self-efficacy to change, self-regulation abilities, and feeding strategies parents use with their children (Martin-Biggers et al., 2014). Many studies have linked home environment to child obesity via provision of an unlimited, convenient supply of energy dense foods coupled with low levels of physical activity (Bryant & Stevens, 2006).

This link between the home food environment and child obesity has been of such great concern that the Food and Nutrition Service, United States Department of Agriculture heavily promoted a campaign to improve the home food environment and provide tips on how to increase the intake of nutritious foods. The key messages included: 1) increase fat free milk and low fat milk and milk products, 2) increase intake of whole grains; and 3) improve child feeding practices. The eating of family meals encourages parents to discuss with their children the benefits of each food item, for example milk builds bones and muscles (www.fns.usda.gov/tipsformoms.htm).

Anderson and Whitaker (2010) found that preschool children in the US exposed to three routines had approximately 40% lower prevalence of obesity than those who were exposed to none of the three routines. These routines included regularly eating the evening meals as a family, adequate night time sleep, and having limited TV viewing time. This study supports the importance of the home food environment as a parent feeding strategy to develop a young healthy eater, which is an interest being addressed in this study. The EH intervention aimed to improve the home environment by increasing the availability of fruits and vegetables and by limiting children's access to sweets, candy and sweetened beverages.

Parent Feeding Strategies Versus Parenting Styles or Feeding Styles

Research on the effect of parent behaviors on their children's food intake and weight status has been confounded somewhat by use of different terms. As described in the glossary, **parenting styles** are considered to be very stable characteristics that refer to overall parenting as measured by standardized instrument (Baumrind, 1989). Nearly a decade ago, Rhee et al. (2006) found that children of permissive parents had increased obesity. Since then child development researcher Sheryl Hughes validated a feeding specific instrument for **parent feeding styles**. Its use in several studies have resulted in consistently finding parents with permissive feeding styles (indulgent or non-involved) to have children with the poorest diet quality intake of nutrient dense foods such as fruits and vegetables, 100% juice and dairy (Hoerr, et al., 2009; Couch et al., 2014) and who were the most obese (Hughes, 2006; Couch et al., 2014; Frankel et al., 2014). Frankel and colleagues further found that the relationship between permissive feeding style and high BMI-Z score to be mediated by the child's lessened ability to self-regulate around food. These findings of permissive feeding styles and BMI Z-scores in low income families are in contrast to

those of Birch et al. (1999) with middle income parents. Birch found the authoritarian parent feeding style was associated with a higher BMI for the children.

If parenting styles or parent feeding styles are considered stable, however, then the focus of educators is best spent on **parents' feeding strategies** that have potential for change. Studies suggest that parent feeding strategies have a great effect on children's weight status and diet quality (Birch et al., 2001, Hughes et al. 2008). Child feeding strategies determine the availability of various foods and beverages, the portion sizes that children are offered, the frequency of eating occasions, and the social context in which eating occurs (Ogden et al., 2006). Children 5 years of age and younger start to learn when, where and how to eat (Lent et al., 2012; Savage et al., 2007). Child feeding strategies are considered behaviors that parents use to get children to do something specific.

Control in child feeding is defined as "strategies that the parent performs for the child to achieve healthy eating or consume the recommended amounts of nutrient dense foods and limited amounts of energy dense foods" (Hughes et al., 2006; Murashima et al., 2012). Control for child feeding strategies can be further divided into **directive control** and **non-directive control**. **Directive feeding control** is when parents put external pressure on the child to eat a healthy diet. Directive feeding control can also be divided into **high control**, where parents verbally, psychologically and physically pressure the child to eat and **high contingency,** where the parents threaten or reward the child to eat. Some examples are pressure to eat, monitoring, rewards/threats and food restriction (Ogden et al., 2006; Hughes et al. 2008; Megumi et al. 2012). **Non- directive feeding control** is when parents interact with the child to motivate him/ her to eat a healthy diet by internalizing the goal. Some examples are encouraging, complementing, modeling and reasoning (Hughes et al. 2008; Megumi et al. 2012). For **non-**

directive feeding control, two sub-constructs are in this category: **child centered feeding**, such as rearranging foods to make them interesting, including healthy foods the child enjoys and complementing the child when she/he eats. The second is **food environmental controls** which are strategies where parents provide a healthy and organized home food environment with family rules around eating to help the child eat a healthy diet. This can be further divided into: **food availability,** where parents keep or do not keep certain types of foods in the house (Brown et al., 2008); **mealtime behaviors,** where parents set rules during meals such as sitting at a table, eating together and not viewing TV during meals (Hoerr et al., 2005); and **timing of the meals,** where parents set regular meal and snack times for the child and family (Baughcum et al., 2001).

Research on Parent Feeding Strategies Relating to Children's Diet Quality and Weight Status

Most, but not all, studies have shown that food restriction, a highly controlled feeding strategy, to be associated with children being overweight (Clark, 2007; Fisher, 1999; Thompson et al. 2009). Powers et al. (2006) studied 296 low income African American women with preschool children. Among these low-income African Americans, there was a positive association between maternal food restriction and control in feeding and their preschoolers' BMI, but this was limited to obese mothers. On the other hand, parents with permissive feeding practices had children with low intake of nutritionally balanced foods like fruits, vegetables and low fat dairy (Hoerr et al., 2009). Entin et al. (2008) studied low socio- economic status families in Israel with children aged 5-6 years and found food restriction to be associated with consumption of low density food such as sweets and junk food. Campbell et al. (2006) studied 5-6 year-old children in Australia and found increased TV viewing time associated with childrens' increased energy intake, increased sweet snack and high-energy drink consumption,

and deceased vegetable intake. Two studies found parent's modeling of fruits and vegetables associated with their children's intake of these foods. While this study did not investigate food restriction, it did examine high feeding control and high contingency feeding control as well as the other feeding strategies mentioned.

Intervention Studies to Change Parent Feeding Strategies and Affect Child Weight and Food Intake

So far, nine studies have been located that attempted to change parent feeding strategies in order to reduce risk for child obesity as shown in **Table 3**. Each will be briefly summarized here. Harvey-Berino and Rourke (2003) studied overweight and obese Native American moms and their children ages 9-36 months. The intervention included the delivery of 11 home lessons in 16 weeks. One of the lessons compared the restrictive vs permissive parental feeding strategies. The intervention group of parents reduced their food restriction significantly compared to the control group, the weight-for-height Z-score also declined for the intervention group compared to those in the control group. This was a small study that had a control group, but no follow-up measures.

Healthy Children, Healthy Families (HCHF): Parents Making a Difference! provided an eight week lesson series of 90-minute sessions through EFNEP in New York State (Dickens et al., 2014; Lent et al., 2012). Participants were low income families (at 185% of poverty level or below) and their children age 3-11 years old. Four categories of positive parenting practices to promote healthful eating and activity at home were chosen to assess parent behavior change: (1) demonstrating role modeling; (2) helping children feel good about themselves; (3) offering choices with limits; and (4) shaping home environment. Mean scores for parent behaviors

improved significantly and improvements were also seen in consumption of low fat dairy, fewer sweet beverages, less screen time, increased physical activity, increased family meals and increased fruit and vegetable intake. This study was notable for addressing low income families and having a large sample, but it had no control group or weight measures.

Most recently, Skouteris et al., (2015), intervened with 201 middle income parent-child dyads of 2-4 year olds with 10 weekly 90 minute workshops for small groups of 6-10 child-parent dyads. They found significant positive group effects for increased vegetable and reduced snack food intakes, and child satiety immediately post intervention. At the 12 months follow-up, intervention children exhibited less neo-phobia than controls, but there was no change in weight status and dietary changes were not maintained at follow-up.

Fletcher et al., (2013) in New South Wales, Australia, studied 394 middle income parents of pre-schooners ages 3-5 years. The intervention comprised four 30-minute weekly phone calls for one month stressing parent modeling, the food environment and supportive food routines. Energy dense food like sweets, ice-cream and candy were assessed as was the home food environment and parental pressure to eat. The authors concluded that there was a significant decrease in the consumption of energy-dense foods in the intervention group at the 2 month follow-up compared to the control group, but the difference lost significance at the 6 month follow-up. There were no weight measures taken.

A pilot intervention study by Horodynski and Stommel (2005) was conducted with 96 low income families of Early Head Start children age 11-36 months. Four lessons, 90-minutes each, were offered over six months stressing parent food modeling, introducing new foods and parenting skills. One of several instruments used was the Child Parent Mealtime Behavior

Questionnaire (CPMBQ). The self-regulatory behavior of toddlers and their parents' knowledge of child feeding improved in the intervention group vs the control group. Weight status was no measured, but one day diet recalls were conducted. There was no follow-up with this small pilot study.

West et al. (2010) conducted an intervention study in Australia to improve parent feeding practices for prevention of obesity among 4-11 year old children in white and mostly middle income families. The 12-week intervention consisted of 90-minute group sessions and three 20 minute telephone sessions. Nutrition strategies, positive parenting strategies and physical activity strategies were taught to the parents in the intervention group. The 12-week intervention was associated with significant improvement in children weight status and weight related problem behavior. Diet was not assessed, however, and only 31 families participated in the one year follow-up.

Ostbye et al. (2012) conducted an intervention study targeting 400 obese women and their children 2-5 years of age in North Carolina. The intervention group received eight monthly mailed interactive kits which were followed each month by 20-30 minute phone calls. The kits provided and emphasized the following: (1) an authoritative parent style; (2) routines for sleep and meal times; (3) a supportive home environment; (4) role modeling of healthy eating and physical activity; and (5) improvement of feeding practices. This study resulted in a significant improvement in feeding practices, maternal dietary intake, reduction in sweet beverage intake, increased consumption of fruits and vegetables, as well as fewer dinners and snacks eaten in front of the TV. The outcomes of the intervention study by Ostbye et al. are promising for decreasing obesity by improving the parent strategies.

Tabak et al. (2012) mailed four newsletters and had two goal setting phone calls to 43 parents of 2-5 year olds in middle income families. Newsletters focused on healthy food availability, especially vegetables, offering food choice within limits, role modeling and encouraging vegetables. Compared to those in the control group, intervention parents reported increased availability of vegetables in the home, offering more fruits and vegetables as snacks and improved self-efficacy for managing their children's food and activity behaviors. No weights were measured and there was no follow-up.

To summarize, the intervention studies by Skouteris et al.(2015), Tabak et al. (2010) and Dickens et al.(2014) demonstrated improved diet quality and increased fruits and vegetable consumption of children. Likewsie, studies by Ostybe et al. (2012), Dickens et al. (2014) and Harvey-Beniro et al.(2003) showed some improved parent feeding strategies. West et al. (2010) and Harvey-Beniro et al. (2003) demonstrated short term improvement in children weight status, but the study by West and colleagues was with middle income families in Australia and the Harvey-Beniro study was with low income families and had no follow-up data. Fletcher et al. (2013), Dickens et al. (2014), Skouteris et al. (2015) demonstrated decreased use of sweets, snacks and sweet beverage. None of these studies used materials primarily targeting parent feeding strategies or instruments as comprehensive as the PFBQ.

Table 3. Summary of Intervention Studies to Change Parent Feeding Strategies and Affect Child Weight and Food Intake to Address Child Obesity in Young Children over Last Decade

Authors	Participants	Intervention	Outcomes	Comments
Skouteris et al., 2015	201 mid-income parent child dyads, 2-4 yo. New Zealand	10 weekly 90 min. workshop Groups of 6-10 child-parent dyads	• Increased intake of vegetables and less snacks for intervention group compared to control group • No wt change	• Assessments conducted at baseline, post intervention and 6 and 12 mo. • Assessed food intake and wt
Dickens et al., 2014	500 EFNEP parents of children 3-11 yo New York 2/3 Latino	**Healthy Children, Healthy Families,** Parents Making a Difference • 8 90-min lessons in small groups for 8 wk • Role modeling • Promoted Child self-esteem • Food choices within limits • Shaping the food environment	Improved scores for parents and children in: • low fat dairy • Less sweet beverage • Less screen time • Increase physical activity • Increased family meals • Increased FV intake	• Large sample • Pre vs 3 mo FU data, but no control group • No wt data • Avail in Spanish

Table 3 (cont'd)

Fletcher et al., 2013	394 mid-income parents of children 3-5 yo, Australia	Four 30-min weekly phone Focus on food modeling, meal structure and food environment Assessed energy dense foods	• Decrease in energy-dense foods by intervention group at the 2 month follow-up, but not significant at the 6 month FU. • Wt not measured	• 2 mo. and 6 mo. follow up • one month duration of intervention • No wt measures
Ostybe et al., 2012	400 White mid-income obese women and children 2-5 yo, in North Carolina	• 8 lessons mailed monthly followed by 20 min phone calls • Focused on authoritative parenting, Healthy food environment, Role modeling, Feeding practices	• No change in BMI Z score • Mothers used less food rewards • Reduced emotional feeding • Children spent less time in front of TV • More healthy foods in the home	• Large sample • Had Intervention and control groups
Tabak et al.,2012	White middle income in St. Louis, MO 43 parent child dyads, 2-5 yo	2 phone calls and 4 newsletters over 4 month Newsletters topics: Food availability, choice within limits, Making vegetables accessible, Snack preparation	• Increased availability of vegetable and vegetable offering for snacks in the intervention group • No wt measures	• RD conducted the phone call • No follow-up and small sample

Table 3 (cont'd)

West et al., 2010	101 White mid-income parents of OW/obese 4-11 yo in Australia	• 12 wk of 90 min group sessions • 3 phone calls (20 min) • Focused on modeling healthy eating and offering healthy Choices within limits	• Decreased BMI Z-scores • Increased parents' self-efficacy of managing their children weight related behavior • Diet no assessed	• Control and intervention groups • Only 31 in 1 year FU measures
Hordynski et al., 2005	43 Early Head Start mothers of children 6-30mo in rural Michigan.	**Nutrition Education Aimed at Toddlers (NEAT)** • 4 lessons, 90 min each for 4 mo. • Focus on parent modeling and introducing new foods	• Improved feeding self-regulation of toddlers in the intervention group more than the control group • Improved parent knowledge about child feeding • No change in wt or diet	• Intervention and control groups • Small sample • Low income, rural sample of diverse race-ethnicity
Harvey-Beniro et al., 2003	43 obese, Native American mothers of children 9-36 mo	• 11 home lessons in 16 hr/wk	• Decreased Ht and Wt. Z-scores • Decreased energy intake in children. • Parental food restriction declined in Rx group.	• Control and intervention groups • No follow-up

CHAPTER III. METHODS

Study Design

This study was a secondary data analysis. To collect the data, a quasi-experimental design was used wherein parents who volunteered to participate in a 6-week intervention plus a three month follow-up were randomly assigned to the intervention group or to a control group that received materials on general health. At the end of the first six-week intervention, an educator taught the EH program to the control group, making the study a crossover in design. Both groups received pre and post-tests as well as three-month follow-up assessments. See **Table 4** for study design.

Table 4. A Quasi-Experimental Study Design and Group Comparisons.

Thin brackets show effect of EH compared to matched control group. Thick brackets show EH program effect at 3 month follow-up for both groups and without a control group.

Week		Intervention group	Control Group
0		Pretest	Pretest
1-7		Eat Healthy Intervention	Booklet on general health tips
8		Post-test	Post-test
9-15		NA	Eat Healthy Intervention
16		NA	Post-test
20		Follow-up	NA
32			Follow-up

Sample and Recruitment

Beginning in April 2013, family nutrition educators recruited SNAP-Ed eligible families living within four Michigan counties-Genesee, Kent, Ingham and Van Buren—all in the Lower Peninsula and within a 90 minute drive from Michigan State University. Eligibility criteria included being a parent or guardian over the age of 18 years, literate in English, with a 2½ to 5 year old child living at home who did not have a health problem that interfered with eating. Parents were recruited from Head Start in Ingham County and from home visiting programs for preschoolers via Intermediate School Districts in the other counties using home educators in the other counties.

Procedures

Upon Human Subjects approval for this project from Michigan State University, MSU staff conducted two trainings for educators in the four counties: (See MSU Institutional Review (IRB) letter in **Appendix C**). All 22 educators completed the MSU Institutional Review training. When parents were recruited they signed a consent form (**Appendix B**) and the educators measured their height and weight as well as that of their target child. Parents completed a 39-item Block Kids Food Screener (BKFS) for their child's food intake over the past week, a Likert-scaled questionnaire about their child feeding behaviors (29 items), and a demographic form. Then, the outside evaluator randomly assigned parents to the intervention group (n=81) or the control group (n=77). At the post-test, educators collected feeding data from parents again using the PFBQ. At the three-month follow-up educators collected another BKFS, PBFQ, as well as heights

and weights from both the parent and child. This was done for both groups as shown in **Table 5**. At the follow-up parents received $25 gift certificates to a local food store.

Table 5. Types of Data Collected for Each Group over Time of the Lesson Delivery and Follow-Up

[a] Height and weight of parent and child.
[b] Block Kids Food Screener, for frequency of FV, Sweet beverage, etc.
[c] Parent Feeding Behavior Questionnaire, for high control, high contingency, availability of healthy foods, availability of sweets, meal time behaviors healthy modeling. Ht and Wt: Height and weight for BMI for adults and BMI percentiles for children.

Group	**Baseline Wk 0**	**Wk 1-7**	**Wk 8**	**Wk9-14**	**Follow- up (3 months)**
Intervention (Rx)	Ht and Wt [a] BKFS [b] PFBQ [c]	Rx. starts	PFBQ Post- test		Ht and Wt BKFS PFBQ Wk 12
Control	Ht and Wt BKFS PFBQ		PFBQ Post- test	RX starts	Ht and Wt BKFS PFBQ Wk27

Intervention

The EH intervention consisted of five lessons (one booklet each) and 2–3 minute videos delivered to parents of preschool children, 2½-5 years. Paraprofessional educators (n=22) taught EH to parents in four Michigan counties using a combination of three home visits and three phone calls alternated every other week. The lessons topics were: 1) kids are what they eat; 2) be a good role model; 3) ways to praise at meals; 4) making mealtime family time and fun; and 5) learning to eat healthy. The feeding strategies targeted were those associated most with normal weight status of the child and optimal food behaviors. These strategies included availability of healthy foods, parent modeling of healthy foods, encouragement to try new foods,

mealtime structure, and timing of meals and snacks. The disadvantages of negative feeding strategies such as highly controlling feeding behaviors, using contingency (reward and punishment), availability of unhealthy foods, and parenting modeling of unhealthy foods were also taught. After a 6-week intervention period with the first intervention group, 90 participants remained and were assessed for parent feeding behaviors at post-test and follow-up. After the post-test, educators also delivered the intervention to parents in the control group. Three experts in pediatric nutrition and two in developmental psychology reviewed all items for content validity according to the main constructs. Face validity was conducted with parents. The PFBQ was administered at baseline, post-test, and at a 3-month follow-up. **See Table 6** for a description of each lesson with teaching objectives and list of activities and video clips for each one.

Table 6. Curriculum Grid for Eat Healthy by Lesson, Concepts, Objectives and Activities

Topic	**1a** visit	**1b** phone	**2** visit	**3** phone	**4** phone	**5** visit
Title	**Kids are what they eat**		**Be a good role model**	**Ways to praise at meals**	**Making mealtime fun**	**Learning to eat healthy**
Key Concepts	Keep healthy foods in the home visible and available	Portion sizes for preschoolers are smaller than for adults	Be a good role model with food and drinks New foods can take time	Labeled praise helps your child understand what he/she does right	Make positive family mealtimes a priority Family meals benefit everyone	Use mealtime rules to reduce struggles
Teaching Objectives	Learn healthy vs unhealthy food choices. Explain why water is a better beverage choice than juice and fruit favored drinks. Recall what make the food healthy. List ways to make healthy fruits and vegetables snacks visible and accessible for children. List the number of servings of fruits ,vegetables and low fat dairy foods that a 4 years old need each day		List ways that you model healthy food eating for your child. Provide things you will say to influence your child eating behaviors. Identify how what you say influence your child's eating behavior	Recall the kinds of praise you give to you child for eating. Describe a child act where you can praise it. Give an example of child's behavior that you can ignore	Describe why preschooler likes rules. List 3 reasons why food should not be used as a reword List 3 benefits of letting your child help with food preparation. List 3 ways to make mealtime enjoyable for your family	List 3 strategies to encourage your child to learn to eat without pressure. List rules your family has for meal time. Explain how setting some rules at meal time reduce mealtime struggle

Table 6 (cont'd)

Topic	1a	Topic	1a	Topic	1a	Topic
Anchor	**Clip 1.1** Discuss the types of foods that parent keeps available Parent does food inventory pp4-5	**Clip 1.4** Discuss changes parents have seen in child's appetite	**Clip 2.1** Discuss who modeled food habits for the parent	**Clip 3.1** Discuss how the parent encourages and praises their child eating	**Clip 4.1** Discuss typical food commands that parents use	**Clip 5.1** Discuss food struggles the parent has with their child Discuss when parent got their child to eat without pressure
Add	Healthy foods are "anytime foods," but "Sometimes" are only for now and then, p 5,8 F/V don't need to be fresh; frozen and canned are good. Be sure to rinse canned veggies to remove added sodium.	Children need less food than adults, p19-20 Growth spurts make appetite erratic Eating behavior milestones, p23	Everything a parent does is a lesson for their child It can take up to 15 tastes to learn to like a new food	Praise the action, not the person. Be specific with praise	Positive feeding pattern allows children choice within structure Indulgent/uninvolved feeding leads to poor diet and weight problems p3-5 Reward children with attention and family activities, not food	The 90 minute rule between meals & snacks can reduce struggles

Karp S. Jamie, Process Evaluation of Implementing The Eat Healthy, Your Kids are Watching. A Parent's Guide to Raising a Healthy Eater Program. East Lansing, MI: Department of Food Science and Human Nutrition, Michigan State University, 2014

Table 6 (cont'd)

	1a visit	**1b** phone	**2** visit	**3** phone	**4** phone	**5** visit
Title	**Kids are what they eat**	**Be a good role model**	**Ways to praise at meals**	**Making mealtime fun**	**Learning to eat healthy**	
Away	Parent switches a "sometimes" food for an "anytime" food, p7	Parent waits 90 minutes between meals & snacks Parent serves only small portions at first, p22	Parent let's child pick a new fruit or vegetable at the store and tastes it, p10-11	Parent keeps track of labeled praise they use for next 2-3 meals, p4	Parents choose two non-food rewards to use the next week, p11	Parent plays a sensory game with child to en courage tasting new food p6
Child Activity	Child selects photos of healthy snack choices that can substitute for sometimes foods, p14		Child chooses a new fruit or vegetable to try. Child places a super taster sticker in activity book after trying it, p11	Parent enhances praise of child with touch, eye contact and smiles, p15	Parent and child choose and do a fun mealtime activity, p13	Parent helps child pick mealtime rules and track for several days, p13
Handouts	EH binder; Topics 1 & 2		Topics 3,4,5			
Nutrition Education Reinforcing Incentive	Eat Healthy Magnets		Supertaster stickers			Healthy Snacks recipes or Fruit/Veg playing cards, MSU extension recipe book

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Instruments, Measurements and Variables

Demographic Data. Demographic data included the children's and parents' gender, age and race-ethnicity. In addition, the parents reported their educational attainment, current relationship, living arrangement, employment, pregnancy, breastfeeding, transportation for and frequency of grocery shopping, and participation in Supplemental Nutrition Assistance Program (SNAP) and SNAP-Education (SNAP-Ed).

Anthropometrics. A trained staff member measured the height and weight of each child and parent twice following standard procedures as stated by Lohman et al., 1988. The height was measured to the closest 0.1 cm using a portable stadiometer (SECA 214, Seca corp., Hanover, MD). Weight was measured to the closest 0.2kg using a digital scale accurate to 200 kg (BWB00AS, Tanita, Tokyo, Japan). The Body Mass Index (BMI) was calculated using the equation = weight (kg)/height $(m)^2$. For children, percentile by age and gender specific BMI was obtained using CDC growth charts (www.cdc.org). For all measurements, the average was calculated before calculating the child's BMI percentile or the parent's BMI.

Block Kids Food Screener (BKFS)

The BKFS is a food frequency questionnaire for the child's food intakes. Mothers reported the foods that children ate within the past week using the BKFS for children aged 2–6 (Nutrition Quest Inc., Berkeley, CA). This food screener is a 39-food item questionnaire developed from a validated 80-item food frequency questionnaire to assess food and nutrient intakes in children 2–17 years old (Block, 2008; Cullen, Watson, & Zakeri, 2008). Of the 39 foods and beverage items, eight nutrient-dense diet variables and four energy-dense diet variables were selected for data analysis. Nutrient-dense foods were those that provided

substantial amounts of vitamins and minerals and relatively few calories, i.e., fruits without juice, non-fried vegetables without potatoes, whole grains, and low fat milk in frequency per week and as cup equivalents per day (American Academy of Pediatrics, 2001; Barlow, 2007). Energy-dense foods were those that contained greater than 25% of the food energy from added sugars, and/or greater than 35%of the food energy from fat per serving based on USDA's food and nutrient database, i.e., sweets (ice cream, candy, cookies), sweet beverages, chips/popcorn, and high fat milk (http://www.nal.usda.gov/US Department of Agriculture, national agricultural library).

The units of measure for each indicator were: 1 cup equivalency= 8 fl oz and frequency consumed per week = 0-7 times. See **Table 7** for a list of the sentinel indicators used separately to indicate diet quality. Note that some variables can be interpreted as indicators either nutrient density or energy density**.**

Table 7. Categories and Indicators of Diet Quality from BKFS

Category	Variable	Indicators
Fruit	1.Total Fruit with juice freq. per wk	Nutrient dense
	2. Fruit without juice (CE) per day	Nutrient dense
	3. Fruit without juice frequency per wk	Nutrient dense
Vegetables	1. Vegetable freq. per week	Nutrient dense
	2. Vegetable cup equivalency per day	Nutrient dense
	3. No. different vegetables per wk	Nutrient dense
Milk	1. Milk freq. per week	
	2. Milk cup equivalency per day	
	3. Percentage drinking high fat milk	Energy dense
	4. Percentage drinking low fat milk	Nutrient dense
Sweets beverage	1. Sweet beverage frequency per wk	Energy dense
	2. Sweet beverage (CE) per day	Energy dense
Sweet and chips snacks	1. frequency per day	Energy dense
	2. frequency per week	Energy dense
Whole grain and fiber	1. Whole wheat bread frequ. per wk	Nutrient dense
	2. Whole wheat bread amount per wk	
	3. Average daily grams of fiber	Nutrient dense
	4. Percentage eating whole grain cereal	
	5. Percentage eating non-whole grain cereal	
Energy	1. Average daily Kcal	
	2. Diet energy density = grams food/kcal per day	
	3. Average daily grams fat	
	4. Average daily grams sugar	

CE=Cup equivalency. Freq.= Frequency

Parent Feeding Behavior Questionnaire (PFBQ)

The PFBQ lists the strategies that the parent used to encourage children to eat. It was administered at baseline, post-test, and at the 3-month follow-up. Items were selected from other instruments designed to measure feeding strategies which had shown significant associations with children's food intakes. Most of the original instruments from which the items were selected had been tested for validity and reliability (Baughcum et al., 2001; Brown et al., 2008; Hughes et al., 2006a, 2006b; Spurrier et al., 2008; van der Horst et al., 2007). Item selection was based on the association with the three main constructs—directive control, non-directive control, and food environmental control. Each construct included two or three sub-constructs (See PFBQ by construct-**Appendix A).** A five-point Likert scaled response category (never = 1 to always = 5) was used for each item. Items measuring undesirable behaviors (e.g., keeping sweets and salty snacks in the home) were reverse- scored. High scores indicated a more positive behavior for each construct (Murashima et al., 2012; Reznar et al., 2014).

The PFBQ, consisting of 30 items (Q), was divided into the following subconstructs: high control (3Q), high contingency (4Q), availability of healthy foods (2Q) , Unhealthy modeling (2Q), meal time behaviors (6Q), timing of meals (2Q), child centered –non directive (6Q) and food modeling non directive (4Q), overweight (1Q). Questions 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 14, 15, 19, 28, and 29 were reverse-scored. These items comprised six multi-items and two single-item constructs as follows, with the first four considered negative feeding strategies and the last four considered positive feeding strategies. Examples of items: **High Control** feeding strategies= parents score ≥4 for three items such as, "I beg my child to eat dinner"; **High Contingency** feeding strategies= parents score ≥4 for four items such as, "I warn my child that I will take a food away if the child doesn't eat, for example, "If you don't finish your vegetables,

you won't get dessert"; **Permissive feeding time=** parents score ≥4 for three items such as, "I allow my child to eat whenever he or she is hungry"; **Indulgent mealtime behavior=** parents score ≥4 for five items such as, "I allow my child to play and watch TV during meals"; **Healthy Availability and Modeling=**parents scored ≥4 for five items such as, "I keep sweets, candy or salty snacks where my child can reach them" (reverse scored);**Child-centered feeding** = parents scored ≥4 for six items such as, "I say something positive about the food"; **Milk modeling=**parents scored ≥4 for one item, "I drink milk in front of my child"; **Fruit and vegetable modeling=**parent scored ≥4 for one item, "I eat fruits and vegetables in front of my child."

Statistical Analysis

Data were cleaned before analysis. For this analysis, SPSS version 20, 2013, Armonk, NY: IBM Corp was used. Descriptive data analysis of demographic data and sample characteristics was conducted using mean and standard deviation. The data on diet quality, parent feeding strategies and preschoolers' BMI percentiles were all checked for skewedness and kurtosis. If the skewedness is between -1.0 and 1.0 and the kurtosis between -1.0 and 2.0, the assumption is that the variable is normally distributed (Rosner, 1995). All variables were normally distributed so none needed to be transformed. Paired T-Test analysis was used to compare control and intervention groups in parental feeding behavior and food dietary quality at the base line. Pearson correlation matrix was constructed to test associations between BMI and parental feeding behavior, BMI and food dietary quality, and between dietary quality and parental feeding behaviors. Descriptive statistics, including means and frequencies, were reported for demographics and weight of the parents and their children based on the baseline

dataset. Next, descriptive statistics and Cronbach's Alpha (an index to measure reliability) were examined for parental feeding behavior.

Research Question 1 was analyzed three ways. First, Pearson correlations were run between the parent feeding behavior strategy sub constructs and the preschoolers' BMI percentile. Then the BMI percentiles were categorized into two groups within one variable. Preschoolers whose BMI percentile was normal weight or underweight codes as zero and those who were overweight or obese were coded as 1. Finally Bi-serial correlations were run for these variables. Two types of regression models were conducted in examining effects of each measure of parental feeding behavior on child BMI separately: 1) to use general linear regression to regress child BMI percentile on each measure of parental feeding behavior; and 2) to use logistic regression to regress child weight status (underweight/normal weight versus overweight/obesity) on each measure of parental feeding behaviors. For both types of the models, parental age and BMI were controlled. The general linear regression and the logistic regression model are represented by the following equations for each measure of parental feeding behavior (FB), respectively:

$$Y_i = \beta_0 + \beta_1 FB_i + \beta_2 Age_i + \beta_3 BMI_i + \varepsilon_i \quad (1)$$

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 FB_i + \beta_2 Age_i + \beta_3 BMI_i \quad (2)$$

In Equation 2, p represents the probability of children with overweight/obesity.

For **Research Question 2**, a series of Generalized Estimating Equation (GEE) models were conducted to evaluate whether changes from baseline to post-test in variables of parental feeding behavior were different between the control and intervention groups. Each parental

feeding behavior was predicted by three variables: group (0=control and 1=treatment), time (0=baseline and 1 = post-test), and interaction of group and time. The models are represented by the following equations for each measure of parental feeding behavior (FB):

$$FB_i = \beta_o + \beta_1 Group_i + \beta_2 Time_i + \beta_3 Group_i \times Time_i \quad (3)$$

Significant effects of interaction of group and time indicated that the control and intervention groups were different in the change from baseline to post-test in parental feeding behavior. The study was also interested in testing whether the change from baseline to post-test within each study group for each parental feeding behavior was significant. To that end, within each model, Z-tests were conducted to test differences in the marginal means (estimated from the GEE model) between the baseline and the post-test for the control and treatment groups separately. For each model, the *p* values based on the Bonferroni adjustment were reported.

The analysis plan for **Research Question 3** was analyzed similar to the plan for Research Question 2. Specifically, a series of GEE models were conducted to evaluate whether there were significant changes from baseline to follow-up test in variables of parental feeding behavior and diet quality for the whole sample (including the control and intervention groups). Each parental feeding behavior or diet quality was predicted by time (0=baseline and 1 = follow-up test). The models are represented by the following equations for each measure of parental feeding behavior (PFB) and diet quality (DQ):

$$FB_i = \beta_o + \beta_1 Time_i \quad (4)$$

$$DQ_i = \beta_o + \beta_1 Time_i \quad (5)$$

Significant effect of time indicated that there were the changes from baseline to follow-up test in parental feeding behavior and diet quality for the whole sample.

CHAPTER IV. RESULTS

Demographics

Descriptive statistics for demographics and weight status for parents and children are shown in **Table 8**. A majority of parents were white (75.9%), and female (92.4%), and the biological parents (91.1%). Close to half of the parents (48.7%) were obese with an average age of 32 years. Over half of the parents received SNAP and WIC. The child sample was composed of almost equal proportions of males to females. The majority of the children were white (77.2%) and over half (55.1%) had normal weight.

Table 8. Demographics and Weight Status for Parents and Children at Baseline

	Total N = 158	
	Parent	**Child**
Characteristics	**Mean±SD or %**	**Mean±SD or %**
Age(yr)	32.02±8.29	3.50±.83
Gender, Female	92.40	49.40
Race/Ethnicity[a]		
White	75.90	77.20
Black	14.60	16.50
Hispanic	13.30	18.40
Mixed/others	5.00	3.20
Weight Status		
Underweight	1.30	1.90
Normal Weight	27.80	55.10
Overweight	19.60	19.00
Obese	48.70	20.30
Education Level		
Less than High School	8.2	
High School	24.1	
Any post high school	67.1	
Employment		
Part-time	20.9	
Full-time	15.2	
SNAP	55.1	
SNAP-Ed	7.6	
WIC	63.3	
EFNEP	3.2	

[a]Sum of percentage was larger than 100%, because participant could be Hispanic and any race.

Table 9 shows the descriptive data from the PFBQ. An average parent had high scores for controlling feeding strategies, mealtime behaviors and modeling fruits and vegetables. Due to high scores indicating positive feeding strategies, these parents were not highly controlling, their overweight concerns for their child were very low.

Table 9. Descriptive Statistics and Internal Reliability of Parental Feeding Strategies by Construct at Baseline

Construct	N	Mean	SD	Cronbach Alpha
High Control	158	4.21	.74	.68
High Contingency	158	3.88	.87	.84
Mealtime Behavior	158	4.14	.64	.70
Healthy Food Availability	158	3.79	.72	.68
Timing of Meals	158	3.37	.77	.61
Child Centered	154	3.53	.68	.71
Concern for Child Overweight	154	1.30	.87	N/A
Fruit/vegetable Modeling	153	4.48	.72	N/A
Milk Modeling	154	3.75	1.41	N/A

Note: Concern for child overweight, fruit/vegetable modeling, and milk modeling did not have reliability reported because they only had a single item each. A five-point Likert scaled response category (never = 1 to always = 5) was used for each item. Higher scores indicated more positive behavior in each construct.

The descriptive data for the child's food intake from the KBFS are in **Table 10.** The average amount of fruit without juice per day, the number of different vegetables per week, the percentage drinking low fat milk, and the percentage eating whole grain cereal scored high,

suggested good diet quality for these indicators. The overall diet quality was low, however, as indicated by high sweet beverage frequency per week and per day, and frequent intake of sweets and snack chips per week. The cups of vegetables per day was low compared to the DGA recommendation of 1-1 ½ /day (DGA, 2010). The average intakes of both milk and dietary fiber were low.

Table 10. Descriptive of Child's Food Intake from the KBFS Measured at Baseline Shown by Group at Baseline

Food Item	**Total**	**Intervention**	**Control**
	N=158	**N=81**	**N=77**
	Mean± SD (%)	**Mean± SD (%)**	**Mean± SD (%)**
Fruit with juice frequency/wk	3.4±1.4	3.5±1.4	3.2±1.3
Fruit with juice cup equiv/day	1.7±.8	1.7±.9	1.5±.8
Fruit without juice frequency/wk	3.2±1.5	3.4±1.6	2.9±1.4
Fruit without juice cup equiv/day	1.1±.6	1.2*±.7	.9*±.6
Vegetable freq/wk	1.4±.9	1.5±.9	1.4±.9
Vegetable cup/day	.6±.5	.7±.6	.6±.5
No. different veg/wk	4.1±1.7	4.4±1.8	3.8±1.6
Milk freq/wk	5.6±2.1	5.7±2.0	5.5±2.2
Milk cup/day	1.6±.9	1.6±.9	1.5±.8
% Low fat milk	72.8	79.0	66.2
Sw Beverages freq/wk	.8±1.3	.9±1.5	.7±1.2
Sw Bevarages per day	.1±.2	.1±.21	.1±.2
Sweets (ice cream + candy + cookies) freq/wk	1.5±1.2	1.5±1.3	1.4±1.1
Snack & chips freq/wk	1.55±1.4	1.7±1.6	1.4±1.2
Whole Wheat bread freq/wk	3.07±2.4	3.3±2.3	2.8±2.4
Whole Wheat bread Amt/time eaten	1.8±.6	1.8±.5	1.8±.6
Whole wheat 1oz equiv/day	.6±.5	.7±.5	.5±.4
Ave daily fiber in gm	11.0±6.2	11.9±6.8	10.1±5.5
% eating Whole grain cereal	61.4	63.0	59.7
Ave daily kcal	1209.5±737.6	1277.9±808.4	1137.5±652.5
Ave daily fat in gm	48.4±33.9	50.9±37.0	45.8±30.5
Ave daily sugar	79.4±39.7	83.6±45.4	75.0±32.4
Ave daily Retinol equiv, mcg	495.4±240.8	533.5±253.9	455.4±220.6
Ave daily folate, mcg	330.7±209.5	351.2±225.4	309.1±190.3

*Means significantly different at $p<0.05$.

Results for Research Question 1, Table 11 shows the bivariate results for correlations between parental feeding strategies and parents' and children's BMI's. No measures of parents' feeding behavior were associated with the child's or parent's BMI. The variance predicted by each model was negligible. One exception was that parents' concern for child overweight was positively associated with child's and the parent's BMI.

Table 11. Bivariate Correlations Between Feeding Strategies and Parent and Child BMI at Baseline

Variable	1	2	3	4	5	6	7	8	9	10	11
1. High Control	1										
2. High Contingency	.574**	1									
3. Mealtime Behavior	.319**	.291**	1								
4.Healthy Food Availability	.157*	.199*	.288**	1							
5.Timing of Meals	.150	.132	.324**	.111	1						
6.Child Centered	-.280**	-.245**	.074	.002	-.079	1					
7.Concern for Child Overweight	-.001	.015	-.094	-.051	.03	.095	1				
8.Fruit/vegetable Modeling	.044	.170*	.362**	.130	.011	.332**	.137	1			
9.Milk Modeling	-.027	.020	.167*	.012	-.009	.197*	-.014	.228**	1		
10.Child BMI	-.047	.032	-.015	-.033	-.004	.093	.288**	-.016	-.038	1	
11. Parent BMI	.013	.089	-.085	-.099	.039	.094	.264**	-.021	.071	.268**	1

* Correlation was significant at the 0.05 level (2-tailed).
** Correlation was significant at the 0.01 level (2-tailed).

In **Table 12**, consistent with the bivariate results, the results of the general linear regression indicated that parents' concern for child overweight predicted higher percentile of child BMI (β = .24, *P* = 0.004). This was when parental age and BMI were controlled.

Compared to the normal weight children, parents of overweight children were twice as likely to be concerned about their children's weight status. Compared to the normal weight children, parents of overweight children were ½ as likely to structure mealtime behaviors like family meals or no TV.

Table 12. Regression Models for Association of Child Weight Status with Parental Feeding Strategies: Estimated Odds Ratios, Standard Errors, 95% CI of Parental Feeding Strategies at the Baseline

	B	**SE**	**β**	**R^2**
Model 1: High Control	-.02	.03	-.06	.004
Model 2: High Contingency	.01	.03	.02	.000
Model 3: Mealtime Behavior	.001	.035	.003	.000
Model 4: Healthy Food Availability	-.01	.03	-.02	.000
Model 5: Timing of Meals	-.02	.03	-.04	.002
Model 6: Child Centered	.03	.03	.06	.004
Model 7: Concern for Child Overweight	.08*	.03	.24	.053
Model 8: Fruit/vegetable Modeling	.004	.031	.010	.001
Model 9: Milk Modeling	-.01	.02	-.04	.002

Notes:
1) In each model, parental age and BMI were controlled. To save space, the regression coefficients were not reported.
2)*Coefficient was significant at 0.05 level (2-tailed).
3) R^2 was the percentage of variance for child BMIpercentile explained by the parental feeding strategy in each model.

Results of the logistic regression (**Table 13**) indicated a similar relation between children's weight status and parents' concern for child overweight. Specifically, with each one unit increase in parents' concern for child overweight, the odds of overweight or obese versus under or normal weight increased by 127% ($OR = 2.27$, $p = 0.006$), when parental age and BMI were controlled.

Table 13. Logistic Regression Models for Association of Child Weight Status with Parental Feeding Behavior: Estimated Odds Ratios, Standard Errors, 95% CI of Parental Feeding Strategies at Baseline

Constructs	Odds Ratio	SE	95% CI of Odds Ratio
Model 1: High Control	.72	1.27	.455-1.150
Model 2: High Contingency	1.14	1.22	.770-1.699
Model 3: Mealtime Behavior	.58+ [a]	1.33	.336-1.011
Model 4: Healthy Food Availability	1.00	1.26	.642-1.570
Model 5: Timing of Meals	.85	1.24	.552-1.302
Model 6: Child Centered	1.24	1.29	.752-2.042
Model 7: Concern for Child Overweight	2.27** [b]	1.35	1.257-4.084
Model 8: Fruit/vegetable Modeling	.92	1.28	.562-1.488
Model 9: Milk Modeling	.91	1.13	.718-1.162

Note: The reference group for child weight status was under or normal weight. Parent age and BMI were controlled for the model.
** Odds ratio was significant at the 0.01 level (2-tailed); + Odds ratio was marginally significant at 0.10 level (2-tailed).
[a] p=.055
[b] p=.006

Although the bivariate and the general linear regression results indicated that the mealtime behavior construct was not associated with child BMI, the logistic regression results indicated that mealtime behavior construct was associated with healthier child weight status with an approximate significant level. Particularly, with each one-unit increase in mealtime behavior, the odds of overweight or obese versus under or normal weight decreased by 42% ($OR = 0.58$, $p = 0.055$), when parental age and BMI were controlled. Except for mealtime strategies and parents' concern for child overweight, the other parent feeding constructs were not significantly associated with child weight status or child BMI, based on the general linear and the logistic regression results.

In the results for correlations between parental feeding strategies and diet quality (see **Table 14**), high control (really low control), high contingency (really low contingency), mealtime behavior, and healthy food availability were associated with decreased children's intake of sweet beverages, sweets, and snack and chips. Timing of meals was associated with children's intake of fruit with juice in both less frequency per week and fewer cups per day, with fewer cups of milk per day, and with lower frequency of sweet beverages and snacks per week. Child centered feeding was associated with higher frequency of sweet beverages per week. Fruit/vegetable modeling was associated with lower frequency of sweet beverages and snacks per week.

Table 14. Pearson Correlations Between Parental Feeding Behavior and Diet Quality at Baseline

	Fruit with Juice Frequency	Fruit CE	Milk cup	Sweet Beverages cup	Sweet Beverage Frequency	Sweets frequency	Snack and Chip Frequency
High Control	-.072	-.052	-.077	-.034	-.296**	-.026	-.189*
High Contingency	-.015	-.055	-.028	-.172*	-.394**	-.163*	-.326**
Mealtime Behavior	.034	-.051	.004	-.321**	-.283**	-.303**	-.363**
Healthy Food Availability	.057	-.035	-.033	-.372**	-.326**	-.371**	-.307**
Timing of Meals	-.193*	-.263**	-.161*	-.022	-.243**	-.023	-.186*
Child Centered	.111	.074	-.096	-.008	.166*	-.004	-.010
Concern for Child Overweight	.024	.051	-.068	.041	-.001	.043	-0.005
Fruit/vegetable Modeling	.144	.028	-.016	-.098	-.185*	-.083	-.170*
Milk Modeling	.118	.113	.081	.052	-.013	.057	-.001

* Correlation was significant at p<0.05 (2-tailed).
** Correlation was significant at p< 0.01 (2-tailed).

Research Question 1: Baseline Results

Research Question 1.1: What is the relationship between parent feeding strategies and child BMI percentiles at the **baseline**? (**See Table 11**)

Ho 1.1a: Preschoolers in low-income families whose parents have negative feeding strategies will be overweight/obese. Ho 1.1a was not supported, because there was no relationship between parent practicing negative feeding strategies of high control and high contingency and their children's BMI's.

Ho1.1b: Preschoolers in low-income families whose parents have positive feeding strategies will be less overweight/obese. Ho1.lb was not supported by the correlational or general linear regression data, but was supported in part by the logistic regression when the parent's BMI and age were both controlled and the child's weight was dichotomized as underweight/normal (0) or overweight/obese (1). The parents who practiced the most positive mealtime behaviors like setting regular meal times, eating together, and avoiding TV distractions were slightly more likely to have children who were normal weight ($p<0.055$).

Research Question 1.2: What is the relationship between parental feeding strategies and child diet quality of their preschooler? **(See Table 12)**

Ho 1.2a: Preschoolers in low-income families whose parents have negative feeding strategies will have poor diet quality. **Ho.1.2a** was not supported

Ho 1.2b: Preschoolers whose parents have positive feeding strategies will have improved diet quality. **Ho.1.2b** was supported, in part, because parents who practiced child centered feeding strategies had children who consumed sweet beverages and snacks less frequently. Also, parents who modeled eating fruits and vegetables in front of their children had children who

consumed sweet beverages and chips less frequently. However, **Ho 1.2.b** was not supported, in part, because parents who practiced child centered feeding strategies had children who more frequently consumed sweet beverages. Also, parents who practiced regular times for meals and snacks had children who consumed fewer fruit and drank less milk.

Research Question 2: Post-Test Results

Table 15 shows results for changes in parent feeding strategies from baseline to post-test by group. Both groups significantly improved their scores for feeding control, mealtime behaviors, and timing of meals and snacks. There was no effect of the EH intervention on the feeding strategies, however, as is shown in the last column.

Table 15. Change in Feeding Strategies Between Pre- and Post-Tests for the Treatment and Control Groups Using GEE for Repeated Measures and Controlling for Time and Group

Feeding Behavior	**6 wk Post -test Difference test**				
	Rx N=55		**Control N=35**		
	Δ_{Rx}	**SE**	**$\Delta_{Control}$**	**SE**	**Difference between Δ_{Rx} and $\Delta_{Control}$**
High control	.23*	.07	.31*	.10	**$\Delta_{Rx} = \Delta_{Control}$**
High Contingency	-.09	.10	.07	.13	**$\Delta_{Rx} = \Delta_{Control}$**
Fruit/Veg Modeling	.16	.09	.00	.14	**$\Delta_{Rx} = \Delta_{Control}$**
Milk Modeling	.25	.15	-.03	.23	**$\Delta_{Rx} = \Delta_{Control}$**
Healthy Availability Modeling	.16	.09	.10	.10	**$\Delta_{Rx} = \Delta_{Control}$**
Mealtime behaviors	.16*	.07	.19*	.06	**$\Delta_{Rx} = \Delta_{Control}$**
Timing of meals	.24*	.09	.32*	.13	**$\Delta_{Rx} = \Delta_{Control}$**
Child centered	.19	.09	.14	.12	**$\Delta_{Rx} = \Delta_{Control}$**
Concern Child Over wt	-.07	.09	-.06	.04	**$\Delta_{Rx} = \Delta_{Control}$**

* Δ significant at $p < 0.05$ (2-tailed).

Research Question 2: How does a six-week parent feeding intervention (EH) **change** the parent feeding strategies of parents compared to the control group? (See **Table 13**).

Ho 2.1: Feeding strategies of parents in the EH intervention group will improve compared to the control group, from baseline until the end of the post–test.

Ho2.1 was not supported.

Research Question 3: Follow-Up Results

Table 16 shows the difference between baseline and follow-up data from the PFBQ. Parents became less controlling, high contingency decreased, and the mealtime behaviors were improved.

Table 16. Differences in Feeding Strategies Between Baseline and 3 Month Follow-Up for the Combined Sample of Both the Treatment and Control Groups After Receiving the EH Curriculum (N=91)

	Mean	SE
High control	.20*	.06
High Contingency	.17*	.07
Fruit/Veg Modeling	.14	.08
Milk Modeling	.05	.14
Healthy Availability Modeling	.08	.08
Mealtime behaviors	.13*	.06
Feeding times	.07	.07
Child centered	.09	.07
Concern Child Wt.	.00	.09

* p<0.0.05 level (2-tailed)

In **Table 17**, the vegetable frequency per week, vegetable cup equivalency per day, and number of different vegetables per week intake all increased significantly at the follow-up. The Folate was also increased significantly implying and indicating that the intake of vegetables was increased. Milk cup equivalency intake per day, and sweets such as ice cream, candy, and cookies frequency per week decreased significantly at the follow-up. Milk cup equivalency intake decrease was undesirable, but earlier milk modeling was correlated with mealtime behaviors.

We saw fruit with juice cup equivalency, fruit with juice frequency, milk cup equivalency, and milk frequency intake decreased at the follow-up but they were not significant. The whole wheat bread frequency per week and amount increased after the 3 month follow-up.

The percentage drinking low fat milk increased from 72% at the baseline to 75% at the follow-up.

Table 17. Difference in Diet Quality Between Baseline and 3-Month Follow-Up for the Combined Sample of Both the Treatment and Control Groups (N=91)

Diet quality indicator	Mean	SE
Fruit with juice freq./wk	0.01	.15
Fruit with juice cup equiv/day	-0.07	.10
Fruit without juice frequency/wk	-0.01	.16
Fruit without juice cup equiv/day	-0.05	.08
Vegetable freq/wk	0.19*	.08
Vegetable cup/day	0.08*	.04
No. different veg/wk	0.47*	.16
Milk freq/wk	-0.17	.20
Milk cup/day	-0.19*	.09
% Low fat milk	75.0	
Sw Beverages freq/wk	-0.10	.16
Sw Beverages per day	-0.01	.02
Sweets (ice cream + candy + cookies) freq/wk	-0.22*	.10
Snack & chips freq/wk	-0.07	.14
Whole Wheat bread freq/wk	-0.01	.27
Whole wheat 1oz equiv/day	0.08	.05
Ave daily fiber,gm	0.9	.51
% eating whole grain cereal	58.7	
Ave daily kcal	43.0	42.7
Ave daily fat,gm	2.2	1.8
Ave daily sugar, gm	-3.8	3.4
Ave daily Retinol equiv, mcg	18.0	19.3
Ave daily folate equiv, mcg	33.7*	16.2

Table 18 shows the difference in child BMI percentile and weight status, where normal weight=0 and overweight/obese=1, between baseline and the 3-month follow-up.

There were no significant differences.

Table 18. Difference in Child BMI Percentile and Weight Status Between Baseline and Follow-Up for the Combined Sample of Both the Treatment and Control Groups (N=91)

	Mean	**SE**
Child BMI percentile	-.22	2.57
	Odds Ratio (OR)	**95% CI of OR**
Weight status	1.03	.95, 1.12

Note: Parent age and BMI were controlled for this model

Research Question 3: At the three month follow-up**,** what impact does a six-week parent intervention focusing on child feeding have on: (a) parent feeding strategies of preschoolers, (b) the preschoolers' diet quality, and (c) preschoolers' weight status as compared to their baseline measurements?

Ho 3.1: There will be an increase in positive parent feeding strategies, and a decline in negative feeding strategies. **Ho 3.1** Was supported because we did see a decrease in both high controlling and high contingency, that imply the EH intervention was successful in improving the feeding strategies. The parents used less feeding control and less contingency with their preschoolers. Also, the mealtime behaviors improved at the follow-up. These included things like not watching TV, eating family meals, not eating before meals, and being seated while eating.

Ho 3.2: There will be an increase in dietary strategies reflecting good diet quality and a decline in those reflecting poor diet quality**. Ho3.2** was supported, in part, because there were improvements in amounts, frequency, and number of different types of vegetables that children ate, as well as an increase in folate. Also, the frequency of eating sweets declined. The only undesirable behavior seen was the decreased intake of milk.

Ho 3.3: There will be fewer overweight and obese preschoolers (BMI of ≥85 percentile), and/or a decline in average BMI percentiles. **Ho 3.3** was not supported.

CHAPTER V. DISCUSSION

This study was designed to see if a six-week EH intervention with low income parents of preschoolers could improve their child feeding strategies, their children's diet quality and their children's weight status at the 3-month follow-up. Eat Healthy was successful in improving three of eight parent feeding strategies that were targeted and measured—high control, high contingency, and mealtime behaviors. By the end of the intervention, parents became less overtly controlling, use of rewards and punishments to get their child to eat had declined, and their mealtime behaviors, like eating as a family, no TV at meals, and not eating an hour before meals, had improved. For the children's diets, EH was also successful in increasing the amounts of, the frequency of, and the number of different vegetables, as well as decreasing the intake of sweets, snacks, and sweet beverages. EH did not, however, impact weight status of children at the three month follow-up measurements. This finding was not surprising perhaps because four to five months was too short to see change in weight status. Also, for preschoolers, the average change in weight and height is 2-3 inches and 5-6 pounds per year (Brown, 2010).

Although the bivariate and the general linear regression results from baseline data indicated that mealtime behavior was not associated with child BMI percentile, the logistic regression results, wherein weight was categorized as not overweight versus overweight or obese, indicated that mealtime behavior was associated with healthier child weight status with an approximate significant level. With each one-unit increase in mealtime behavior, the odds of overweight or obese versus under or normal weight decrease by 42% (OR=0.58, p=0.055) when parental age and BMI were controlled. This finding is supported in part by other studies that found family mealtimes and/or limited TV to be associated with lower BMI's (Jones et al, 2014; Wansink et al., 2014; Lehto et al, 2012; Chan et al, 2011). Except for mealtime behavior and

parents' concern for child overweight, the rest of the measures for parents' feeding strategies were not significantly associated with child weight status or child BMI percentiles.

In contrast to parental feeding strategies and children's' BMI percentile, there were many significant associations at baseline for diet quality, an outcome more proximal to strategies than is weight status. High control, high contingency, mealtime behaviors, and healthy food availability were associated with a decrease in children's intake of sweet beverages, sweets, and snack and chips. Timing of meals was associated with less children's intake of fruit with juice in both frequency per week and cups per day; with fewer cups of milk per day; and with lower frequency of sweet beverage and snack and chips per week. Child centered feeding was associated with higher frequency of sweet beverages per week. Fruit/vegetable modeling was associated with lower frequency of sweet beverage and snack and chips per week.

The baseline descriptive of child food intake from the food screener show high scores for the frequency of fruit and milk, percentage of children drinking low fat milk, variety of different vegetables, and percentage of children eating whole grain cereal indicating good diet quality for these foods. These findings are in contrast to those found prior to new WIC food package implemented in 2010 (http://www.idfa.org/). Indicators of poor diet quality included few cups of vegetables per day (0.6 cups versus 1-1½ cup recommended); low milk intake of 1.6 cups versus 2-3 cups recommended (Table 1 and Table 2). Dietary fiber averaged 11 grams compared to 19 grams recommended for children age 1-3, and 25-26 grams for children age 4-8 years (Table 1 and Table 2). These finding are similar to Krebs-Smith et al. (2010) who analyzed national datasets. Furthermore, the overall diet quality was low as indicated by high frequency of sweet beverages, sweets, and snack chips.

At the post test, the finding was that both the control and intervention groups were less controlling, had improved mealtime behaviors, and better timing of meals and snacks. Because parents in both groups volunteered for this study on child feeding strategies, they were motivated to address some issues and make a significant time commitment. This might have affected the post-test results. Furthermore, the educators in the out-state counties (other than Ingham) had regular contact with families in both groups. Because the educators were excited about the EH curriculum, they might have unintentionally contaminated the study by starting to give parents in the control group some advice on feeding strategies before the control group was intended to receive the intervention. A different and cleaner design to avoid this issue could be done by first evaluating the knowledge of the parents at the baseline, and secondly changing the educators for the control group when the intervention starts.

At the three month follow-up, there was no change in either parent or child weight status. Of the intervention studies reviewed, only the one by Harvey-Bernino et al. (2003) reported a reduction in weight status at the post test, but not at the follow-up when working with low-income families. The other studies that resulted in weight reduction at post-test but not follow-up were with middle income families (West et al., 2010). The majority of parents were overweight or obese; a finding similar to other studies (Ostybe et al., 2012).

At the three month follow-up, scores had improved for high control, similar to Harvey-Beniro et al.,2003 findings, reduction in high contingency was similar to that of Ostybe et al., 2012. Two other studies demonstrated improvements in mealtime strategies such as less TV with meals (Ostybe et al., 2012; & Dickens et al., 2014) although they used different measurements. These were the same parent feeding strategies that correlated with children's food intake at baseline.

The sub-constructs of high control, high contingency, and child centered feeding were developed and validated by (Hughes et al. 2005, Hughes et al., 2006) and can be considered standardized. The construct of mealtime behavior was developed and validated by Murashima et al. (2012). All four of these sub constructs had good internal reliability and should be considered robust indicators for parent feeding strategies. To our knowledge, this study is the first to use these validated sub-constructs in an intervention study and find improvements.

The findings at follow-up of increased vegetable frequency, amount, and variety were similar to those of three other intervention studies (Skouteris et al., 2015; Dickens et al., 2014& Tabak et al., 2012). Our findings differed, however, in that these researchers also found an increase in fruit intake where EH did not. Because folate also increased significantly this suggests that the vegetable increase was for green leafy vegetables, a very positive finding.

Sweets such as ice cream, candy, and cookies frequency per week and milk cup equivalency intake per day decreased at follow-up. The decline in such energy-dense foods following intervention were similar to those from several studies (Skouteris et al., 2015;Dickens et al., 2014; Fletcher et al., 2013; Horodynski et al., 2012 and Harvey et al., 2003). The decline in milk intake was undesirable, although earlier milk modeling by parents correlated with their mealtime behaviors like avoiding distractions during meals. The decrease in milk consumption, because it correlated to this mealtime strategy, might explain this decline. For example, if children remain seated during meals without distractions like TV, they should be more likely to eat well, feel full, and drink fewer fluids, especially between meals. That there was a trend towards less fruit juice might support this possibility. On the positive side, these preschoolers consumed a higher percentage of low fat milk than has been reported in the past with young children from low income families (Hoerr et al., 2006; Hoerr et al., 2009). Changes in the WIC

program package in 2010 might have contributed to this difference (http://www.idfa.org/). The majority of children in this study (63%) were on WIC.

The EH study differed from the other parent intervention studies reviewed in that the EH focused specifically on several parents' feeding strategies (Skouteris et al., 2015; Dickens et al., 2014; Fletcher et al.,2013; Taback et al., 2012) both in regards to the intervention, as well as to the measurement. The EH intervention was successful in improving several negative feeding behaviors such as decreasing the high control and high contingency strategies and improving the mealtime behaviors using multi-item validated constructs.

CHAPTER VI. STRENGTHS, LIMITATIONS, AND IMPLICATIONS

Study Strengths

The EH intervention study was unique in combining all of the following aspects: 1) it targeted low income families with young children; 2) was home based using video clips and full color booklets with engaging activities for both parents and children; 3) captured the diet quality by using a well-known dietary screener for children; 4) used paraprofessional educators in conveying educational concepts to parents within the context of their own homes; 5) measured the heights and weights with research quality instruments and trained educators; and 6) used valid and reliable multi-item constructs for parent feeding strategies. The participating educators attended two 3 hour training sessions and were in weekly follow-up contact with the researchers to maintain program fidelity. All the parents were low income families, a group who has the highest rate of obesity in the U.S., yet only a few intervention studies have targeted low income families (Harvey-Beniro et al., 2003; Horodynski et al., 2005; Dickens et al., 2104). Most other intervention studies have targeted middle income families (Skouteris et al., 2015, Tabak et al., 2012; Ostobe et al., 2012; West et al., 2010 and Fletcher et al., 2013).

Limitations

The biggest limitation was that the only time for comparing the two groups was at the post test due to funding constraints and the fact that our funder hired an outside reviewer to conduct independent assessments. Therefore, the 3-month follow-up measurements became a gross impact analysis of the EH intervention.

Another limitation was that while we had multi-item validated constructs for six feeding strategies, two sub-constructs—milk modeling and fruit and vegetable modeling, remained single

items due to poor Cronbach alphas for the original multi-item variables. Also, the PFBQ was self-reported by the parents. The accuracy of the information depended on parent memory and lack of social bias.

The BFKS used for dietary intake of the children is less accurate than the multiple 24 hours dietary recall (Nelms et al., 2011). The BKFS may underestimate their dietary intake (Murshima et al.,2012). The BKFS might not have captured all ethnic food consumed by families from ethnicities other than Black and White Americans. The study did not collect the parents or mother food intake which is a very good indicator of the childs diet (Hoerr et al., 2006). Because we did not fully captured in what previous nutrition education programs parents had participated at base line, it is unknown to what degree differences in nutrition knowledge might have affected the outcomes.

Although overall this study was successful with two of three objectives at the three month follow-up, it is not known if such improvements will continue. Some intervention studies did not see the improvement at the 6 month follow-up, e.g. Fletcher et al., (2013) a 6 or 12 month follow-up would strengthen the study, but would require significant financial incentives to maintain sample size. The study duration was not long enough for a 6 or 12 month follow-up as is recommended. Still a 3 month follow-up was better than none as in the Harvey-Berniro et al. (2003) study. Although there was a 30% drop-out rate, it was about the same as two other studies that worked with low income families (Harvey-Berniro et al., 2003; Horodynski et al., 2005).

Finally, the EH did not target nor evaluate physical activity or sleep of preschoolers. Both are known to affect weight status (Firouzi et al.,2014 and Golley et al.,2013). Therefore, it is recommended for future research to add the physical activity and sleep patterns as measurements.

Implications for Future Research

The study demonstrated that a home-based intervention targeted to parent feeding strategies could successfully change three of them and that these were associated with positive changes in their children's diet quality. Future studies should use the EH curriculum with different groups to determine generalization of findings. There is a need to translate the materials into Spanish for use with Hispanic populations. Because obesity is also associated with physical activity (Firouzi et al.,2014) and poor sleep quality (Golley et al.,2013), these two aspects might be added to the materials. Finally, it is highly recommended that researchers use the sub-constructs for parent feeding strategies used in this study.

Conclusion

At the 3 month follow up the EH study was successful in improving three of the eight parent feeding strategies, high control, high contingency, and mealtime behaviors. The parents became less controlling, were using less contingency and rewarding, and had improved mealtime strategies. The EH was also successful in improving the diet quality of the preschoolers by increasing nutrient dense food and decreasing energy dense food. The preschoolers also had a decreased intake of sweets which included ice-cream, candy, and chips. However the EH was not successful in improving the weight status of the preschoolers.

EH was unique compared to other studies. First, the study focused specifically on feeding strategies related to child weight status and diet quality. Second, it targeted low income families. Third, the curriculum was designed to 3rd to 5th grade reading levels and did not require high literacy. Fourth, interactives materials were in full color and the short video clips were from real parents who exhibited ethnic and racial diversity. The messages delivered from the videos were

from real experiences and real daily life interactions. Fifth, the education material was delivered in person, not mailed to the parents, as compared to several other studies.

APPENDICES

Appendix A. Parent Feeding Strategy Questionnaire Listed by Construct

Construct	Item no	Items	Never	Rarely	Sometimes	Most of the time	Always
HC1	1	I beg my child to eat dinner. R	1	2	3	4	5
HC2	2	I spoon-feed my child to get him or her to eat dinner. R	1	2	3	4	5
HC3	3	I physically struggle with my child to get him or her to eat (for example, putting my child in the chair so he or she will eat). R	1	2	3	4	5
Hi Cont1	4	I warn my child that you will take away something other than food if he or she doesn't eat (for example, "If you don't finish your meal, there will be no TV tonight after dinner"). R	1	2	3	4	5
Hi Cont2	5	I promise my child to something other than food if he or she eats (for example, "If you eat your beans, we can play ball after dinner"). R	1	2	3	4	5
Hi Cont3	6	I encourage my child to eat something by using food as a reward (for example, "If you finish your vegetables, I'll get you some ice cream"). R	1	2	3	4	5
Hi Cont4	7	I warn my child that I will take a food away if the child doesn't eat (for example, "If you don't finish your vegetables, you won't get dessert"). R	1	2	3	4	5
HA1	8	I keep fruits and vegetables available that my child can eat.	1	2	3	4	5
UHM1	9	I keep sweets, candy or salty snacks where my child can reach them. R	1	2	3	4	5
UHM2	10	I keep sugar-sweetened beverages* where my child can reach them. *Drinks like Coke, 7-Up, Sunny Delight, Hawaiian Punch, or aguas frescas (DO NOT include 100% fruit juice and diet soda) R	1	2	3	4	5
HA2	11	I limit my child's access to sweets, candy, salty snacks or sweetened beverages by not having them readily available.	1	2	3	4	5
MB1	12	I allow my child to play and watch TV during meals. R	1	2	3	4	5
MB2	13	We eat dinner together as a family.	1	2	3	4	5
TM1	14	I allow my child to eat whenever he/she is hungry during a day. R	1	2	3	4	5

Scored: 1=never; 2=rarely; 3=sometimes; 4= most of the time; 5= always

			Never	Rarely	Sometimes	Most of the time	Always
TM2	15	I allow my child to decide when to eat meals and snacks. R	1	2	3	4	5
MB3	16	I allow my child to eat an hour before meals.	1	2	3	4	5
MB4	17	I set regular meal times for my child.	1	2	3	4	5
MB5	18	I have my child sit down at home while eating.	1	2	3	4	5
MB6	19	I allow my child to eat while standing or walking. R	1	2	3	4	5
NonDir1	20	I say something positive about the food my child is eating during dinner.	1	2	3	4	5
NonDir2	21	I reason with my child to get him or her to eat (for example, "Milk is good for your health because it will make you strong").	1	2	3	4	5
NonDir3	22	I help my child to eat dinner (for example, cutting the food into smaller pieces).	1	2	3	4	5
NonDir4	23	I compliment the child for eating food (for example, "What a good boy! You're eating your beans").	1	2	3	4	5
NonDir5	24	I encourage my child to eat by arranging the food to make it more interesting (for example, making smiley faces on the pancakes).	1	2	3	4	5
NonDir6	25	I ask my child questions about the food during dinner.	1	2	3	4	5
ModND1	26	I eat fruits and vegetables in front of my child.	1	2	3	4	5
ModND2	27	I drink milk in front of my child.	1	2	3	4	5
ModND3	28	I eat sweets, candy or salty snacks in front of my child. R	1	2	3	4	5
ModND4	29	I drink sweetened beverages in front of my child. R	1	2	3	4	5
OVWT	30	I worry that my child is overweight right now	1	2	3	4	5
		R=Reverse score (1=Always, 2=Most of the time, 3=Sometimes, 4=Rarely, 5=Never					
		HC= High Control	MB= Mealtime Behaviors				
		Hi Cont= High Contingency	TM= Timing of Meals				
		HA= Availability of Healthy Foods	NonDir= Child Centered, Non-Directive				
		UHM= Unhealthy Modeling	ModND= Modeling, Non-Directive				

Appendix B. Parent Consent Form

Eat Healthy: A Parent's Guide to Raising a Healthy Eater FY13-Draft 12-10-12

Research Participant Information and Consent Form

We are asking you to participate in a research project. Researchers must provide a consent form to inform you about the study, to say that participation is voluntary, to explain risks and benefits of participation, and to help you make an informed decision. Please feel free to ask the researchers any questions you have.

Study Title:	Eat Healthy: A Parent's Guide to Raising a Healthy Eater
Researcher and title:	Sharon L. Hoerr, PhD, RD, Professor
Institution and Dept:	Michigan State University, Department of Food Science and Human Nutrition
Address and Contact	Trout Food Science Building, Rm 136, 469 Wilson Rd, East Lansing, MI 48824, 989-506-3603; 517-355-8474 x 156 (lab); 517-490-1554 (Hoerr), hoerrs@msu.edu

1. PURPOSE OF RESEARCH

Thank you for your interest in this project. We are asking you to participate in a research study about parent feeding practices. You are a possible participant, because you are 18 years or older and the parent or primary caregiver of a 3-5 year old child. From this study, we hope to improve parent-child interactions around food and to learn if our materials meet the needs and wants of parents like you. In this portion of our study, we will have approximately 100 participants. Your participation in this study will take about 6 hours over a 6-week period. If you are assigned to the 1st treatment group, there will be a follow-up visit 3 months after the 6 weeks.

2. REQUIREMENTS

In order to participate in this study; you must be the mother, father, or caregiver 18+ years with a 3-5 year old child. You must be reachable by telephone and have access to a DVD player. You must be able to speak and read English. Your child must not have special needs except for speech, language, and/or orthopedic issues. Finally, your child is not currently participating in nor has participated in the *Eat Right Play Hard*™ program.

3. WHAT YOU WILL DO

You will be randomly assigned to a 1st or 2nd home visit group. When it is your group's turn to get the materials, we will ask you to complete Topic 1 of the parent guide and view the video clips at the places indicated in the booklet. It will take you about 30-60 minutes to complete each topic. You may complete a little each time if you wish, or you may complete the entire topic all in one session. We ask that you have the topic completed within one week. After each topic (there are 5), a home visitor will contact you for either a home visit or phone call to inquire about how the topic went for you and your child. This weekly contact may last from 10-20 minutes. If you choose to participate in this study, the activity schedule will occur as shown on the back of this page. Your participation will include 3 phone calls and 3 home visits. Both you and your child's height and weight will be measured during week 1 and at the 3 month follow-up visit.

This consent form was approved by a Michigan State University Institutional Review Board.
Approved 12/12/2012 - valid through – 06/05/2013. This version supersedes all previous versions. IRB # 09-451

Table 19. Healthy Eating Activities

This graph explains what you can expect with each activity, what will be measured and the incentive you will receive.

Week	Activity	Measures	Incentive
1	Topic 1: Home Visit (part 1 of Topic 1)	✓ Consent Form ✓ Questionnaires (5) o FFQ (Child) o FV Screeners (M/C) o Feeding Control Questionnaire o Demographic Questionnaire o Confidence to eat FV(Parent) ✓ Height/Weight (Mother and Child)	✓ $40 Booklets and DVD ✓ NERI
2	Topic 1: Phone Call (part 2 of Topic 1)		✓ NERI
3	Topic 2: Home Visit	✓ IMMS	✓ NERI
4	Topic 3: Phone Call	✓ IMMS	✓ NERI
5	Topic 4: Phone Call	✓ IMMS	✓ NERI
6	Topic 5: Home Visit	✓ IMMS ✓ Feeding Control Questionnaire ✓ FV Screeners ✓ Confidence to eat FV	✓ NERI
19	Follow-Up	✓ Height/Weight (Mother and Child) ✓ FV Screeners ✓ FFQ (M/C) ✓ Feeding Control Questionnaire	✓ $25 gift card and Fruit & Vegetable playing cards

FFQ= Food Frequency Questionnaire FV Screener= Fruit and Vegetable Screener IMMS- Instructional Materials Motivation Survey
NERI= Nutrition Education Reinforcement Incentive could include- healthy snacks cookbook, refrigerator magnets, plastic measuring cup and spoons, cutting board and shopping bag, child-safe stuffed veggie/fruit toy.

4. POTENTIAL BENEFITS

Parents may benefit by improving skills for feeding preschoolers. Also, participation in this study may provide improved nutrition education materials to other parents and caregivers.

5. POTENTIAL RISKS

Except for your time and inconvenience, there are no foreseeable risks associated with participating in this study.

6. PRIVACY AND CONFIDENTIALITY

We are collecting the data for this project confidentially. We will keep information about you confidential to the maximum extent allowable by law. Data will be kept in a locked cabinet in the Trout Building, Michigan State University, East Lansing for 3 years following closure of the study. Michigan Nutrition Network is funding this project and may have access to the anonymous data records. Researchers of this project will have access to the data; however, the MSU Human Research

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Protection Program will be given access to data in the event of an audit. The results of this study may be published or presented at professional meetings, but your identity will remain anonymous.

7. YOUR RIGHTS TO PARTICIPATE, SAY NO, OR WITHDRAW

Participation in this research project is completely voluntary. You have the right to say no. You may change your mind at any time and withdraw. You may choose not to answer specific questions or to stop at any time. Choosing not to participate or withdrawing from this study will not make any difference in the quality of any services you receive with your child's preschool program.

8. COSTS AND COMPENSATION FOR BEING IN THE STUDY

There are no costs to you for participating in the study. You will receive a packet of nutrition education materials and DVD (value $40), plus one Nutrition Education Reinforcement Incentive (NERI) with each contact (see graph below). With the 3-month follow up visit, you will receive one $25 gift card.

9. REQUIRED REPORTER CLAUSE (new MSU policy)

Due to a recent addition in University policy, researchers at MSU are obligated to report any suspected child abuse or neglect to the MSU Police Department. If, in my position at MSU, I suspect a child may be abused or neglected, I must contact the MSU Police Department (MSUPD) immediately. MSUPD will determine whether or not I am obligated to report the suspected incident to Child Protective Services.

10. CONTACT INFORMATION FOR QUESTIONS AND CONCERNS

If you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact the researcher Dr. Sharon Hoerr (136 Trout Building, Michigan State University, East Lansing, MI 48824; hoerrs@msu.edu, 517-490-1554). If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or email irb@msu.edu or regular mail at 408 W. Circle Dr., Room 207 Olds Hall, MSU, East Lansing, MI 48824. You will be given a copy of this form to keep.

11. DOCUMENTATION OF INFORMED CONSENT

With my signature below, I agree to evaluate the activity book materials, be audio-taped in an interview and to voluntarily complete a demographic survey. I also agree to have my child participate and have his/her height and weight measured.

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_____ _____

Parent Signature Date

_____ _____

Parent Signature on child's behalf Date

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Appendix C. IRB Consent Form

Figure 1. IRB Consent Form Image

MICHIGAN STATE UNIVERSITY

Revision Application Approval

December 12, 2012

To: Sharon Hoerr
Trout Food Science Bldg, Rm 139
469 Wilson Rd, Mich State Univ
East Lansing, MI 48824

Re: **IRB# 09-451** Category: EXPEDITED 7
Revision Approval Date: December 12, 2012
Project Expiration Date: June 5, 2013

Title: Eat Healthy, A Parent's Guide to Raising a Healthy Eater (CGA# 111074)

The Institutional Review Board has completed their review of your project. I am pleased to advise you that **the revision has been approved**.

This approval letter notes the project's title has been changed from: Eat Healthy: A Parent's Guide to Feeding Preschoolers (CGA# 111074), to: Eat Healthy, A Parent's Guide to Raising a Healthy Eater (CGA# 111074).

The PI has requested the removal of the following investigators: A. Rosalez, W. Guo and B. Smith and the addition of J. Karp (as study coordinator).

The PI has been advised that the "home visitors" will be IRB trained, a personnel changes form will be submitted to the IRB and these persons will be added to the project before they engage in any research activity involving human subjects.

The PI has updated the recruitment flyers to reflect these approved changes.

This approval letter also notes the PI has edited the consent form to include a parental signature line, changed the project title to reflect the new title, added children's participation, added the number of current target subjects, and updated the address of the IRB office.

The review by the committee has found that your revision is consistent with the continued protection of the rights and welfare of human subjects, and meets the requirements of MSU's Federal Wide Assurance and the Federal Guidelines (45 CFR 46 and 21 CFR Part 50). The protection of human subjects in research is a partnership between the IRB and the investigators. We look forward to working with you as we both fulfill our responsibilities.

Renewals: IRB approval is valid until the expiration date listed above. If you are continuing your project, you must submit an ***Application for Renewal*** application at least one month before expiration. If the project is completed, please submit an ***Application for Permanent Closure***.

Revisions: The IRB must review any changes in the project, prior to initiation of the change. Please submit an ***Application for Revision*** to have your changes reviewed. If changes are made at the time of renewal, please include an ***Application for Revision*** with the renewal application.

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to the human subjects, notify the IRB office promptly. Forms are available to report these issues.

Please use the IRB number listed above on any forms submitted which relate to this project, or on any correspondence with the IRB office.

Office of Regulatory Affairs
Human Research Protection Programs

Biomedical & Health Institutional Review Board (BIRB)

Community Research Institutional Review Board (CRIRB)

Social Science Behavioral/Education Institutional Review Board (SIRB)

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www.humanresearch.msu.edu

Figure 1 (cont'd)

Good luck in your research. If we can be of further assistance, please contact us at 517-355-2180 or via email at IRB@msu.edu. Thank you for your cooperation.

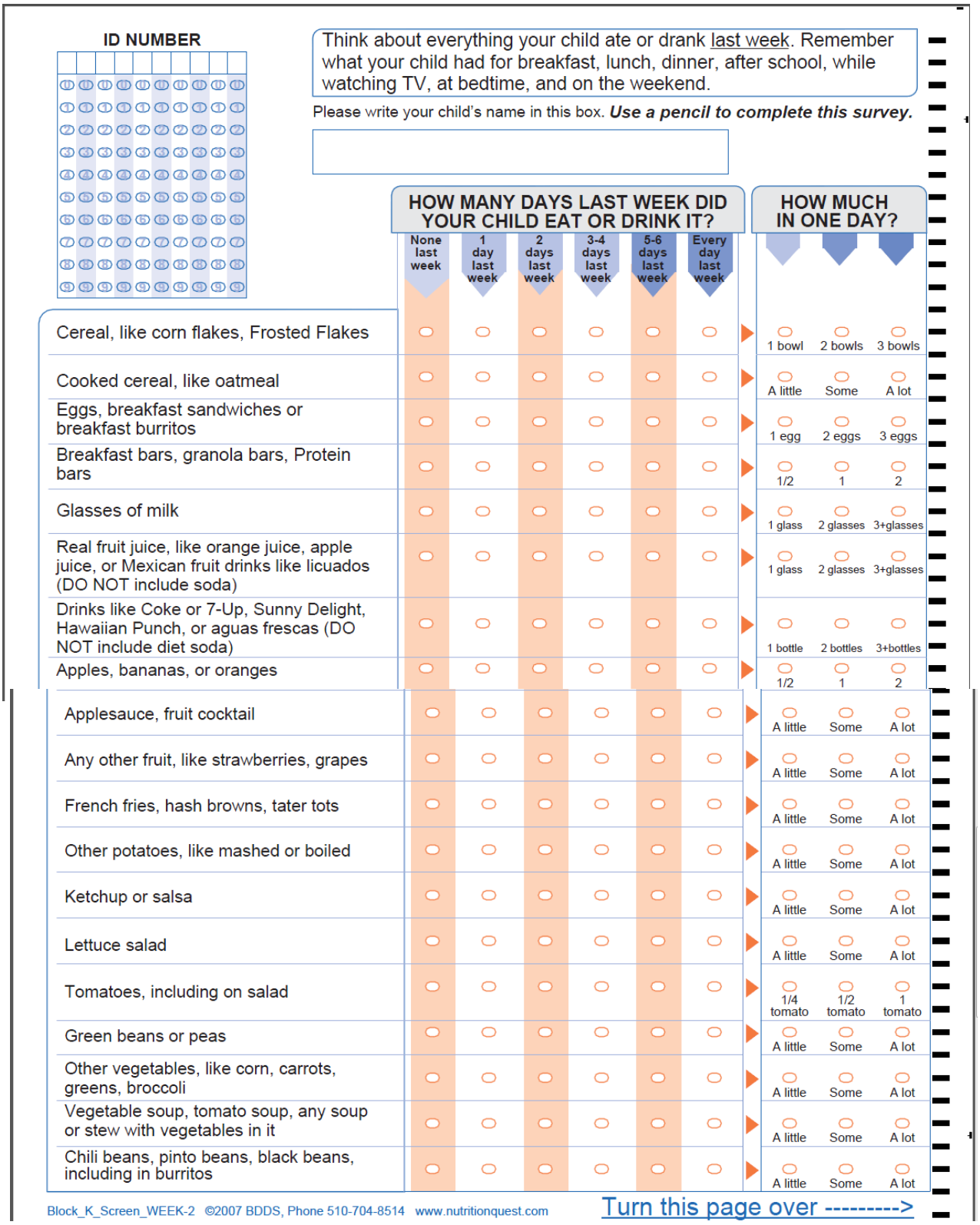
Sincerely,

Ashir Kumar, M.D.
BIRB Chair

c: , Kimberly Gilmore, Amy Shulman, Jamie Karp

Appendix D. Block Kids Food Screener (BKFS)

Figure 2. Block Kids Food Screener (BKFS) Questionnaire Image



ID NUMBER

Think about everything your child ate or drank last week. Remember what your child had for breakfast, lunch, dinner, after school, while watching TV, at bedtime, and on the weekend.

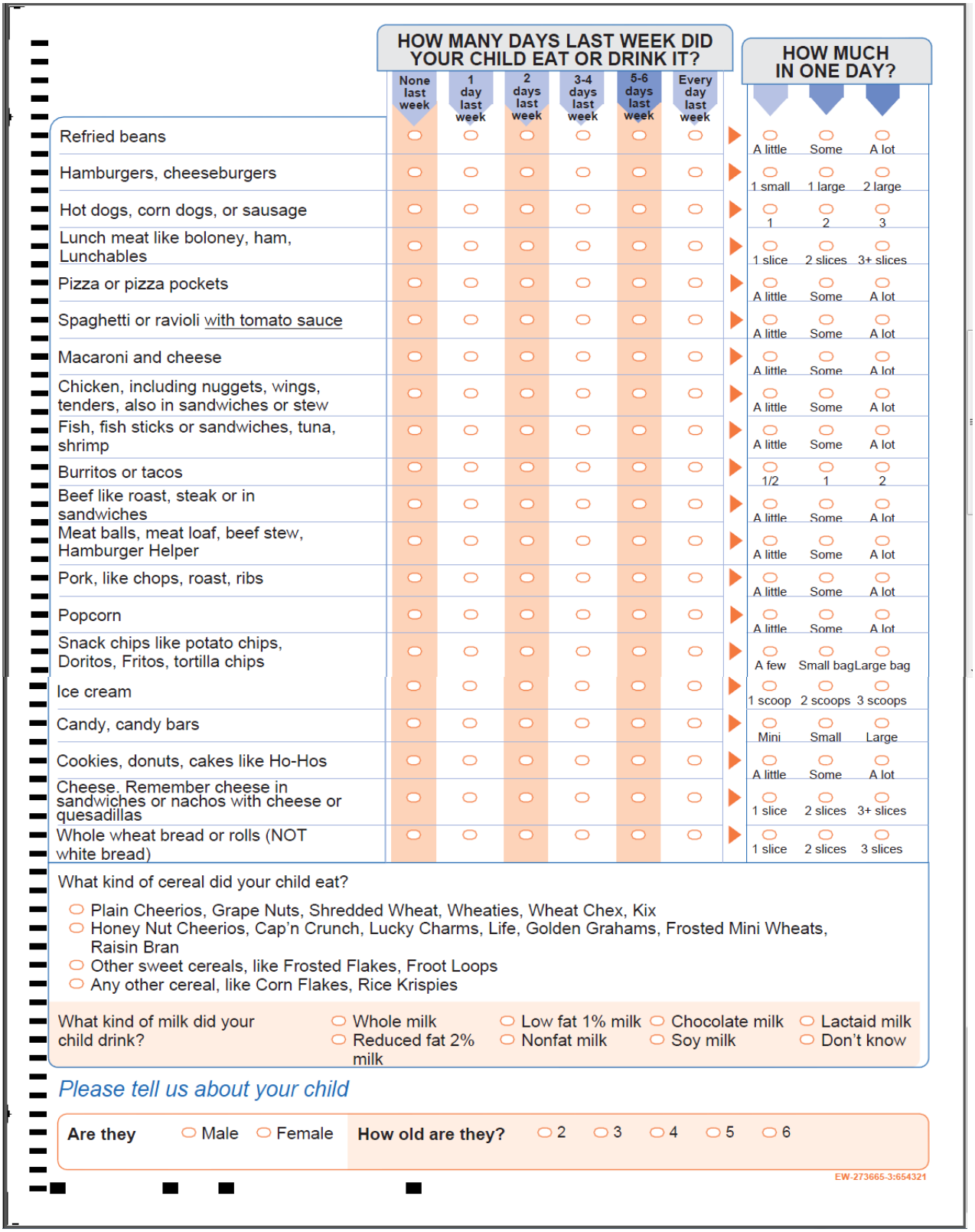
Please write your child's name in this box. ***Use a pencil to complete this survey.***

	HOW MANY DAYS LAST WEEK DID YOUR CHILD EAT OR DRINK IT?						HOW MUCH IN ONE DAY?		
	None last week	1 day last week	2 days last week	3-4 days last week	5-6 days last week	Every day last week			
Cereal, like corn flakes, Frosted Flakes	○	○	○	○	○	○	○ 1 bowl	○ 2 bowls	○ 3 bowls
Cooked cereal, like oatmeal	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Eggs, breakfast sandwiches or breakfast burritos	○	○	○	○	○	○	○ 1 egg	○ 2 eggs	○ 3 eggs
Breakfast bars, granola bars, Protein bars	○	○	○	○	○	○	○ 1/2	○ 1	○ 2
Glasses of milk	○	○	○	○	○	○	○ 1 glass	○ 2 glasses	○ 3+glasses
Real fruit juice, like orange juice, apple juice, or Mexican fruit drinks like licuados (DO NOT include soda)	○	○	○	○	○	○	○ 1 glass	○ 2 glasses	○ 3+glasses
Drinks like Coke or 7-Up, Sunny Delight, Hawaiian Punch, or aguas frescas (DO NOT include diet soda)	○	○	○	○	○	○	○ 1 bottle	○ 2 bottles	○ 3+bottles
Apples, bananas, or oranges	○	○	○	○	○	○	○ 1/2	○ 1	○ 2
Applesauce, fruit cocktail	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Any other fruit, like strawberries, grapes	○	○	○	○	○	○	○ A little	○ Some	○ A lot
French fries, hash browns, tater tots	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Other potatoes, like mashed or boiled	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Ketchup or salsa	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Lettuce salad	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Tomatoes, including on salad	○	○	○	○	○	○	○ 1/4 tomato	○ 1/2 tomato	○ 1 tomato
Green beans or peas	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Other vegetables, like corn, carrots, greens, broccoli	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Vegetable soup, tomato soup, any soup or stew with vegetables in it	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Chili beans, pinto beans, black beans, including in burritos	○	○	○	○	○	○	○ A little	○ Some	○ A lot

Block_K_Screen_WEEK-2 ©2007 BDDS, Phone 510-704-8514 www.nutritionquest.com

Turn this page over --------->

Figure 2 (cont'd)



	HOW MANY DAYS LAST WEEK DID YOUR CHILD EAT OR DRINK IT?						HOW MUCH IN ONE DAY?		
	None last week	1 day last week	2 days last week	3-4 days last week	5-6 days last week	Every day last week			
Refried beans	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Hamburgers, cheeseburgers	○	○	○	○	○	○	○ 1 small	○ 1 large	○ 2 large
Hot dogs, corn dogs, or sausage	○	○	○	○	○	○	○ 1	○ 2	○ 3
Lunch meat like boloney, ham, Lunchables	○	○	○	○	○	○	○ 1 slice	○ 2 slices	○ 3+ slices
Pizza or pizza pockets	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Spaghetti or ravioli with tomato sauce	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Macaroni and cheese	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Chicken, including nuggets, wings, tenders, also in sandwiches or stew	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Fish, fish sticks or sandwiches, tuna, shrimp	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Burritos or tacos	○	○	○	○	○	○	○ 1/2	○ 1	○ 2
Beef like roast, steak or in sandwiches	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Meat balls, meat loaf, beef stew, Hamburger Helper	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Pork, like chops, roast, ribs	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Popcorn	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Snack chips like potato chips, Doritos, Fritos, tortilla chips	○	○	○	○	○	○	○ A few	○ Small bag	○ Large bag
Ice cream	○	○	○	○	○	○	○ 1 scoop	○ 2 scoops	○ 3 scoops
Candy, candy bars	○	○	○	○	○	○	○ Mini	○ Small	○ Large
Cookies, donuts, cakes like Ho-Hos	○	○	○	○	○	○	○ A little	○ Some	○ A lot
Cheese. Remember cheese in sandwiches or nachos with cheese or quesadillas	○	○	○	○	○	○	○ 1 slice	○ 2 slices	○ 3+ slices
Whole wheat bread or rolls (NOT white bread)	○	○	○	○	○	○	○ 1 slice	○ 2 slices	○ 3 slices

What kind of cereal did your child eat?

- ○ Plain Cheerios, Grape Nuts, Shredded Wheat, Wheaties, Wheat Chex, Kix
- ○ Honey Nut Cheerios, Cap'n Crunch, Lucky Charms, Life, Golden Grahams, Frosted Mini Wheats, Raisin Bran
- ○ Other sweet cereals, like Frosted Flakes, Froot Loops
- ○ Any other cereal, like Corn Flakes, Rice Krispies

What kind of milk did your child drink?

○ Whole milk ○ Low fat 1% milk ○ Chocolate milk ○ Lactaid milk
○ Reduced fat 2% milk ○ Nonfat milk ○ Soy milk ○ Don't know

Please tell us about your child

Are they ○ Male ○ Female **How old are they?** ○ 2 ○ 3 ○ 4 ○ 5 ○ 6

EW-273665-3:654321

Appendix E. Glossary

Child centered feeding is rearranging foods to make them interesting, and complimenting the child when she/he eats. (Hughes et al., 2006).

Food availability is where parents do or do not provide access to certain types of foods in the house (Brown et al., 2008).

Food environmental controls are strategies where parents provide a healthy and organized home food environment and family rules around eating to help the child eat a healthy diet.

High contingency is where parents threaten or reward the child to eat. (Hughes et al., 2006).

High control is where parents verbally, physiologically, and physically pressure the child to eat (Hughes et al., 2006).

Mealtime behaviors are where parents set rules during meals such as sitting at a table, eating together, and not viewing TV during meals (Hoerr et al., 2005).

Modeling is where parents demonstrate the preferred eating strategies in front of the child, e.g., eating fruits and vegetables and not eating high fat /sugar foods (Vander Horst et al., 2007).

Parenting strategies are **behaviors** that parents use to get the child to do something specific, in this case to influence children's eating. Examples of controlling feeding strategies are: restriction, monitoring, pressure to eat, rewarding, threats...etc.

Parenting styles are **stable characteristics** of parenting reflecting both the degree of demands on/control of the child as well as parental responsiveness to child needs (Baumrind, 1989).

Timing of the meals is where parents set a regular mealtime for the child and family (Baughcum et al., 2001).

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