

HOME ENVIRONMENT AND CHILD DIET

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ABSTRACT

RACHEL TABAK: Home Environment and Child Diet
(Under the direction of Dianne S Ward)

The purpose of this research was to assess the association between the home environment and child diet. This dissertation followed three aims. Aim 1 examined the association between home food availability, measured by an open, researcher conducted inventory, and dietary intake in 3-8 year old children (N = 82). The only significant association remaining after adjustment for income, number of children and adults in the home, occupation, and race, was between vegetable intake and vegetable availability (OR=1.51, 95% CI=1.17-1.96). The purpose of Aim 2 was to explore the social environment and its relationship with dietary behaviors. From a parent-report questionnaire, three factors describing the home environment were identified, *where eat*, *control*, and *self-serve*, using exploratory factor analysis. The associations between these factors, and four individual, non-loading items, and child diet were examined. After adjustment for child age, occupation, income, and race, positive correlations were observed between intake of sweet snacks and the self-serve subscale ($r = 0.29$, $p = 0.01$), vegetable intake and parent modeling ($r = 0.26$, $p = 0.04$), and dinners away from home and fruit/fruit juice ($r = 0.24$, $p = 0.05$) intake. A negative correlation was observed between soda intake and modeling ($r = -0.26$, $p = 0.03$). Aim 3 consisted of a randomized controlled trial piloting a four-month intervention involving four tailored

newsletters and two phone calls targeting the home environment to increase vegetable intake in children. Vegetable intake in intervention group children (n=22) increased more than those in the control group (n=21) ($+0.09 \pm 0.3$ servings/day intervention vs. -0.03 ± 0.54 control), but this difference was not significant. Parents in the intervention group reported increased vegetable availability in their homes ($+1.55 \pm 2.46$ intervention vs. -0.33 ± 2.69 control, $p=0.02$). Additionally, intervention group parents reported positive social environment changes, for example, the number of days per week they suggested a fruit or vegetable for snack ($p=0.04$). The results of this dissertation suggest that a parent-focused intervention may lead to changes to the home environment. More research is needed to see if such interventions over longer intervention periods could be helpful for making dietary changes.

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CHAPTER I

INTRODUCTION

I.A. Overview

The World Cancer Research Fund and the American Institute for Cancer Research recently released a report recommending that maintaining a healthy body weight, adopting certain diet and physical activity (PA) behaviors, and avoiding of all types of tobacco may reduce “much and perhaps most of the global burden of cancer.” (*Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective*, 2007) Diet behaviors are considered the major modifiable risk factors for obesity and significant relationships between dietary intake (e.g., fruits & vegetables, high fat foods) and a number of cancers have been observed (*Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective*, 2007; Uauy & Solomons, 2005; WHO, 2002). The American Heart association also lists ‘eat better’ and ‘lose weight’ as two of its ‘Simple 7’ for better health (“My Life Check: Live Better With The Simple 7,” 2010).

It is well-known that parent eating behaviors influence child eating behaviors, and ultimately child nutrition (L. L. Birch & J. O. Fisher, 1998). This is particularly true for younger children who are developing food preferences and are dependent upon caregivers for provision of food; however, the nature of this relationship is poorly understood (Larson & Story, 2009). Researchers have also begun to explore the impact the home environment has on diet behaviors in children.

McLeroy and colleagues’ social ecological model highlights the influence of the environment on health behaviors.(McLeroy, Bibeau, Steckler et al., 1988) Although existing studies provide support for a relationship between the home environment and behavior, there are still many gaps in the research with regard to exactly how the physical (availability) and social

(modeling, parental and child control over food intake, meal environment,) environments collectively influence diet.(L. L. Birch & Davison, 2001; Campbell, Crawford, & Ball, 2006; Gillman, Rifas-Shiman, Frazier et al., 2000; Glanz, Sallis, Saelens et al., 2005; Gorin, Raynor, Niemeier et al., 2007; Hanson, Neumark-Sztainer, Eisenberg et al., 2005; Kratt, Reynolds, & Shewchuk, 2000; Patterson, Kristal, Shannon et al., 1997; Trost, Owen, Bauman et al., 2002). In order to move forward with intervention based efforts to alter environmental factors within the home and thus influence diet and disease risk, a solid understanding of the home food-environment-diet relationship is necessary.

A major challenge to this area of research is the lack of studies using a measure of home environment factors thought to influence diet with adequate reliability and validity data. Without accurate measurement, the home environment's influence on child nutrition and weight status cannot be understood. Thus, the overall goal of this project is to improve our understanding of the relationship between the home food environment, both physical and social, and child diet behaviors. A minimal intervention to modify the home environment will be developed and tested. Specific aims are outlined below.

I.B. Specific Aims

Aim 1: Using extant food availability data from 85 homes and the Block Kids food frequency questionnaire (FFQ) data for a child in that home, determine the relationship between the home food availability and child diet.

Aim 2: Using extant food availability data from 85 homes, determine the relationship between child dietary behaviors, as measured by the Block Kids FFQ, and the social environment (modeling, parental and child control over food intake, meal environment,) in the home.

Aim 3: Based on the results from Aims 1 and 2, as well as a review of the literature, develop a low-intensity home environment intervention designed to increase child vegetable consumption, and pilot it in a sample of approximately 25 families with a child age 2-5 to evaluate efficacy.

CHAPTER II

LITERATURE REVIEW

II.A. Health Consequences and Trends of Overweight/Obesity

Childhood overweight puts children at increased morbidity and mortality (Franks, Hanson, Knowler et al., 2010; Mauras, Delgiorno, Kollman et al., 2010; Must, 1996). A recent report by the World Cancer Research Fund and the American Institute for Cancer Research found that diet, physical activity, and body fatness are related to risk of cancer (*Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective*, 2007). The panel concluded that factors which modify weight or obesity risk also modify risk of weight-related cancers (e.g., postmenopausal breast cancer, colon cancer, kidney (renal cell) cancer, esophagus (adenocarcinoma), and endometrial cancer (WHO, 2002). Other studies also have shown reduction of cancer risk by diet and weight status modification (Benetou, Orfanos, Lagiou et al., 2008; Cui, Dai, Tseng et al., 2007; Key, Schatzkin, Willett et al., 2004; Michels, Mohllajee, Roset-Bahmanyar et al., 2007; Ryan-Harshman & Aldoori, 2007). Three behaviors are encouraged to lower cancer risk: (1) maintaining a healthy weight throughout life; (2) adopting a physically active lifestyle; and (3) consuming a healthy diet, with an emphasis on plant sources. (Kushi, Byers, Doyle et al., 2006) Obesity is also a risk factor for cardiovascular disease (Poirier, Giles, Bray et al., 2006), a leading cause of death in the US. A recent study found that only eight percent of Americans are currently at low risk for cardiovascular disease (not currently smoking, total cholesterol below 5.17 mmol/L (_200 mg/dL) and not using

cholesterol-lowering medications, systolic blood pressure below 120 mm Hg and diastolic blood pressure below 80 mm Hg and not using antihypertensive medications, not overweight, and not having been previously diagnosed with diabetes mellitus) (Ford, Li, Zhao et al., 2009).

Habits during childhood alone may be associated with adult all-cause mortality (Engeland, Bjorge, Sogaard et al., 2003) as well as cancer mortality. A longitudinal study found that energy intake in childhood was associated with cancer mortality in adulthood (Frankel, Gunnell, Peters et al., 1998), and the World Health Organization concluded diet and activity habits from *childhood through adulthood* could impact one's risk of cancer (Uauy & Solomons, 2005). Further, obese children already show risk factors for future cardiovascular disease and diabetes in childhood (Mauras et al., 2010)

Data from NHANES show that in 2007-2008 32.2% of men and 35.5% of women were obese ($BMI \geq 30$) (Flegal, Carroll, Ogden et al., 2010). As indicated above, these individuals are at increased risk for several types of cancer as well as cardiovascular disease. Additionally, obesity rates have risen significantly among children, with data from NHANES indicating that in 2007-2008 10.4% of children age 2-5 are now ($>95^{th}$ percentile) and 6.9% are categorized as an even higher BMI category ($>97^{th}$ percentile) (Ogden, Carroll, Curtin et al., 2010). Given this alarming trend, and the growing body of literature demonstrating that overweight and obese children are more likely to remain overweight, (Freedman, Khan, Serdula et al., 2005; Rolland-Cachera, Deheeger, Guillaud-Bataille et al., 1987) adult and childhood obesity represent major public health concerns. In order to deal effectively with this threat to public health, we need to understand the factors that cause and influence childhood obesity.

II.B. Overweight and Obesity and Physical activity and Diet

In order to deal effectively with this threat to public health, we need to understand the factors that influence weight. A diet low in fruits and vegetables (Bes-Rastrollo, Martinez-Gonzalez, Sanchez-Villegas et al., 2006) and high in fat (Astrup, Ryan, Grunwald et al., 2000; Baxter, Coyne, & McClintock, 2006; Panagiotakos, Pitsavos, Skoumas et al., 2007) is associated with excessive weight gain. In 2005, only 29% of women and 36% of men ate fruit 2 or more times per day and only 22% of men and 32% of women consumed vegetables 3 or more times per day ("Fruit and vegetable consumption among adults--United States, 2005," 2007). Fruit and vegetable intake are low for children as well (Brady, Lindquist, Herd et al., 2000; Guenther, Dodd, Reedy et al., 2006). Changes in these behaviors are necessary to help bring about energy balance and prevent the excess weight gain which is associated with poor health outcomes.

II.C. Tracking of Diet and PA behaviors

Prevention of obesity in childhood is important as early life overweight and weight-related behaviors are thought to influence later risk (Parsons, Power, Logan et al., 1999), and because it is very difficult for obese adults to lose weight and obese children are more likely to become obese adults (L. Birch & J. Fisher, 1998; Dietz, 1999; Lobstein T, 2004; Whitaker, Wright, Pepe et al., 1997). It is also possible that obesity and dietary behavior during childhood are independent risk factors for adult cancer (Uauy & Solomons, 2005), cardiovascular disease, and diabetes (Mauras et al., 2010). Positive feeding practices and access to diverse foods are important for developing health promoting and disease preventing eating habits (L. L. Birch, 1998; Koivisto Hursti, 1999). A diet of diverse fruits and vegetables is particularly important for cancer prevention because exposure to carcinogens in any one food will be less intense (Uauy & Solomons, 2005). Unfortunately, many cancer-protective foods, those high in beneficial phytochemicals, are bitter, and many children have an aversion to the bitter taste (L. L. Birch, 1998). The converse of this, high fat, high sugar foods, are often more palatable, and children fed

these early in life, may develop preferences for these foods, impacting their diet during adulthood. However, studies have shown that these preferences can be changed by changing parent feeding practices (J. Wardle, L. J. Cooke, E. L. Gibson et al., 2003).

II.D. The role of the Environment in Overweight and obesity

For many years, researchers have been using McLeroy and colleagues' social ecological model to examine the influence of environmental factors on various health behaviors (McLeroy et al., 1988). The dramatic rise in obesity rates observed in recent years (Ogden, Carroll, Curtin et al., 2006) has led to increased interest in the role environmental factors play in weight outcomes and weight-related behaviors. A growing body of evidence has demonstrated that the environment is an important cause of obesity (Elinder & Jansson, 2009; Glanz et al., 2005; Kirk, Penney, & McHugh, 2009; van der Horst, Oenema, Ferreira et al., 2007). An obesogenic environment has been described as one that provides an almost unlimited, convenient supply of highly palatable, energy dense foods (Swinburn, Egger, & Raza, 1999). Micro-level environments, specifically the home (Larson & Story, 2009; Pearson, Biddle, & Gorely, 2008; van der Horst et al., 2007), may have a more direct influence on behaviors that are critical to obesity development in young children. Researchers have begun to explore both physical and social factors of the home environment and their impact on diet (L. L. Birch & Davison, 2001; Campbell et al., 2006; Gillman et al., 2000; Glanz et al., 2005; Gorin et al., 2007; Hanson et al., 2005; Kratt et al., 2000; Patterson et al., 1997; Trost et al., 2002); however, work to date remains incomplete. Within this limited body of research, evidence is mounting that significant interactions among home environmental factors may also exist (Fitzpatrick, Edmunds, & Dennison, 2007).

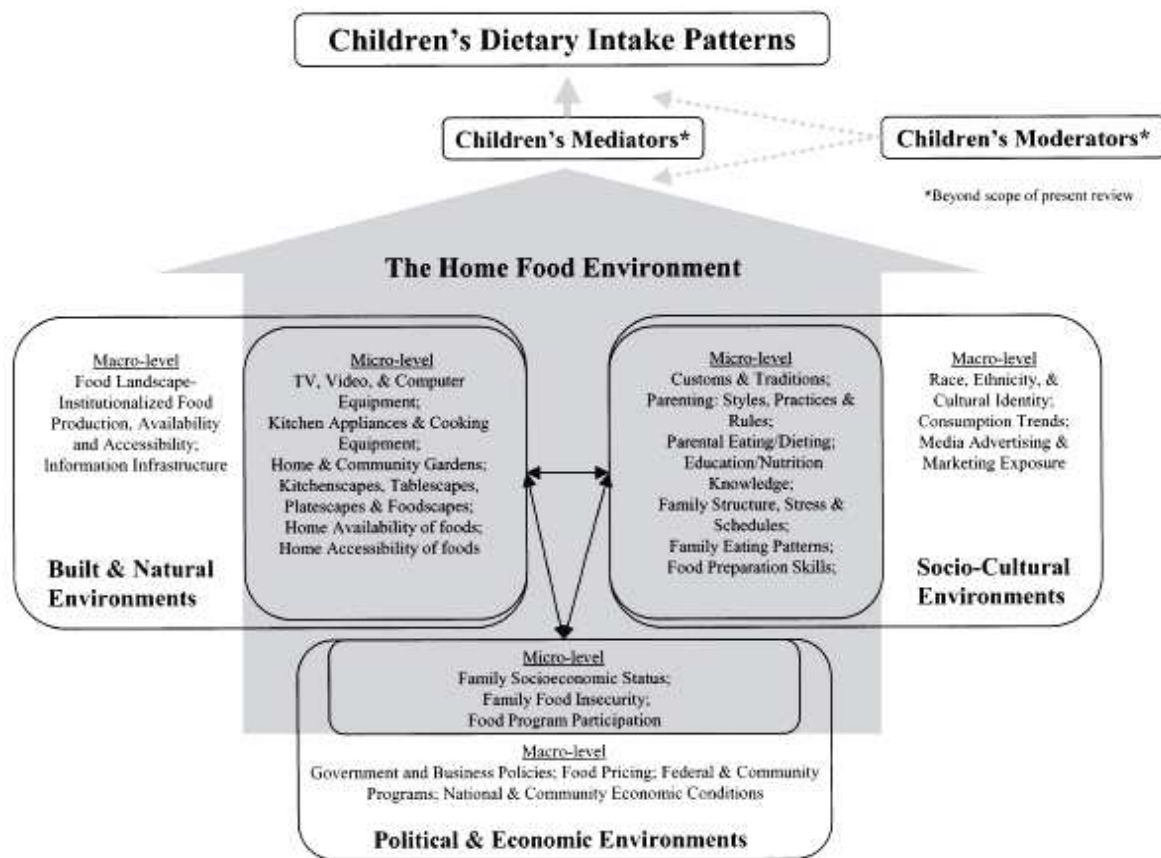


Figure 2.1. Model depicting home environmental influences on child weight-related behaviors and BMI (Rosenkranz & Dziewaltowski, 2008)

The model above, put forth by Rosenkranz et al. (Figure 2.1), highlights factors at the level of the home thought to influence obesity risk, but does not focus on child level psychosocial characteristics, which may very well be important to child diet and serve to mediate or moderate the relationship between the home environment and diet (Rosenkranz & Dziewaltowski, 2008), These characteristics, however, are distinct from environmental influences. The body of literature investigating specific physical or social factors within the home environment and their impact on dietary behaviors is growing; however, it is still unclear how these factors may interact and impact children's eating habits.

II.E. Home Physical Environment and Diet

Researchers have begun to explore both physical and social factors of the home environment and their impact on diet. The availability and accessibility of foods in the home has been shown to have a major influence on childhood diet (Baranowski, Domel, Gould et al., 1993; Blanchette & Brug, 2005; M. Bryant & Stevens, 2006; Glanz et al., 2005; Hearn, Baranowski, Baranowsk et al., 1998; Kirby, Baranowski, Reynolds et al., 1995). The majority of studies on this topic have consistently demonstrated a relationship between food availability in the home and child food intake. Recent literature reviews by Jago (Jago, Baranowski, & Baranowski, 2007) and van der Horst (van der Horst et al., 2007) highlight the impact that fruit and vegetable, snack, and soft drink availability have on children's intakes of these items. A review of physical and social correlates for fruit and fruit juice, and vegetable intake conducted by Pearson et al. found that home availability, family rules, and parental encouragement were positively associated with fruit and vegetable intake in children and that fruit and fruit, fruit juice and vegetable intake were associated positively with parental modeling and parental intake (Pearson et al., 2008). A summary of research in this area in elementary school aged children is provided in Table 2.1.

Research in this area has focused primarily on fruits and vegetables specifically, (K. Cullen, Baranowski, Owens et al., 2003; K.W. Cullen, T. Baranowski, L. Rittenberry et al., 2001; Hanson et al., 2005; M. D. Hearn, T. Baranowski, J. Baranowski et al., 1998; Kratt et al., 2000; Neumark-Sztainer, Wall, Perry et al., 2003; Reynolds, Hinton, Shewchuk et al., 1999; van Assema, Glanz, Martens et al., 2007; Young, Fors, & Hayes, 2004) generally finding that if fruits and vegetables are available in the home, children are more likely to eat them. More recently, studies have begun to expand their scope to include availability of additional food items. Studies that have assessed healthy and unhealthy snack foods, (S Gable & Lutz, 2000; Hang, Lin, Yang et al., 2007; Martens, van Assema, & Brug, 2005) soft drinks, (Grimm, Harnack, & Story, 2004) and "unhealthy" foods (Campbell, Crawford, Salmon et al., 2007; Haerens, Craeynest, Deforche et al., 2008) also found that the presence of these foods in the home was associated with greater intakes.

A significant caveat of research to date is that all of the availability studies assessed food availability by self-report checklists or surveys, very few of which were validated by direct observation.

Table 2.1. Relationship Between Home Food Availability and Diet

Study	Sample	Methods (availability & diet)	Results
Cullen (2004)(K. W. Cullen, Klesges, Sherwood et al., 2004)	n = 150 children, 8-10 y, all African American(AA)	<ul style="list-style-type: none"> 39-item checklist for fruits, fruit juices (FJ), and vegetables (modified from Cullen 2003(K. Cullen et al., 2003)), and 32-item on low- and high-fat foods (based on Cullen 2000(K.W. Cullen, T. Baranowski, L. Rittenberry et al., 2000)) 2 diet recalls 	Availability of these foods was NOT significantly associated with intake.
Cullen (2003)(K. Cullen et al., 2003)	n = 225 children, 4 th -6 th grade, 31% Hispanic, 26% AA, 12% Asian	<ul style="list-style-type: none"> 34-item checklist for fruits, fruit juices, and vegetables (FJV) (modified from Hearn 1998(M. D. Hearn, T. Baranowski, J. Baranowski et al., 1998)) 6 days of food records, completed by children 	Availability of FJV as report by child and parent both correlated with child intake ($p<.05$).
Cullen (2001)(K.W. Cullen et al., 2001)	n = 221 children, 4 th -6 th grade, 37% Mexican-American, 25% AA, 9% Asian	<ul style="list-style-type: none"> 34-item checklist for fruits, fruit juices, and vegetables (modified from Hearn 1998(M. D. Hearn, T. Baranowski, J. Baranowski et al., 1998)) 3 days of food records 	Intake of fruit and vegetables was significantly associated with availability of fruits ($p<.05$) and vegetables ($p<.001$).
Gable (2000)(S. Gable & Lutz, 2000)	n = 65 children, 3-10 y	<ul style="list-style-type: none"> frequency of presence in the home of selected foods (fresh fruits and vegetables, cereals, rice, pasta, meats, dairy products, salty snacks, frozen desserts, and sweets) was captured using a 5-point scale 31-item FFQ completed by parents 	Availability of sweets was significantly associated with child's intake of fats, sugars, and junk foods ($p<.01$, $p<.05$, $p<.05$, respectively). Availability of salty snacks was significantly associated with child intake of junk food ($p<.05$).
Grimm (2004)(Grimm et al., 2004)	n = 560 children, 8-13 y	<ul style="list-style-type: none"> 11-item survey assessed both availability of soft drinks at home and consumption (as well as other factors) 	Logistic regression analysis showed that availability of soft drinks at home was significantly associated with intake; however, availability was no longer significant in the combined model.
Hang (2007)(Hang et al., 2007)	n = 722 children, 4 th -6 th grade, from Taiwan	<ul style="list-style-type: none"> 8-item checklist for snack foods (3 healthy and 5 unhealthy) 33-item FFQ 	Availability of healthy and unhealthy snacks in the home was associated with intake of those foods ($p\leq.05$).
Hearn (1998)(M. D. Hearn, T. Baranowski, J. Baranowski et al., 1998)	n=13 families 3 rd grade	<ul style="list-style-type: none"> 20-item checklist for fruits and vegetables 7-day food records 	Availability associated with intake of FJV ($P<0.05$).
Kratt (2000)(Kratt et al., 2000)	n = 1196 children, 4 th grade	<ul style="list-style-type: none"> 27-item checklist for fruits and vegetables (modified Hearn 1998(M. D. Hearn, T. Baranowski, J. Baranowski et al., 1998)) 24-hour food recall 	Intake of fruit and vegetables greater in children with high availability compared to medium and low availability ($P<0.01$).

Study	Sample	Methods (availability & diet)	Results
Reynolds (1999)(Reynolds et al., 1999)	n = 414 children, 3 rd grade	<ul style="list-style-type: none"> • 31-item checklist for fruits, fruit juices, and vegetables (modified Hearn et al. 1998(M. D. Hearn, T. Baranowski, J. Baranowski et al., 1998)) • 24-hour food recall 	Availability of fruit and vegetables related to intake in girls ($P<0.05$).
Spurrier 2008(Spurrier, Magarey, Golley et al., 2008)	280 Families, 4.1- 5.4 y	<ul style="list-style-type: none"> • Open inventory: Quantity (weight) of fruit and vegetables, high fat/sugar non-core snack foods, fat content of dairy products, and sweetened drinks present • 24-item parent report questionnaire to assess children's dietary patterns 	<p>Availability of Fruit ($p<.001$), fruit juice ($p=.01$), and musli bars/breakfast bars ($p=.04$) related to fruit and vegetable intake</p> <p>Availability of fruit juice ($p=.02$) and type of dairy ($p<.001$) related to intake of fat from dairy</p> <p>Availability of FJ ($p<.001$) and amount of cordial and carbonated drink ($p=.004$) related to sweetened beverage intake</p> <p>Availability of chips, snack savory biscuits, salted nuts ($p=.01$), lollies, sweets, chocolates ($p<.001$), muesli bars/breakfast bars ($p=.001$), and cake/biscuits ($p<.001$) related to intake of non-core foods</p>

II.F. The Social Environment: Parenting Practices, Home Policies, and Diet

Parenting research has demonstrated the importance of parenting in child development (Darling, 1993; Maccoby, 1992). Parenting style and practices have implications for all aspects of development, including behaviors that affect healthy weight gain (Benton, 2004). These influences are exerted through permissiveness with regards to access to salty and sweet snack food as well as restriction which has been positively associated with overeating or eating in the absence of hunger, especially in girls (J. O. Fisher & Birch, 1999a). In a qualitative study examining causes of obesity in children, Brewis et al. (2006) asked mothers of children age 3-6 years about beliefs surrounding child feeding. They found that mothers' knowledge and beliefs about what foods were healthy for their children was not incorrect, but that when it came time to getting their children to eat these foods, they had incredible difficulty. Additionally, the diets the women described as healthy were different than what their children were eating. For example, mothers' models included "low sugar, low fat, non-excessive eating of a variety of nutrient-dense foods," but the children were consuming diets which were too high in calories, too low in fruit and vegetables, and included excessive sugar-sweetened beverages. Interviews found that

difficulty feeding was a common concern and may explain this discrepancy (Brewis & Gartin, 2006).

Specific parent feeding practices that have been shown to be associated with improved dietary intakes and weight outcomes in children include: providing healthy foods in the home (e.g., fruits and vegetables) (K. Cullen et al., 2003; K.W. Cullen et al., 2001; S Gable & Lutz, 2000; Gattshall, Shoup, Marshall et al., 2008; Hanson et al., 2005; M. D. Hearn, T. Baranowski, J. Baranowski et al., 1998; Kratt et al., 2000; Neumark-Sztainer et al., 2003; Reynolds et al., 1999; Spurrier et al., 2008)), having established family meal patterns (e.g., eating meals/dinner as a family,(S. Gable, Chang, & Krull, 2007; Gattshall et al., 2008; Gillman et al., 2000; Sen, 2006) not skipping breakfast(Andersen, Lillegaard, Overby et al., 2005; Berkey, Rockett, Gillman et al., 2003; Rampersaud, Pereira, Girard et al., 2005; Utter, Scragg, Mhurchu et al., 2007), and modeling of healthy eating behaviors (Tibbs, Haire-Joshu, Schechtman et al., 2001b) (e.g., parent intake of fruits and vegetables, particularly in front of the child) (Campbell et al., 2006; De Bourdeaudhuij, Te Velde, Brug et al., 2007; Gibson, Wardle, & Watts, 1998)). In contrast, practices such as modeling of unhealthy eating behaviors(Gattshall et al., 2008) (e.g., disinhibition,(Contento, Zybert, & Williams, 2005) parents intake of snacks(Campbell et al., 2007; Lee, Mitchell, Smiciklas-Wright et al., 2001), eating with the television on (Fitzpatrick et al., 2007)), providing unhealthy foods in the home (salty and sweet snacks,(S Gable & Lutz, 2000; Gattshall et al., 2008; Hang et al., 2007; Spurrier et al., 2008) sweetened beverages(Grimm et al., 2004; Hang et al., 2007; Hanson et al., 2005; Spurrier et al., 2008)), and restricting consumption of unhealthy foods(L. L. Birch & Fisher, 2000; Faith, Berkowitz, Stallings et al., 2004; J. O. Fisher & Birch, 1999b, 2002; Francis & Birch, 2005; Lee et al., 2001)) appear to have unintended and negative consequences with regard to children's dietary intake and weight outcomes. Evidence is mounting that significant interactions among home environmental factors may also exist. For example, the positive benefits of family meals may be diminished or even negated by watching television during dinner.(Fitzpatrick et al., 2007)

II.G. Limitations Assessing the Home Environment

While some evidence exists to suggest that the home environment is related to dietary factors in children(K. Cullen et al., 2003; K. W. Cullen, T. Baranowski, L. Rittenberry et al., 2001; K. W. Cullen, T. Baranowski, L. Rittenberry et al., 2000; M. D. Hearn, T. Baranowski, J. Baranowsk et al., 1998; Weber Cullen, Baranowski, Rittenberry et al., 2000), assessment of the home environment is almost exclusively captured using tools which lack appropriate reliability and validity data. A preliminary review of studies measuring aspects of the home environment thought to influence weight-related behaviors highlighted major weaknesses in existing measures. Of the 50 studies reviewed, roughly 60% reported some form of reliability evidence (most internal consistency), only 25% reported test-retest (none addressed trait stability versus score reliability), and fewer than 20% presented evidence for validity. This was supported by the review by Pearons et al. which presents the lack of reliability and validity data for the assessment of predictor variables as a limitation in this area of research(Pearson et al., 2008). Evaluation of this association using an objective assessment of the environment is necessary to better elucidate the true relationship.

CHAPTER III

INTERVENTION FRAMEWORK

III.A. Treatment and Prevention of Child Obesity

It is hypothesized that family-based interventions targeting obesity reduction will be successful in addressing long-term behavior change, and a recent review has shown that these types of interventions can have reasonable impacts (Kitzmann & Beech, 2006). While there is a distinction between treatment of and prevention of childhood obesity, treatment research stresses the importance of the family, and this likely translates to prevention as well. The strongest and most long lasting weight loss effects have been found in treatment studies which include parents, when compared with varying degrees of parent/family engagement.(Bluford, Sherry, & Scanlon, 2007; Jelalian & Saelens, 1999; Kitzmann & Beech, 2006; Summerbell, Ashton, Campbell et al., 2003) Research from Epstein and colleagues as well as Golan and colleagues supports the long-term efficacy of family-based behavioral weight control programs for treatment (Epstein, Valoski, Wing et al., 1994), endorsing “parents as agent of change”.(Golan & Crow, 2004; Golan, Fainaru, & Weizman, 1998; Golan, Kaufman, & Shahar, 2006; Golan, Weizman, Apter et al., 1998)

III.B Interventions at the Family Level

Interventions at the level of the family can be delivered to individual families or to families in groups. An advantage to delivering interventions to individual families is that the intervention can be tailored to each family’s unique needs. Additionally, if families with multiple ethnic backgrounds or who speak different languages are included, staff can be better matched to each family’s needs. This method also allows for better retention of families than interventions delivered through centralized locations such as schools or community centers, especially if the

intervention includes prolonged follow-up. This may reduce the burden placed on the family (i.e., less scheduling impact and travel time). As noted in a recent review, there has been an increase in the number of family-based interventions targeting the home environment for obesity prevention in young children (Hesketh & Campbell, 2010).

One pilot study recruited 43 pairs of Native American mothers and their young children (age 9 months to 3 years) into a culturally-tailored obesity prevention program.(Harvey-Berino & Rourke, 2003) Parenting support alone (PS) was compared to parenting support plus obesity prevention (OPPS) both of which were delivered through 16 weekly in-home visits with a peer educator. This intervention used the “Active Parenting Curriculum,” which emphasizes child’s psychological and behavioral goals, logical and natural consequences, mutual respect, and encouragement techniques. For the OPPS group, the emphasis was on parenting skills that would facilitate development of appropriate eating and physical activity behaviors in children. Eleven lessons were delivered over 16 weeks; these were based on social cognitive theory (SCT) and social learning theory (SLT). Constructs included: perceived benefits, intentions, outcome expectations, and self-efficacy. In the OPPS group, there was a focus on parent modeling of positive behaviors for the child; there were also lessons addressing barriers. Additionally, reinforcements for the parent and the child were incorporated in the intervention. Children in the OPPS condition gained less weight over 4 months than those in the PS group. Although not statistically significant, perhaps due to the limited scope and duration of the pilot study, the change in WHZ scores approached significance ($p=0.06$), and was likely a result of a decreased calorie intake in children in the OPPS condition.

With the aim of improving child intake through the creation of positive fruit and vegetable environments, parents were targeted in the High 5 for Preschool Kids program(Haire-Joshu, Elliott, Caito et al., 2008). This home-based intervention was guided by SCT and an ecological framework, and cites reciprocal determinism as a main model construct. This intervention targeted the intrapersonal environment of the parent, interpersonal interactions between the parent

and child, and the physical environment in the home. Methods to target parents included tailored newsletters, home visits with parent educators, and sing-a-long storybooks with cassettes. Core foci of this intervention were: parent knowledge, parental modeling, non-coercive feeding practices, and food availability. Haire-Joshu et al. (Haire-Joshu et al., 2008) found improved fruit and vegetable knowledge and availability, as well as in intake, in intervention compared to control parents, and an increase in fruit and vegetable servings in normal, but not overweight, children compared to controls. Notably, parent change in fruit and vegetable servings was a predictor of child change as were availability and knowledge; however, weight, modeling, and non-coercive feeding were not predictors of child behavior change.

In an earlier, related study, Haire-Joshu et al evaluated the impact of the *High 5 Low Fat* program on parent diet. They conducted a randomized trial in 738 African American parents (with children >3 yrs) and found a positive impact on parental diet, with intervention parents being significantly more likely to change both fruit and vegetable and fat dietary behaviors compared to control (32% vs. 25% for intervention and control, respectively). (Haire-Joshu, Brownson, Nanney et al., 2003) This intervention was also SCT-based and developed in coordination with the Parents as Teachers program; the program incorporated home visits, parent-child newsletters, and group meetings. This work further supports the importance of including parents in prevention and treatment of child overweight, though limited work has been done in this area.

III.C. Social-Cognitive Theory and Changing the Home Environment

In addition to the interventions just mentioned, another SCT-based intervention targeted the home environment at multiple SEF levels (individual and interpersonal). The *Linking Childcare to Home* project was a feasibility trial to test a child-care and home-based intervention. Parents of 2 to 5 year olds (n=150) were recruited from 18 child care centers to participate in the study. Centers were randomly assigned to one of three arms: child care environmental intervention (the Nutrition and Physical Activity Self-Assessment in Child Care (NAP SACC), a child-care based

intervention, child care plus home condition, and control (delayed intervention). In the child care plus home condition, 33 parents (of 46 enrolled) completed a 57-item home assessment for factors thought to influence diet and physical activity behaviors. Working with project staff during home visits, parents used this assessment to complete an action plan to set goals aimed at improving the nutrition and physical activity behaviors of their family. Included in the action plan were changes the family intended to make in their homes to achieve the behavioral goals. Several constructs from SCT were incorporated into this intervention, including: expectancies, environment, situation, reinforcement, and reciprocal determinism. This environment-centered intervention aimed to change parents' perceptions of their environment, as well as demonstrating that children can play actively even if it is raining. Although dietary and body weight results are not available, participants reported positive experiences with the NAP SACC family program, and many reported achieving their goals.

These interventions aimed to alter the home environment to improve dietary behaviors. Since the goal is to alter individual behavior (child) though changes in the home environment created by changes in individual behavior (parent), an appropriate theory to be applied to this intervention is SCT. SCT is based on the reciprocal influences of individuals on their environment and the environment on individual behavior.

III.D. Self-Determination Theory and Motivation

Self-Determination Theory (SDT) provides a framework for understanding motivations and for building autonomous motivation to adopt healthier behaviors. According to SDT, humans have three innate psychological needs: competence, relatedness, and autonomy (R.M. Ryan & Deci, 2002). SDT suggests that motivation for action lies on a continuum ranging from amotivation (unwillingness to engage in a specific behavior) to intrinsic motivation (engaging in a behavior for the inherent satisfaction of doing that behavior). (Deci & Ryan, 2000; R. M. Ryan & Deci, 2000) There are varying levels of motivation between these extremes. SDT promotes

autonomous motivation through person-centered approaches. The insight gained through SDT leads to interventions which foster autonomous motivation to alter behavior.

This theory distinguishes between autonomous and controlled behavior, suggesting that when individuals are acting in what they perceive as their own volition and choice, they will be more motivated; intrinsic motivation is more likely to lead to action than extrinsic motivation(R.M. Ryan & Deci, 2002). This theory has been used in weight loss research and has been used extensively in exercise science(Williams, 2002)

Based on these ideas, an intervention which aims to foster intrinsic motivation for behavior change should be conducted in an autonomy-supporting environment. Elements of an autonomy-supporting environment include: (1) providing information without pressure for a particular outcome, (2) positive feedback concerning competence, (3) absence of pressure to act in a certain way to achieve a particular outcome, (4) acknowledgement and acceptance of the other's perspective, (5) provision of choice, and (6) provision of a meaningful rationale.(Foote, DeLuca, Magura et al., 1999)

III.E. Goal Setting to Achieve Behavior Change

Two review articles that study goal setting for dietary and physical activity behavior change suggest these are effective strategies. A 2004 review by Shilts et al. found that a majority of studies looking at the effectiveness of goal setting found significant positive effects on dietary behavior(Shilts, Horowitz, & Townsend, 2004). Additionally, all of the intervention studies using goal setting in adults identified in this review showed positive effects on dietary behaviors. The second review laid out 4 steps for successful goal-setting for dietary behavior change among adults: (1) Recognizing the need for change, (2) Establishing a goal, (3) Monitor goal-related activity, and (4) Self-reward for goal attainment(K. W. Cullen, Baranowski, & Smith, 2001). In an intervention which aimed to prevent child problem behaviors by targeting parents, phone calls were combined with self-administered materials. Though both groups had better results than the controls, the group receiving both the calls and self-administered materials showed greater

intervention effects than those receiving only the self-administered materials (Morawska & Sanders, 2006).

III.F. Selecting Intervention Targets

Intervention targets should be selected based on two broad criteria: impact and changeability (Bartholomew, 2006). While some home factors such as kitchen size may influence diet, it is unlikely that parents will be able to achieve changes to these factors during the course of an intervention, thus such factors would not make good intervention targets. Selecting changeable as well as important targets home environment ensures that an intervention will yield the greatest behavioral changes. This may be especially important when selection is parent-driven and leads to selection of goal which are perceived by the parent as being both important and changeable. Where parents able to select areas they would like to improve, it may give them a sense of control and push them toward autonomous motivation for change.

III.G. Intervention Intensity

Many interventions aimed at changing child dietary behaviors are intensive, often taking a “kitchen sink” approach and requiring significant parent time and effort, as well as time and effort from project staff. Often, interventions aim to change many parts of the diet ranging from fruits, vegetables, and fat to total energy and soft drinks. However, it is possible that targeting only one, specific behavior may increase comprehensibility of an intervention for parents. Intervening on vegetable intake is especially important because children often prefer sweet foods, or even fruit compared to vegetables (Gibson et al., 1998; Jaramillo, Yang, Hughes et al., 2006; J. Wardle et al., 2003). Importantly, these preferences for vegetables can be increased with exposure by parents (J. Wardle, L. Cooke, E. Gibson et al., 2003).

While it is important to demonstrate the efficacy of intensive dietary change in these interventions, dissemination of these programs has limited feasibility. Also, there is evidence for the efficacy of minimal interventions, which has been observed with other health behaviors (Bauman, Ennett, Foshee et al., 2002). Using a randomized design, Bauman et al. conducted an

evaluation of a family program featuring four mailed booklets to adult family members with follow-up telephone calls by health educators in a national sample of adolescent–parent pairs. The program significantly reduced the prevalence of smoking cigarettes and drinking alcohol among adolescents. A self-administered intervention to reduce reported behavior problems in children was examined in 126 parents of toddlers (Bauman et al., 2002). When Morawska et al contrasted the effects of 2 different levels of intensity of the self-administered intervention (self-administered alone or self-administered plus brief therapist telephone assistance), the results supported the efficacy of the self-administered form. They found significant short-term reductions in reported child behavior problems and improvements in maternal parenting style, parenting confidence, and anger, and these effects were maintained at 6-month follow-up (Morawska & Sanders, 2006). In these family-based studies, parent were the agent of change for influencing the child’s behavior (Ennett, Bauman, Pemberton et al., 2001; Knai, Pomerleau, Lock et al., 2006; Morawska & Sanders, 2006).

III.H. Summary

In order to reduce the burden of poor health resulting from inadequate diet and overweight, childhood obesity prevention must be addressed from multiple levels of the social-ecological framework. To intervene at the level of the home environment, the relationship between dietary behaviors and the social and physical environment within the home must be clearly understood. This information can be used to produce interventions which alter the home environment to improve child dietary behaviors. Thus understanding the influence of physical and social home environment characteristics on child dietary behaviors is essential for use of this information in development of interventions at the home level.

CHAPTER IV

ASSOCIATION BETWEEN FOOD AVAILABILITY AT HOME AND CHILD DIET

IV.A. Abstract

Parents are responsible for the environment at home and their actions can support healthy dietary habits in their children. We recruited 83 families with a child between 3-8 years. During in-home observations, research staff conducted open inventories of foods available. Parents completed a food frequency questionnaire to estimate their child's intake. Associations between food availability and diet were assessed using correlations and logistic regression. The odds of changing tertiles of vegetable intake associated with a 10 serving increase in home availability was OR=1.51 (95% CI=1.17-1.96) after adjustment for income, number of children and adults in the home, parent occupation, and race. Associations between fruit intake and fruit availability and soda intake and fruit availability were significant only before adjustment. This study suggests increasing availability of vegetables at home is associated with an increase the likelihood a child in that home will consume vegetables.

IV.B. Introduction

Current estimates suggest that almost 32% of US children aged 2 to 19 years are overweight or obese (Ogden, Carroll, & Flegal, 2008). These alarming numbers of overweight and obese children and the growing body of literature demonstrating the increased risk for numerous adverse health outcomes (Erickson, Robinson, Haydel et al.,

2000; Freedman, Dietz, Srinivasan et al., 1999; Weiss, Dziura, Burgert et al., 2004) have made childhood obesity a major public health concern. In order to deal effectively with this threat to child health, the need to improve our understanding of the factors that cause and influence child weight status has led us to examine the environment as a potential influence. The current environment has been described as “toxic” or “obesogenic” due to the presence of an almost unlimited, convenient supply of highly palatable, energy dense foods, coupled with conditions that encourage sedentary behaviors and discourage physical activity (Glanz et al., 2005; Swinburn et al., 1999). Research has focused largely on the impact of meso- and macro-level environments, such as neighborhoods and communities, in an effort to modify behaviors associated with unnecessary weight gain. While these meso- and macro-level environmental factors are undoubtedly important, micro-level environments, specifically the home environment (Swinburn et al., 1999), may have a more direct influence on behaviors critical to obesity development in children (Davison & Birch, 2001).

Physical and social parameters of the home environment hypothesized to influence children's diets include food availability, parents' eating habits, and child feeding practices (L. L. Birch & J. O. Fisher, 1998). The availability of foods in the home could be a major influence on childhood diet, since a child's food intake is largely dependent upon provision of food by others (Baranowski, Cullen, & Baranowski, 1999; M. Bryant & Stevens, 2006; Glanz et al., 2005; Resnicow, Hearn, Smith et al., 1997). Although limited in number and scope, most studies examining the relationship between home food availability and diet, particularly availability of fruits and vegetables (M. Bryant & Stevens, 2006; K. Cullen et al., 2003; Fulkerson, Nelson, Lytle et al., 2008;

Hanson et al., 2005; M. Hearn, T. Baranowski, J. Baranowski et al., 1998; Kratt et al., 2000; Neumark-Sztainer et al., 2003; Patterson et al., 1997; Raynor, Polley, Wing et al., 2004; Reynolds et al., 1999; Spurrier et al., 2008) have found that increased availability of certain foods, including fruits and vegetables, is related to the consumption of those foods.

Previous research in the area of the home environment and diet has been somewhat limited by use of predefined checklists and parent- or self-reported measures (K. Cullen et al., 2003; M. Hearn et al., 1998; Kratt et al., 2000; Patterson et al., 1997; Raynor et al., 2004; Reynolds et al., 1999). Checklists assess a limited number of foods and, therefore, cannot capture the variety of foods in the home. As it has been used, this method also failed to capture the quantity of the foods available. Moreover, these measures are completed by parents, rather than research staff, and are subject to bias which may limit validity. Error in reported food availability may also be confounded with measures of child intake, which, too, are generally reported by the parent.

Researcher-conducted assessments can reduce this source of error, introduced by food availability assessed by self-report. Although open-ended methods of collecting home environment data allow for assessment of both quantity and variety of food in the home, few studies investigating the relationship between home food availability and child diet have used researcher-conducted, open (non-checklist) inventories of all available foods. As a result, accurate information about the association between home food availability and child diet may be limited.

Thus, it is the purpose of this paper to use home food availability data collected by researchers using an open inventory method to describe the association between

availability and child diet. Results from this investigation may contribute to a more complete understanding of the relationship between the home environment and child diet.

IV.C. Methods

Sample

A convenience sample of families with at least one child between the ages of 3 and 8 years were recruited using newspaper advertisements, list-serves and community postings. Inclusion criteria were: residing within 20 miles of the University of North Carolina (UNC) at Chapel Hill; having lived in their current residence at least 6 months with no plans to move residences within the next 3 months; and agreement to participate in home visits and assessments. If there were more than one eligible child in a family, the eldest child was selected to be the study reference child. Informed consent was obtained from all subjects, and all study procedures were reviewed and approved by the UNC Institutional Review Board.

Procedures

This study was conducted as part of a pilot study to establish reliability and validity evidence for a new phone interview survey of the home food environment, the Healthy Home Survey (HHS) (M. J. Bryant, Ward, Hales et al., 2008) (Appendices A and B). As a means to validate the HHS, researchers conducted direct observations within family homes, and collected the food availability data, which is presented in this study. Demographic and other home environment factors, such as age of the child, household income, and number of children and adults in the home, were collected during telephone interviews using the HHS. Research staff were trained to conduct home visits and were monitored and supervised throughout data collection to ensure quality control. Each

home visit was conducted by two researchers. During home visits, researchers also measured height and weight of the parent and reference child. At the end of the visit, researchers left a food frequency questionnaire (FFQ) with the parent to report the reference child's diet.

Measures

Child Diet

Dietary information on the child was collected using the Block Kids FFQ and analyzed by Block Dietary Data Systems (<http://www.nutritionquest.com/index.htm>). Parents completed the FFQ within one week after the home visit. Intake of fruits, vegetables, soda, fat, and total energy were derived from these data. Since diet was measured using an FFQ, it was not possible to differentiate foods consumed in some of the food groups collected as part of the home environment measure (e.g., salty and sweet snacks, or candy). However, child intake and home availability of fruits, vegetables, and soda were measured using similar methods across these variables, and associations between intake and availability of these food groups were assessed. These foods were included because intake of fruits and vegetables has been found to be related to health outcomes and soda is a prominent beverage consumed by children and associated with obesity (Welsh, Cogswell, Rogers et al., 2005) and poor diets. In addition, we assessed the relative intake of total calories, fat intake, and fat as a proportion of total calories. Each intake variable was divided by the age-specific recommended intake as calculated using the Mypyramid dietary guidelines (United States Department of Agriculture, 2005) for fruits and vegetables and for fat and energy the Recommended Dietary Allowance (RDAs) from the Dietary Guidelines for Americans (U.S. Department of

Health and Human Services & U.S. Department of Agriculture, 2005) and split into tertiles (high, medium, low). Child's intake, as both an ordinal, three-level variable, and a continuous variable, served as the dependent variables for these analyses.

Home Food Availability

During the home visit, foods within the categories of fruit, vegetables, sweet snacks, savory snacks, candy and soda were recorded (M. J. Bryant et al., 2008). For the purpose of this study, fruit (fresh, dried, frozen, canned/jarred), vegetables (fresh, frozen, canned/jarred), and soda (not diet) were analyzed. Research staff inventoried foods in all areas of the home, including the pantry, freezer, refrigerator, and any other areas where food was stored (e.g., garage, basement). Type and quantity (small, medium, large) were recorded. Methods for determining quantity of foods available in the home as measured by the home visit are described elsewhere (M. J. Bryant et al., 2008).

Statistical Analysis

Statistical analyses were performed using SAS (v9.1, SAS Institute Inc, Cary, NC, 2003). Food availability was quantified as the number of servings available per person in the home in each of the predefined categories. For analytic purposes, a weighted score was created to indicate household size adjusted for differences in energy needs. Weights were defined using the age and gender appropriate energy intake from the Dietary Reference Intakes (DRI) ("Table 3-5 in Recommended Dietary Allowances," 1989); for example, since the Recommended Energy Allowance (REA) for children 4 to 6 is 1800 kcal and the REA for an adult male is 2400, children in that age group were counted as 0.82 people. Linear correlations (simple and partial person correlation coefficients) were used to examine the association between food intake and availability per person.

Subsequently, the association between child vegetable intake and change in the number of servings of food available per person in the home was evaluated. Increases in availability of 10 servings per person were explored. Specifically, bivariate associations between tertile of intake and food availability were compared using proportional odds logistic regression modeling (Hosmer & Lemeshow, 2000). This method was used to estimate the odds of moving between tertiles of intake (high, medium, low) associated with an increase in availability.

Using a backward elimination procedure, covariates were removed from the model until removal of a covariate led to a 10% change in the odds ratio for the association between availability and intake. Covariates tested included several demographic factors (household income, number of children in the home, number of adults in the home, occupation, race, etc.) as suggested by prior research. Though responses to the question, “number of days since most recent shopping trip,” correlated with fruit availability ($r=-0.34$, $p=0.002$), but not with vegetable ($r=-0.11$, $p=0.3$) or soda availability ($r=-0.13$, $p=0.2$), inclusion of this variable in the model did not have a large (10%) impact on the effect estimate. The final adjusted models included: number of children in the home, number of adults in the home, primary care giver occupation (e.g., working inside/outside the home), household income, and race. Models are presented both with and without adjustment for covariates.

IV.D. Results

Participant characteristics

Demographic characteristics of the sample are shown in Table 4.1. About two-thirds of the sample were white/non-Hispanic, most of the sample lived in detached

homes, and almost one-third of the children were overweight (BMI \geq 85th percentile). Eighty-five families completed phone interviews. However, home visits for three families could not be scheduled within the time frame specified; thus, 82 families are included in the current analysis, all of whom completed the diet assessment. The mean age of children and parents was 5.0 years and 35.9 years, respectively. The majority of primary caregivers (98%) involved in the study were female. For children, mean body mass index (BMI) percentile was 64% (sd=27.4). For primary care givers, average BMI was 26.7 (sd=6.7). The average family size weighted by age and gender was 3.8.

Univariate Statistics for Food Availability and Intake

The mean (\pm standard deviation, min-max) for food availability in the home per weighted person of the targeted foods was: 20.7 servings of fruit (\pm 15.3, range=0.34-84.0); 41.6 servings of vegetables (\pm 25.6, range=4.23-165); and 3.40 servings of non-diet soda (\pm 5.48, range=0.0-29.8). Absolute child food intake and child food intake as a proportion of the MyPyramid recommendation are summarized in Table 4.2. Parents reported that children ate an average of 2.23 servings of fruit and 1.18 servings of vegetables, and consumed an average of almost 1,412 Kcals per day, of which 51.5 grams (or 36%) were from fat. Soda intake averaged 0.35 servings per day.

On average, children consumed 80% of the recommended number of servings of fruit, 91% of the recommended energy intake, and 100% of the recommended number of fat grams. However, vegetable intake was, on average, about 40% of the recommended intake for age, and no children met 100% of the recommendation (Table 4.3).

Food Availability-Diet Associations

Pearson correlation coefficients for the linear associations between home food availability per person living in the home and child diet (Table 4.4) ranged from 0.0048 to 0.39, with significant simple correlations between fruit availability and fruit intake (0.272; $p=0.013$) and vegetable availability and vegetable intake (0.26; $p=0.020$). There was also a trend toward an association between soda intake (-0.21; $p=0.052$) and soda availability. The only significant partial correlation (controlling for income, number of children, number of adults, occupation, and race) was vegetable availability and vegetable intake (0.39; $p=0.001$). The effect sizes for these associations are shown in Table 4.5 and range from 0.45, for the relationship between fruit availability and fruit intake, to 0.04, for the association between vegetable availability and fat intake.

The adjusted and unadjusted odds of being in a different the tertile of intake (high, medium, and low) associated with increasing the total number of servings in the home by 10 per person are presented in Table 4.6. Before adjustment, the association between vegetable availability and child vegetable intake was significant ($p<.05$) (OR=1.2, 95% CI=1.0-1.5); after adjustment, the association, strengthened (OR=1.5, 95% CI=1.2-1.9). The association between intake of fruit and fruit availability was significant before (OR=1.4, 95% CI=1.1-1.9), but not after adjustment (OR=1.3, 95% CI=0.93-1.1). Similarly, soda intake was associated with fruit availability only before adjustment (OR for a 10 unit increase=0.69, 95% CI=0.51-0.94). Though not significant, there was a positive association between home availability of fruit and child fat intake (OR=1.29, 95% CI=0.90-1.83).

IV.E. Discussion

Adequate fruit and vegetable intake is important, as diets rich in these foods have numerous health benefits (Heidemann, Schulze, Franco et al., 2008). This may be especially important for children as they are growing and developing; research is currently investigating the early origins of disease and emphasizing the importance of appropriate nutrient intake, especially during early childhood (Ness, Maynard, Frankel et al., 2005). However, children often prefer fruits or sweet foods when compared with vegetables (Gibson et al., 1998; Jaramillo et al., 2006), resulting in inadequate intakes (Guenther et al., 2006; Jaramillo et al., 2006). Therefore, creative methods, such as intervention through manipulation of the home environment, to increase vegetable intake are necessary (Haire-Joshu et al., 2008).

Food availability in the home environment may be influential in determining the ability of a child to self-select adequate diets and has been shown to influence eating behavior (Fulkerson et al., 2008; M. Hearn et al., 1998). This has been supported by recent literature reviews (Pearson et al., 2008; van der Horst et al., 2007). Pearson et al. (Pearson et al., 2008) and Van der Horst et al. (van der Horst et al., 2007) highlight the impact that fruit and vegetable, snack, and soft drink availability at home have on children's intakes of these items. Food selection is determined, in part, by social learning, experience, and exposure (Ogen, 2004) especially in young children for whom availability is largely dependent upon the environment established by others (Baranowski et al., 1999; M. Bryant & Stevens, 2006; Glanz et al., 2005; Resnicow et al., 1997).

Our results show that vegetable availability at home is consistently associated with child vegetable intake before and after adjustment for household income, number of

children in the home, number of adults in the home, occupation, and race. The correlation between availability and intake was moderate (0.39, $p < 0.001$). Furthermore, increases in availability in the home by 10 servings of vegetables per person was associated with a 50% increase in the odds of the child moving from the lowest tertile of intake to the middle or the middle to the highest. Moving children between these tertiles is important because, on average, children in the lowest tertile consumed 20% of the recommended number of servings, those in the middle tertile consumed 40% on average, and those in the highest tertile, on average, met 60% of the recommendation. On average, homes had 3.8 individuals, so, a 10 serving increase corresponds to 38 servings per home, or for example, six two-pound bags of frozen vegetables per household or 1.5 bags per person.

A trend was observed toward a negative association between fruit availability and soda intake as well as a positive association with fruit availability and fat intake. It is difficult to explain this relationship. The types of fat consumed by these children were not examined, so it is possible that this latter relationship is being driven by consumption of unsaturated, rather than saturated fat intake. There are several possible explanations for the finding that fruit availability was associated with soda intake in the current study. Fruit availability may be representing the overall nutrition quality of the home; homes with generous provisions of fruit may be homes with decreased availability of less healthy foods. Previous research by Grimm and colleagues also found that availability of soft drinks in the home was associated with soft drink intake, however, these authors did not measure fruit availability (Grimm et al., 2004). In the current study, using two methods to express home food availability, associations remained.

These data are consistent with previous research, the majority of which shows that if fruits and vegetables are available in the home, children are more likely to eat them (Baranowski et al., 1999; K. Cullen et al., 2003; Fulkerson et al., 2008; Hanson et al., 2005; M. Hearn et al., 1998; Pearson et al., 2008; Spurrier et al., 2008; van der Horst et al., 2007). More recently, studies have begun to expand their scope to include availability of additional food items. A studies assessing availability of soft drinks, (Grimm et al., 2004) also found that presence in the home was positively associated with intake; however, this study assessed availability only by self-report surveys. The current study adds to existing research to assess the association between the home environment and child diet using an open-ended, objective measure of the home environment.

Similar to most of the other research in this area, the cross-sectional and observational nature of this study limits the ability to draw causal inferences. A longitudinal study conducted with participants in the Netherlands found that changes in fruit and vegetable intake behaviors were preceded by changes in availability of vegetables in the home (Tak, Te Velde, & Brug, 2008). This is further supported by an intervention study, the *High 5 for Kids* program, which found that the intermediate outcome of fruit and vegetable availability predicted positive change in the child's fruit and vegetable intake (Haire-Joshu et al., 2008). Though these studies present preliminary evidence for a causal association, both used self-report, checklist measures to assess food availability. Thus further research is necessary to better understand the complexity of the home environment's influence on child diet.

This current work is strengthened by the robust measure of the food environment which allowed for a more complete picture of food availability than is possible using a

checklist. The population included in this work was of higher-than-average income and education, and had, on average, about 20 servings of fruits and 40 servings of vegetables per person in their homes, which somewhat limits the generalizability of the results. Further studies should be conducted in more diverse samples. Though few studies have looked at the quantity of foods (rather than simply presence/absence) available in homes, one study that did, found similar levels of food availability (Fulkerson et al., 2008), though another study found a smaller amount (Spurrier et al., 2008). The latter study did not use open inventories, and was therefore limited to the number of foods assessed using the checklists selected. Although the FFQ dietary measure can only be used to rank individuals based on their intake and cannot provide absolute intake estimates, parent-reported fruit and vegetable intake using FFQs has been shown to correlate with plasma carotenoid levels (Burrows, Warren, Colyvas et al., 2009). For the current study, the FFQ was only used as a means to rank individuals by their intake, as this measure has limitations regarding its use as a measure of absolute intake. An additional limitation was assessment of quantity by package size which has some element of subjectivity regardless of researcher training.

Increasing availability of fruits and vegetables in the home may be necessary but not sufficient for bringing about dietary change. Other factors such as modeling and increased accessibility (i.e., placing ‘healthy’ foods in places which are easy for the child to see or preparing the foods so they are ready to be eaten) also likely influence child diet (K. Cullen et al., 2003). The availability of foods in the home may serve as a measure of the overall home food environment, and future studies that take additional home environment factors into account are necessary to help clarify the interactive nature of

this relationship. It is likely that food availability is one part, and likely an important part, of the home environment's influence on child diet.

Despite these limitations, this study this study has a number of strengths including the use of an objective, open-ended environmental measure capturing both presence and quantity of foods in the home. Fruit and vegetable availability in the home, as measured by an objective, researcher-conducted inventory of the home environment, is positively correlated with vegetable intake, and is associated to the odds of being in a higher tertile of intake of these important food groups as a proportion of the age-specific dietary recommendation. Increasing availability of fruits and vegetables in the home may increase child intake of those foods. This study adds to the growing literature in the area, providing support for the hypothesis that the home environment, and more specifically home food availability, is related to child intake.

Consistent with previous research, this study demonstrated that home vegetable availability is related to dietary intake in children; however, increasing availability of fruits and vegetables in the home may be necessary but not sufficient for bringing about dietary change. Future intervention studies should investigate efforts to alter food availability to determine the effect of this change on child intake.

Table 4.1: Demographic Characteristics For Participants in the Healthy Home Survey Study (N=82)

Variable	Category	N (%)
Race	Non-White	26 (31.7)
	White (non-Hispanic)	56 (68.3)
Child Weight Status ^a	BMI<85%	58 (70.7)
	BMI≥85%	24 (29.3)
Primary Care Giver BMI	Underweight	1 (1.2)
	Normal Weight	42 (51.2)
	Overweight	23 (28.0)
	Obese	16 (19.5)
Income (USD)	<10,000	2 (2.6)
	10,000-19,000	6 (7.9)
	20,000-50,000	15 (19.7)
	50,000-100,000	42 (55.3)
	>100,000	11 (14.5)
	missing	6
House Type	Apartment	3 (3.7)
	Detached home	71 (86.6)
	Town house/duplex/ condo	8 (9.8)
Gender-Child	Male	47 (57.3)
	Female	35 (42.7)

^aChild BMI based on CDC cutpoint for child overweight and obesity

Table 4.2: Dietary Intake for Children Participants in the Healthy Home Survey Study (N=82)

	Servings per Day					Proportion of Recommendation ^{ab}			
	Fruit	Vegetable	Soda	FAT (g)	Energy	Fruit	Vegetable	Fat (g)	Energy
Mean	2.23	1.18	0.35	51.5	1412	0.80	0.41	1.01	0.92
Median	2.10	1.10	0.29	49.9	1362	0.77	0.40	0.99	0.92
SD	1.01	0.58	0.23	13.0	338	0.39	0.20	0.26	0.21
Min	0.20	0.17	0.14	24.3	699	0.07	0.06	0.46	0.44
Max	5.30	2.95	1.00	90.6	2477	1.77	0.98	1.70	1.55

^aBecause no recommendation exists for soda, absolute intake is presented, not proportional

Fruits and vegetables: Mypyramid; Energy and fat: Recommended Dietary ^bAllowance (RDAs) from the Dietary Guidelines for Americans

Table 4.3: Median (Range) in Tertiles of Intake^a

Median (Range)	Fruit	Vegetable	Soda ^b	Fat	Kcal
Low	40 (7 – 57)	23 (6 – 30)	14 (14 – 14)	74 (38 – 129)	70 (44 – 81)
Medium	76 (57 – 93)	40 (30 – 49)	29 (14 – 43)	99 (130 – 171)	91 (81 – 98)
High	117 (93 – 177)	62 (49 – 98)	57 (43 – 100)	120 (171 – 167)	112 (98 - 1.55)

^aAs a Percent of Age Specific Recommended Intake

^bBecause no recommendation exists for soda, absolute intake is presented (frequency of soda intake), not proportional intake

Table 4.4: Simple and Partial Pearson Correlation Coefficients Comparing Availability per Person and Child Intake

		Simple Correlation	Partial Correlation
		Coefficients (p-value)	Coefficients (p-value)
Intake	Availability	(n=82)	(n=73)
Fruit	Fruit	0.27 (0.01)*	0.17 (0.15)
Veg	Veg	0.26 (0.02)*	0.39 (0.001)*
Total Energy	Fruit	-0.11 (0.30)	-0.009 (0.94)
Total Energy	Veg	0.04 (0.69)	0.12 (0.34)
Fat (g)	Fruit	0.01 (0.90)	0.09 (0.48)
Fat (g)	Veg	-0.01 (0.91)	0.07 (0.55)
Soda	Fruit	-0.21 (0.05)*	-0.12 (0.33)
Soda	Veg	0.005 (0.97)	-0.03 (0.83)
Soda	Soda	-0.028 (0.80)	-0.024 (0.84)

Note. Partial correlations control for: Household Income, Number of Children in the Home, Number of Adults in the Home, Occupation, Race. Veg=Vegetable

*p<.05

Table 4.5: Effect Sizes for the Relationship between Availability per Person and Child Intake

Intake	Availability	Effect Size (Cohen's d)
Fruit	Fruit	0.45
Veg	Veg	0.42
Total Energy	Fruit	0.08
Total Energy	Veg	0.12
Fat (g)	Fruit	0.31
Fat (g)	Veg	0.04
Soda	Fruit	0.37
Soda	Veg	0.10
Soda	Soda	0.18

Table 4.6: Crude and Adjusted* Odds of Changing from One Tertile of the Proportion of Recommended Intake to the Next Based on a 10 Serving Increase in Availability per-Person

		Crude	Fully Adjusted
Availability	Intake	Estimate Odd Ratio (95% CI)	Estimate (95% CI)
Fruit	Fruit	1.42* (1.06-1.91)	1.31 (0.93-1.86)
Veg	Veg	1.21* (1.01-1.46)	1.51* (1.17-1.95)
Fruit	Kcal	0.99 (0.76-1.29)	1.14 (0.81-1.59)
Veg	Kcal	1.01 (0.86-1.19)	1.06 (0.87-1.28)
Fruit	Fat	1.14 (0.87-1.48)	1.29 (0.90-1.83)
Veg	Fat	1.00 (0.85-1.17)	1.06 (0.88-1.28)
Fruit	Soda	0.69* (0.51-0.94)	0.81 (0.57-1.15)
Veg	Soda	0.95 (0.81-1.11)	0.95 (0.79-1.15)
Soda	Soda	0.88 (0.45-1.70)	0.87 (0.43-1.76)

Note. Adjusted models control for: Household Income, Number of Children in the Home, Number of Adults in the Home, Occupation, Race (n=72) - a number of parents requested not to report their annual household income.

Veg=Vegetable

^aPer person availability is weighted by age and gender

*p<.05

CHAPTER V

SOCIAL ENVIRONMENT IN THE HOME AND DIETARY INTAKE OF CHILDREN IN THAT HOME

V.A. Abstract

The current study expands on research demonstrating the impact of the home social environment on child diet. The environmental contribution to obesity is well recognized. Parents control the home and can support healthy dietary habits in their children by creating an environment which fosters healthy eating. Eighty two families with a child 3-8 years participated in the study. The home social environment (ex: where meals are eaten at home) was assessed via telephone interview using the Healthy Home Survey, and parents completed a paper food frequency questionnaire to assess child diet. Exploratory factor analysis was used to reduce the number of items and revealed 3 factors: where eat (4 items, $\alpha=0.93$), control (4 items, $\alpha=0.53$), and self-serve (2 items, $\alpha=0.44$). Four items were not included in the factor solution due to low factor loadings or cross-loading and were analyzed as individual items (seconds, dinner away from home, modeling healthy eating, and modeling avoiding snacks). Linear correlations and proportional odds logistic regression modeling were used to examine relationships between factor scores, individual items, and children's dietary behaviors. After adjustment for child age, parent occupation, income, and race, statistically significant positive associations were observed between intake of sweet snacks and the self-serve subscale and between vegetable intake and the modeling healthy eating item. These

results suggest important relationships exist between the home social environment and child diet.

V.B. Introduction

In order to combat the current obesity epidemic (Ogden et al., 2008), we need to improve our understanding of the factors that influence child weight gain. One potentially important influence is the home environment (Flynn, McNeil, Maloff et al., 2006). Physical and social parameters of the home environment hypothesized to influence children's diets include food availability, parents' eating habits, and child feeding practices (L. L. Birch & Davison, 2001; L. L. Birch & J. O. Fisher, 1998; Davison & Birch, 2001; Faith, Scanlon, Birch et al., 2004). Family influences strongly impact development of children's dietary behaviors, as parents model food preferences, dietary restraint and possibly dietary even disinhibition (L. L. Birch & J. O. Fisher, 1998). Maternal control and restriction have been shown to play both positive and negative roles in the development of children's food preferences (L. Birch, Marlin, & Rotter, 1984; J. O. Fisher & Birch, 1999a). Costanzo et al. (Costanzo & Woody, 1985) developed a model to explain how children may lose a sense of self-regulation in feeding as a result of excessive parental control in feeding. In a study looking at the relationship between child BMI and feeding practices, Sherman et al. did not find a significant relationship between BMI and mother's overall score on the maternal feeding practices questionnaire (Sherman, Alexander, Dean et al., 1995). There is undoubtedly a complex relationship between the social environment in the home and the dietary behaviors of children that warrants careful study. Clearly, more research is needed to determine the prevalence of various feeding practices in diverse populations and the extent to which

these feeding practices are related to obesity risk. Numerous intervention studies have targeted child dietary behaviors in the home setting, (Hesketh & Campbell, 2010) and further insight into the nature of this relationship could help inform future interventions. This study adds to the literature exploring these complex relationships by using a tool with adequate reliability evidence to measure social factors within the home environment hypothesized to influence dietary behaviors in children. Scale development and relationships between the home social environment and child diet are described.

V.C. Methods

This study was conducted as part of a project to establish reliability and validity evidence for the Healthy Home Survey (HHS) a phone interview survey designed to assess the home food environment (M. J. Bryant et al., 2008) (Appendix A). The HHS aims to measure aspects of the home environment that influence behaviors in children (diet and physical activity) that influence healthy weight. Families with at least one child between the ages of 3 and 8 years were recruited using newspaper advertisements, list-serves and community postings. Inclusion criteria were: residing within 20 miles of the University of North Carolina (UNC) at Chapel Hill; having lived in current residence at least 6 months with no plans to move residences within the next 3 months; and agreement to participate in home visits, phone interviews, and assessments. If there was more than one eligible child in a family, the eldest child was included as the reference child for the study. All procedures were reviewed and approved by the UNC's Public Health-Nursing Institutional Review Board.

Measurement

Home Social Environment

Information on the home social environment was collected during telephone interviews using the HHS. Parents reported practices such as how often they reward their child with dessert and where meals are eaten in their home. Response options were either days per week (0-7), a 5-point likert scale (5=all of the time; 4=most of the time; 3=some of the time; 2=rarely; 1=never), or, for the question assessing where meals are eaten in the home, 4-categories (0=At the dining table, 1=On the sofa or couch, 2=At the coffee table, or 3=somewhere else). These phone-interviews were repeated within one week of the first phone call in 45 families to establish test-retest reliability evidence. Reliability scores for practices within the home related to eating showed generally good agreement between telephone responses; ICCs ranged from 0.64 to 0.92. Kappa scores for eating policies varied (range 0.36–0.75), although most (approximately 55%) were considered at least moderate.(M. J. Bryant et al., 2008).

Child Diet

Dietary data for each child were collected by primary caregiver report using the Block Kids FFQ and analyzed by Block Dietary Data Systems (<http://www.nutritionquest.com/index.htm>). The FFQ was completed within two weeks of the phone interview. Intake of fruits/fruit juice, vegetables, sweet and salty snacks, candy, soda, fat, and total energy were derived from these data. Each child's dietary intake was divided by the age-specific recommended intake for that nutrient as calculated using the Mypyramid dietary guidelines(United States Department of Agriculture, 2005)

and split into tertiles (high, medium, low). Child intake, measured as an ordinal, three-level variable and a continuous variable served as dependent variables for these analyses.

Child BMI

During a home visit, research staff measured the child's height and weight. The children's measurements were used to determine their BMI z-score (<http://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm>), as this measure is recommended for single occasion assessment of child adiposity (Cole, Faith, Pietrobelli et al., 2005), and child weight status (under/normal weight, overweight, obese).

Demographics

Demographic information including age of the child, primary care giver occupation, race, household income, and number of children and adults in the home was also collected during phone interviews.

Analysis

Statistical analyses were performed using SAS (v9.1, SAS Institute Inc, Cary, NC, 2003). Factor analysis was used to identify subscales among the items in the home social environment hypothesized to impact child diet and to reduce the number of comparisons between home environment factors and diet. Exploratory factor analyses (EFA) was run with a promax rotation to compare factor loadings, percentage of variance accounted for and eigen values. Factor loadings greater than or equal to 0.32 were not considered since they only explain 10% of the variance; while factor loading above 0.45 are fair and those above 0.55 are good (Tabachnick & Fidell, 2001). We chose a cut-off of 0.45 to determine item loadings. The criterion of an eigenvalue greater than one was used as a guideline to determine the appropriate number of factors in conjunction with a parallel

analysis plot(Costello & Osborne, 2005; Velicer & Jackson, 1990) and interpretability of the results. Though 4 factors had eigen values of greater than 1, only 3 were maintained, as the fourth factor fell below the ‘simulated’ line on the parallel analysis plot and was not interpretable as a group of items. Items that were removed from the analysis for failure to load on specific factors were examined individually for associations with diet and weight status.

Linear correlations (simple and partial person correlation coefficients) were used to examine the associations between the newly developed home social environment subscales, the individual, non-loading items, and child dietary behaviors and child BMI z-scores. Subsequently, the associations between the ordinal variables for child intake and weight status (under/normal weight, overweight, obese) and changes in subscale scores and individual non-loading item scores were evaluated. Specifically, bivariate associations between tertile of intake and these social environment factors and items were explored using proportional odds logistic regression modeling (Hosmer & Lemeshow, 2000). This method was used to estimate the odds of moving between tertiles of intake (high, medium, low) or weight status (under/normal weight, overweight, obese) associated with an increase in subscale scores and individual items.

Since prior research has suggested that both dietary intake in children and the home environment may be associated with demographic factors (household income, number of children in the home, number of adults in the home, occupation, race, etc.), these covariates were evaluated using backward elimination. Covariates were removed from the model until removal of a covariate led to a 10% change in the odds ratio for the association between availability and intake. Several covariates were found to be highly

correlated; removing two covariates eliminated all collinearity, thus these covariates were removed. Removing these covariates resulted in a change in estimate of less than 10%. Since the variables for fruit, vegetable, energy, and fat intake were created using child age, models predicting these variables were not adjusted for age. The final adjusted models included: child age, parent occupation, income, and race. Models are presented with and without adjustment for covariates.

V.D. Results

Study Population

Table 5.1 provides descriptive information on this sample. Briefly, the sample was primarily (70%) white, with the majority (70%) of the sample having a household income of \$50,000 or greater.

Exploratory Factor Analysis

In the exploratory factor analysis, the parallel plot indicated a 3-factor solution was appropriate. Of the original 14 items, four items either did not meet the minimum required factor loading of 0.45 or cross-loaded on multiple factors, and were removed from subsequent analyses (see Table 5.2 for the final scale and item wording). The items that were deleted included two items assessing parental modeling, one item measuring whether the child was allowed to have a second serving at dinner, and one item asking about frequency of eating dinner away from home. Since these were all thought to be important aspects of the home social environment as it relates to child diet, the associations between these single items and child diet were evaluated. The 3-factor solution was further supported using the recommended cut-offs requiring factors to have an eigenvalue greater than one. The *Where eat* factor (Cronbach's coefficient alpha=0.93)

assessed the location/environment of meals eaten in the home, for example, one question asked if meals in the home are eaten at the dining table, on the sofa, couch, or coffee table, or somewhere else. The *control* factor (Cronbach's coefficient alpha=0.53) measured how much control parents exert over their child's eating, including items such as whether or not the parent rewards their child with desserts if the child finishes their dinner. Finally, the *self-serve* factor (Cronbach's coefficient alpha=0.44) measured to what extent the child was able to self-select the foods they consume (Table 5.2).

Linear correlations between environment and diet

Correlations were observed between the HHS subscales, individual items, and child diet (Table 5.3 - only partial correlations shown). Simple correlations ranged from 0.0005 to 0.33, and partial correlations ranged from 0.005 to 0.27. Small but significant positive correlations were observed between 1) sweets intake and the self-serve subscale ($r = 0.29, p = 0.01$), 2) vegetable intake and the modeling healthy eating item ($r = 0.26, p = 0.04$), and dinners eaten away from home and 3) fruit/fruit juice ($r = 0.24, p = 0.05$) and 4) fat ($r = 0.22, p = 0.05$) intake. Before and after adjustment, small but significant negative correlations were observed between energy intake and frequency of allowing the child to have seconds ($r = -0.26, p = 0.03$). Soda intake was also negatively correlated with the modeling healthy eating item ($r = -0.26, p = 0.03$), before and after adjustment. There were no other significant correlations before and after adjustment for child age, parent occupation, income, and race (Table 5.3).

Regression models for environment and diet

The adjusted and unadjusted odds of changing intake level (high, medium, and low) associated with each subscale and several individual items are presented in Tables

5.4 and 5.5. Children who were more frequently allowed to serve themselves were more than twice as likely to be in a higher tertile for sweets intake than those who could serve themselves less frequently, and children whose parents reported frequently modeling healthy eating were almost two and a half times as likely to be in a higher tertile for vegetable intake, after adjustment.

V.E. Discussion

We developed the HHS based on literature examining the relationship between the home environment and childhood obesity. From 10 of the 14 items on the HHS, three factors emerged: where eat, control, and self-serve. The self-serve factor was associated with sweet snacks intake. Additionally, of the four items which did not load well on any of the three factors, several were found to relate to child diet; specifically, dinners eaten away from home was associated with increased fruit/fruit juice intake and modeling healthy eating was associated positively with vegetable intake and negatively with soda intake,. These results indicate that the HHS measures aspects of the home social environment that are related to the dietary intake behaviors of children in that home.

These findings suggest that living in a home where the parents allow children to serve themselves is related to increased intake of sweets. Though some studies have suggested that restricting a child's access to unhealthy foods may lead that child to consume more of those foods(J. O. Fisher & Birch, 1999a), the current study suggests that children with more freedom to serve themselves consumed more sweets. Fisher et al. found that when 3-5 year old children were allowed unrestricted access to palatable snack foods following a meal, girls with higher levels of maternal restriction consumed more snack foods(J. O. Fisher & Birch, 1999a). Interestingly, in the current study, children

who were allowed to have seconds had lower total intake of all foods/nutrients (though none of these were significant), as reported using a parent-reported FFQ. This further highlights the debate as to whether children should be allowed to self-serve their own food (L. L. Birch & J. O. Fisher, 1998; Costanzo & Woody, 1985; Golan & Crow, 2004; Johnson & Taylor-Holloway, 2006; Sherman et al., 1995). The current findings may be due to the cross-sectional nature of the study, as it may be that parents whose children eat more or are more overweight are not allowed to have seconds, while lower weight children are encouraged to eat. Such a relationship is indicated by our data showing that children in higher weight categories had parents who less frequently allowed their children to have seconds (unpublished data). Further work is necessary to determine the levels of restriction and control that are appropriate for parents to apply when feeding their children.

We found that eating away from home was positively associated with both fat and fruit/fruit juice intake. Eating away from home has been consistently associated with poorer diet quality in children (Ayala, Rogers, Arredondo et al., 2008; Golan & Crow, 2004; Patrick, Nicklas, Hughes et al., 2005), in light of this, the positive association with fruit/fruit juice intake seems inconsistent. Eating dinner away from home was also positively associated with energy intake, however after adjustment for total energy intake, these associations were no longer significant. The association with fruit/fruit juice and fat intake may be driven by an overall increase in food intake; total energy intake was correlated with the frequency of eating dinner away from home, fruit/fruit juice intake, and fat intake. Parent's modeling was found to be associated with increased vegetable and decreased soda intake, which is consistent with previous research showing that

modeling of healthy eating habits by parents is associated with healthier eating habits in their children (J. Fisher, Mitchell, Smiciklas-Wright et al., 2002; Gibson et al., 1998; Golan & Crow, 2004; Patrick et al., 2005; Tibbs, Haire-Joshu, Schechtman et al., 2001a).

The cross-sectional nature of this study limits our ability to disentangle the undoubtedly complex social-environment-diet relationships found in this study. It is certainly possible that there is a reciprocal interaction between child eating behaviors and some social environment factors, but longitudinal and intervention studies are necessary to better understand these relationships. A further limitation of this work is the use of parent report measures to assess both diet behaviors in children as well as the home environment (Willett, 1998). It is possible that error for these two measures could be conflated, as parents who differentially misreport characteristics of their home environment may also misreport their child's diet. Finally, the sample size of this study limits the robustness of the results of the factor analysis, and further work (DeVellis, 2003) in larger sample sizes should aim to develop measures of the home social environment as it relates to diet and activity behaviors in children. Such efforts should include additional procedures, such as cognitive interviewing, to ensure that respondents' understandings of questionnaire items match those intended by the survey developers.

This study was strengthened by controlling for a number of covariates which may confound the association between the home social environment and child diet as well as the ability to examine a number of different food categories and multiple aspects of the social environment in the home. Finally, these data were collected using a survey that has been shown to have acceptable reliability and validity (M. J. Bryant et al., 2008).

This study contributes to a growing body of work seeking to understand how the home environment influences dietary behaviors in children (Rosenkranz & Dziewaltowski, 2008). It is expected that most parents would like to establish home environments which foster healthy eating and activity behaviors in their children. To date, researchers are unable to determine exactly what this home environment should look like. Results from this study can help inform future studies of home environment factors and their associations with child dietary behaviors. Additional exploration of these associations can be used in the development of effective prevention interventions attempting to help parents as they guide their children's development of healthy dietary behaviors.

Table 5.1: Demographic Characteristics For Participants in the Healthy Home

Survey Study (N=82)

Variable	Category	N (%)
Race	Non-White	25 (30.5)
	White (non-Hispanic)	57 (69.5)
Child Weight Status*	BMI<85%	58 (71.6)
	BMI≥85%	23 (28.4)
	Missing	1
Primary Care Giver BMI	Underweight	1 (1.2)
	Normal Weight	42 (51.8)
	Overweight	22 (27.2)
	Obese	16 (19.7)
	Missing	1
Income (USD)	<10,000	1 (1.3)
	10,000-19,000	6 (7.9)
	20,000-50,000	16 (21.0)
	50,000-100,000	42 (55.3)
	>100,000	11 (14.5)
	missing	6
Gender-Child	Male	46 (56.1)
	Female	36 (43.9)

*Child BMI based on CDC cutpoint for child overweight and obesity

**Table 5.2: Factor Structure For the Social Environment As Measured by the
Healthy Home Survey**

Item Wording	Where Eat	Control	Self-Serve
How often does (child's name) eat dinner in front of the TV each week?*	0.863		
How often does (Child) eat snacks in front of the TV each week?*	0.6303		
From the following options, please tell me where most meals are eaten in your home**	-0.721		
How many days a week does your family sit at a table to eat dinner together?*	-0.793		
Do you restrict dessert if (Child) does not eat the food on his/her plate at dinner?†		0.792	
Do you reward (Child) with desserts, snacks or candy if they finish foods from his/her plate at dinner?†		0.746	
Do you ask (Child) to eat everything on his/her plate at dinner?†		0.538	
Do you generally allow (Child) to eat only at set meal times?†		0.507	
Do you allow (Child) to help his/herself to snacks, including salty and sweet snacks, or candy when he/she is at home?†			0.778
Do you allow (Child) to serve his/herself at dinner?†			0.775
Do you allow (Child) to have seconds if they finish foods from their plate at dinner?†			
How often does (Child) eat dinner away from home each week?*			
When eating in front of (Child), do you try to eat healthy?†			
Do you ever avoid eating savory or sweet snacks, candy or soda in front of (Child)?†			
% of variance accounted for	2.56	1.77	1.39
Cronbach coefficient alpha	0.929	0.533	0.444

Factor loadings less than 0.30 are not shown.

Only items with factor loadings greater than 0.45 were included in computing Cronbach's alpha
Response options were *0-7 days per week; **4-categories: (0) At the dinning table, (1) On the sofa or couch, (2) At the coffee table, or (3) somewhere else; or a †5-point likert scale: (5) all of the time; (4) most of the time; (3) some of the time; (2) rarely; (1) never

Table 5.3: Partial^a Correlations of Factors with Individual Items and Dietary Intake in Children

	Factors				Individual Items		
	Where Eat	Control	Self-Serve	Seconds	Dinner Away	Eat Healthy	Avoid Snack
Fruit/fruit juice	0.02 (0.86)	0.06 (0.62)	0.06 (0.60)	-0.13 (0.28)	0.24 (0.05)*	0.13 (0.29)	-0.11 (0.38)
Vegetables	0.07 (0.58)	-0.02 (0.87)	0.04 (0.73)	-0.18 (0.15)	0.17 (0.17)	0.26 (0.04)*	0.01 (0.92)
Energy	-0.10 (0.43)	-0.07 (0.55)	0.11 (0.39)	-0.20 (0.10)	0.18 (0.14)	0.10 (0.42)	-0.01 (0.96)
Fat	-0.08 (0.53)	-0.10 (0.40)	0.11 (0.37)	-0.03 (0.82)	0.14 (0.26)	0.17 (0.17)	-0.03 (0.83)
Sweets	0.08 (0.54)	-0.10 (0.40)	0.29 (0.01)*	-0.16 (0.20)	0.12 (0.33)	-0.10 (0.40)	-0.14 (0.26)
Snacks	0.07 (0.57)	0.009 (0.94)	0.09 (0.45)	-0.19 (0.12)	0.11 (0.39)	0.09 (0.48)	0.02 (0.84)
Soda	-0.10 (0.42)	-0.19 (0.12)	-0.03 (0.77)	-0.08 (0.53)	-0.11 (0.37)	-0.26 (0.03)*	-0.14 (0.24)
BMI z-Score	-0.06 (0.62)	-0.02 (0.87)	-0.07 (0.56)	-0.10 (0.39)	-0.25 (0.04)*	-0.18 (0.13)	-0.05 (0.70)

^aAdjusted: Household Income, Child Age, Occupation, Race; fruit, vegetable, energy, and fat intake models were not adjusted for age

*p<.05

Table 5.4: Unadjusted and Adjusted^a Odds Ratios (95% CI) for Differences Between Tertiles of the Proportion of Recommended Intake to the Next Based on Factor Scores

	Unadjusted			Adjusted ^a		
	Where Eat	Control	Self-Serve	Where Eat	Control	Self-Serve
Fruit/fruit juice	0.95 (0.63-1.43)	1.16 (0.77-1.74)	0.79 (0.53-1.19)	0.90 (0.55-1.47)	1.50 (0.90-2.50)	0.99 (0.63-1.55)
Vegetables	1.02 (0.68-1.54)	1.01 (0.68-1.52)	1.38 (0.90-2.04)	1.24 (0.75-2.04)	1.08 (0.67-1.78)	1.27 (0.81-2.00)
Energy	0.91 (0.60-1.37)	1.09 (0.73-1.63)	1.15 (0.77-1.72)	0.85 (0.52-1.39)	0.92 (0.56-1.51)	1.34 (0.85-2.11)
Fat	1.24 (0.82-1.88)	1.04 (0.70-1.56)	1.20 (0.80-1.79)	1.20 (0.73-1.97)	0.80 (0.48-1.32)	1.40 (0.89-2.22)
Sweets	1.18 (0.77-1.79)	1.22 (0.81-1.83)	2.14* (1.37-3.34)	1.12 (0.65-1.94)	0.96 (0.57-1.62)	2.53* (1.48-4.33)
Snacks	1.38 (0.90-2.11)	1.26 (0.83-1.89)	0.91 (0.61-1.36)	1.59 (0.90-2.83)	1.00 (0.59-1.68)	0.86 (0.53-1.38)
Soda	0.61* (0.39-0.97)	0.83 (0.55-1.26)	1.20 (0.79-1.80)	0.88 (0.49-1.59)	0.77 (0.44-1.34)	0.97 (0.58-1.62)
BMI	0.97 (0.60-1.58)	1.18 (0.72-1.93)	0.77 (0.47-1.27)	0.85 (0.43-1.68)	1.44 (0.75-2.77)	0.52 (0.27-1.01)

^aAdjusted: Household Income, Child Age, Occupation, Race; fruit, vegetable, energy, and fat intake models were not adjusted for age

*p<.05

Table 5.5: Unadjusted and Adjusted^a Odds Ratios (95% CI) for Differences Between Tertiles of the Proportion of Recommended Intake to the Next Based on Individual Items

	Unadjusted				Adjusted ^a			
	Seconds	Dinner Away	Eat Healthy	Avoid Snack	Seconds	Dinner Away	Eat Healthy	Avoid Snack
Fruit/fruit juice	0.96 (0.59-1.56)	1.21 (0.89-1.64)	1.59 (0.83-3.07)	0.97 (0.68-1.37)	0.92 (0.54-1.55)	1.30 (0.87-1.96)	1.64 (0.75-3.60)	0.87 (0.59-1.27)
Vegetable s	0.78 (0.47-1.27)	1.12 (0.83-1.51)	1.94* (1.00-3.79)	0.98 (0.69-1.39)	0.77 (0.46-1.30)	1.41 (0.94-2.11)	2.37* (1.05-5.32)	0.88 (0.60-1.29)
Energy	0.69 (0.41-1.13)	1.31 (0.95-1.81)	1.33 (0.69-2.53)	1.14 (0.80-1.63)	0.69 (0.41-1.19)	1.38 (0.93-2.05)	1.57 (0.73-3.41)	1.03 (0.70-1.50)
Fat	0.75 (0.45-1.23)	1.32 (0.96-1.82)	1.55 (0.81-2.99)	1.20 (0.84-1.71)	0.96 (0.57-1.62)	1.24 (0.84-1.83)	1.63 (0.75-3.56)	0.90 (0.61-1.32)
Sweets	0.87 (0.54-1.42)	1.18 (0.87-1.60)	1.11 (0.58-2.12)	0.89 (0.62-1.26)	0.92 (0.54-1.55)	1.27 (0.85-1.89)	0.75 (0.34-1.62)	0.91 (0.61-1.36)
Snacks	0.86 (0.52-1.40)	1.44* (1.03-2.02)	1.55 (0.80-2.97)	0.90 (0.63-1.28)	0.80 (0.47-1.35)	1.34 (0.90-1.99)	1.63 (0.75-3.58)	1.00 (0.67-1.48)
Soda	0.78 (0.47-1.29)	0.70 (0.49-1.00)	0.40* (0.19-0.81)	0.67* (0.46-0.97)	0.84 (0.47-1.50)	0.77 (0.50-1.19))	0.44 (0.18-1.04)	0.73 (0.47-1.13)
BMI	0.79 (0.46-1.35)	0.88 (0.64-1.21)	0.81 (0.38-1.70)	0.86 (0.57-1.30)	0.72 (0.40-1.30)	0.74 (0.49-1.11)	0.74 (0.30-1.83)	0.83 (0.52-1.31)

^aAdjusted: Household Income, Child Age, Occupation, Race; fruit, vegetable, energy, and fat intake models were not adjusted for age

*p<.05

CHAPTER VI

FAMILY TIES TO HEALTH (FTH) STUDY: A RANDOMIZED INTERVENTION TO IMPROVE VEGETABLE INTAKE IN CHILDREN

VI.A. Abstract

The current study pilot tested an intervention to improve vegetable intake in children. Children consume inadequate amounts of vegetables, which may contribute to obesity and poor health outcomes. It is hypothesized that parents and the home environment can influence this behavior. Methods/Key points: Families were randomly assigned to intervention (n=22) and control (n=21) conditions. Over four-months, intervention families received four tailored newsletters and two motivational phone calls; control families received four children's books. Children in the intervention group increase their vegetable intake ($+0.09 \pm 0.3$ servings/day intervention group vs. -0.03 ± 0.54 control group) more than the control group (n=21), but this difference was not statistically significant, however, parents in the intervention group did report increasing the availability of non-potato vegetables in their homes ($+1.5 \pm 2.5$ vegetable types intervention group vs. -0.3 ± 2.7 control group, $p=0.02$). Additionally, intervention group parents also reported an increased number of times per week they suggested fruits and vegetables as snacks ($p=0.04$), less difficulty getting their child to try new foods (OR=0.05, 95% CI: 0.004-0.6), and increased their confidence in getting their child to eat multiple servings of vegetables every day (OR=0.14, 95% CI: 0.03-0.7) and getting their child to try new foods (OR=0.2, 95% CI: 0.05-0.9). These results suggest it may be

possible to intervene on parents to change the home environment as it relates to child vegetable intake.

VI.B. Introduction

A diet that is high in vegetables has the potential to prevent obesity and chronic disease (Heidemann et al., 2008; Vioque, Weinbrenner, Castello et al., 2008). Following such a diet at a young age is especially important because health behaviors track from childhood into young adulthood. Also, obese children develop disease risk factors even in childhood (Mauras et al., 2010), and childhood exposures appear to influence life-long disease risks (Ness et al., 2005). Unfortunately, data from the 1999-2000 National Health and Nutrition Examination Survey show that neither children aged 2-3 years nor those 4-8 years consume the recommended amounts of fruits and vegetables (Guenther et al., 2006).

Children often do not prefer the taste of vegetables, compared to fruits or sweet foods (Gibson et al., 1998; Jaramillo et al., 2006), and such preferences contribute to inadequate intakes in this key population (Guenther et al., 2006; Jaramillo et al., 2006). Therefore, methods to change these preferences and increase vegetable intake are necessary.

Preferences during childhood, as well as many environmental factors including availability in the home, parent modeling, and encouragement, can influence intake (Brug, Tak, te Velde et al., 2008). Because parents control the home environment, they can have an important influence on dietary habits in young children (Savage, Fisher, & Birch, 2007). The environment includes the physical environment (availability and accessibility) as well as the social environment (feeding practices and policies) within the

home. An alternative method to increase vegetable intake is manipulation of the home environment (Haire-Joshu et al., 2008). Intervening on the parent to influence this environment may be an effective way to influence child dietary behavior, present and future.

Interventions targeting child behavior are often resource intensive and difficult to disseminate. There is evidence for the efficacy of brief, minimal interventions from the literature on other health behaviors (Bauman et al., 2002); these studies were family based, targeting the parent as the agent of change. (Ennett et al., 2001; Knai et al., 2006; Morawska & Sanders, 2006) The Family Ties To Health (FTH) program, was a four-month, low-intensity, pilot intervention targeting the parent and home environment in order to improve child vegetable intake. The purpose of this paper is to describe the FTH program and its impacts on child vegetable intake, other dietary factors, and home environment characteristics thought to influence vegetable intake.

VI.C. Methods

Sample

A convenience sample of 50 parent-child dyads with at least one child between the ages of 2 and 5 years were recruited through child care centers, list-serves, and community postings. Inclusion criteria were having lived in their current residence at least 6 months and having no plans to move residences within the next 6 months. If there was more than one eligible child in a family, the eldest child was selected to be the study reference child. This meant that the parent was instructed to think specifically about this child while completing all questionnaires. Height, weight, and diet were measured for this child. Two families did not fully complete baseline assessments, and thus were

excluded from the analysis. Informed consent was obtained from the parent, and all study procedures were reviewed and approved by the UNC Institutional Review Board.

Procedures

Parents responded to recruitment materials, and those interested in participating were screened by phone. Eligible parents who chose to enroll either had a home visit or brought their child to a central study location, for measurement of height and weight. At this meeting, families were randomly assigned to either the intervention group or a control group (book club: received one book per month for four months), though they were not told to which group they had been assigned until after baseline measures had been returned to the investigators, and parents were provided with three baseline surveys (described below). Follow-up surveys were mailed to participants along with their fourth newsletter or book for the intervention and control groups, respectively. Both baseline and follow-up surveys were returned to the investigators in pre-paid envelopes. This intervention took place between April and December 2009; on average, participation lasted 4 months, 27 days (from baseline to follow-up data collection). Participants received \$25 for each set of surveys returned.

Intervention

After all completed baseline surveys were obtained by study staff, intervention group parents received their first tailored phone call. Phone calls were conducted by an interventionist trained in motivational interviewing and nutrition (registered dietitian), and were guided by the parent's responses to the baseline surveys. During this first call, parents, with the help of the interventionist, selected a target area for improvement during the intervention from four possible options (home availability; picky eating; modeling;

family meals). All parents selected to focus on either availability or picky eating. Content on each of the four topics was included in all the newsletters, but the order and quantity of the content was adjusted based on the goal the parent selected during their phone call. Newsletters were also personalized to include the child's name. Parents received one four-page newsletter per month for four months (See Sample newsletter in Appendix C). Parents received a second phone call during the middle of the third month, during which they described successes, discussed difficulties and received assistance.

Measures

Child Diet

Dietary information on the child was collected using the Block Kids Food Frequency Questionnaire (FFQ) and analyzed by Block Dietary Data Systems (<http://www.nutritionquest.com/index.htm>). Parents completed the FFQ within one week after the child's height and weight were measured. Intake of vegetables, fruits, fiber, total energy, and vitamins C and A. were derived from these data.

Home Physical Environment

The Healthy Home Checklist (Appendix D) contained a checklist for measuring availability of fruits (13), fruit juices (3), and vegetables (18) available in the home (Marsh, Cullen, & Baranowski, 2003). Parents reported whether these foods had been available (presence/absence) in the past seven days, and the total number of items in each category was summed to create a score reflecting the types of vegetables available. This measure has strong validity evidence (Marsh et al., 2003). Marsh et al. found that parent-reported and observed total fruit availability ($r = .56, P < .001$), total 100% juice availability ($r = .52, P < .001$), total vegetable availability ($r = .44, P < .001$), and total

fruit juice, and vegetable ($r = .55$, $P < .001$) availability were significantly correlated with observation (Marsh et al., 2003).

Home Social Environment

Both the Healthy Home Checklist and the Parenting Survey (Appendix E) measured parent feeding behavior as well as aspects of the home social environment thought to impact child vegetable intake. These measures were modified from those used in NAP SACC Family evaluation. Items from these surveys are listed in Tables 6.4, 6.5, and 6.6 for continuous, self-efficacy, and dichotomous variables, respectively.

Child BMI

Child BMI was calculated for each child using height and weight measured at baseline. BMI z-scores were determined based on CDC guidelines

(<http://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm>)

Demographic Characteristics

Demographic factors, such as age of the child, household income, number of adults in the home, and race, were collected as part of the baseline Parenting Survey. With the exception of height, weight, and demographic factors, all measures were repeated at follow-up.

Process Outcomes

Parents participating in the intervention group completed a program evaluation at the end of the intervention (Appendix F). Using a 1-5 rating scale (5 being excellent and 1 being poor), they rated the newsletters, the phone call, and the self-assessment. Parents were also asked what they liked and disliked, and to make suggestions for improvement.

Statistical Analysis

Statistical analyses were performed using SAS (v9.1, SAS Institute Inc, Cary, NC, 2003). Descriptive statistics and variable distributions were assessed for non-normality and outliers. Several dietary variables required log-transformations due to non-normality.

Kruskal-Wallis tests (categorical variables) and two-sided t-tests (continuous variables) were used to examine baseline differences between intervention and control participants. Two-sided t-tests were also used to look at unadjusted differences between control and intervention change scores for the outcome variables. Change scores were created by subtracting the baseline value for each variable from the follow-up value.

Intervention Impact: Change in vegetable intake associated with group assignment was assessed by linear regression models with the vegetable intake of the child at follow-up as the dependent variable, and group (intervention or control) and baseline intake as independent variables. Since two families were lost to follow-up, an intent-to-treat analysis was used. Since no follow-up data were available for these participants, they were assigned their baseline responses for follow-up. This is likely a conservative estimate, as both families were in the control group, and on average, vegetable intake in that group tended to decrease over the course of the intervention. To evaluate bias that may be introduced by this method, analyses were also run excluding these two families. Results were similar, and these results are not presented. A second set of models was run adjusting for age, as children in the intervention group were older than those in the control group at baseline (Table 6.1).

Linear regression was used to measure the impact of the intervention on continuous variables (food availability and days per week), polytomous logistic

regression was used (Hosmer & Lemeshow, 2000) to accommodate the multiple levels for the categorical self-efficacy variables, and logistic regression was employed for dichotomous variables. These analyses were also adjusted for age. Relationships were considered to be significant when $p < 0.05$.

VI.D. Results

Participant characteristics

Demographic characteristics of the sample are shown in Table 6.1. The sample was approximately 86% white/non-Hispanic, approximately 67% had household incomes of greater than \$70,000 per year, and 25% of the children were overweight (BMI $\geq 85^{\text{th}}$ percentile) at baseline. Participants did not differ at baseline on demographic characteristics with the exception of child age. The mean age of children in the control group was 2.8 (sd=0.98) years, while it was 3.5 (sd=0.76) years in the intervention group ($p=0.01$). The mean age of parents was 36.4 y (sd=5.4). The majority of primary caregivers (88%) involved in the study were female. Average BMI for primary caregivers was 26.4 (sd=5.3).

Impact of the Intervention on Child Dietary Intake

Baseline results for child dietary intake as well as the change in intake over the course of the intervention are presented in Table 6.2. Table 6.3 presents the results for regression analyses in which intake at follow-up was the dependent variable and intake at baseline and group were the independent variables. These results are also presented with adjustment for child age.

Vegetables

At baseline, children in the intervention group consumed 0.81 (sd=0.45) servings of vegetables and those in the control group consumed 0.61 (sd=0.36) servings; however, these differences were not significant ($p=0.11$). Over the course of the four month intervention, the intervention group increased their intake of vegetables by 0.086 (sd=0.30) servings, while the control group decreased their intake by 0.031 (sd=0.54). The difference in change between groups was 0.12 (sd=0.43) servings, which was not statistically significant when examined using a t-test of the change scores ($t(39)=-0.87$, $p=0.39$) or when examined as a linear regression predicting the log of follow-up intake for the log of baseline intake, group, and child age ($p=0.86$).

Additional Dietary Intake Variables

Though the focus of this intervention was on vegetable intake in children, many of the intervention messages and positive changes to the home environment were hypothesized to have positive impacts on child fruit intake as well. Children in the intervention group began the study consuming 2.10 (sd=1.14) servings of fruits, and those in the control group consumed 2.52 (sd=1.43) servings ($p=0.29$). The intervention group decreased their intake during the intervention by 0.08 (sd=0.54) servings over the course of the intervention, while the control group decreased their intake by 0.45 (sd=0.69) servings of fruits. The difference between these changes was 0.37 (sd=0.62) servings ($p=0.07$).

Similar results were found for the combination of fruit and vegetable intake (created by summing total fruit and vegetable intake). Children in the intervention group began the study consuming 2.71 (sd=1.26) servings of fruits and vegetables, and those in

the control group consumed 3.34 (sd=1.70) servings (p=0.18). The intervention group increased their intake during the intervention by 0.01 (sd=0.60) servings over the course of the intervention, while the control group decreased their intake by -0.48 (0.98) servings of fruits and vegetables. The difference between these changes was -0.48 (0.80) servings (p=0.06). Furthermore, when the log of follow-up intake was predicted by for the log of baseline intake and child age using linear regression, the effect of intervention vs control group was not statistically significant (p=0.14).

No significant associations between group assignment (intervention/control) and any of the dietary variables examined were found.

Impact of FTH on other Home Environment Variables

Baseline distribution of continuous, self-efficacy, and dichotomous home environment variables are presented in tables 6.4-6.6, respectively. Results from the regression analyses predicting follow-up responses with baseline, are presented in tables 6.7 and 6.8 for continuous and categorical variables, respectively.

Total Vegetable Availability

There was no difference in the number of types of vegetables available between groups at baseline (intervention: 7.3 sd=2.4 ; control: 8.4 sd=3.3) ; p=0.19). The intervention group had 1.41 (sd=2.72) more types of vegetables at home at follow-up than at baseline, while the control group had 0.14 (sd=2.90) fewer; using an unadjusted t-test, these changes were not statistically significantly different (0.08) (Table 6.4). A linear regression predicting follow-up availability with baseline and age did not find a statistically significant group effect (p=0.27) (Table 6.7).

Non-potato vegetable Availability

As with total vegetable availability, there was no difference in non-potato vegetable availability between the groups at baseline (intervention: 6.0 sd=2.4 ; control: 7.4 sd=2.8) ($p=0.09$). The intervention group had 1.55 (sd=2.46) more types of non-potato vegetables at home at follow-up than at baseline, while the control group had 0.33 (sd=2.69) fewer. This unadjusted difference was significant ($t(41)=-2.39$, $p=0.02$) (Table 6.4), however, when examined using a linear regression to predict follow-up availability with baseline availability, group p -value was 0.11 before and 0.17 after adjustment for child age (Table 6.7).

Social Environment:

At baseline, parents suggested their child have a fruit or vegetable for a snack 5.30 and 5.36 times per week for intervention and control parents, respectively. Control parents did not report a large change in this behaviors (-0.05), but intervention parents reported an increase of 0.95 times per week ($t(40)=-1.91$, $p<.06$) (Table 6.4). Group significantly predicted follow-up behavior, while controlling for baseline, before ($p=.01$) and after adjustment for age ($p=.04$) (Table 6.7). Parents also reported increased confidence to get their child to eat multiple servings of non-potato vegetables everyday (OR=0.14, 95% CI: 0.03-0.71) and to get their child to eat a variety of vegetables every week (OR=0.22, 95% CI: 0.05-0.91) compared to the control group (Table 6.8).

Parents in the intervention group decreased (-0.45, sd=0.67 days/week) the number of days per week they prepare a special meal for their child because that child does not like what the rest of the family is eating, while this behavior increased in the control group (0.20, sd=0.70 days/week); these changes were significantly different

($p < .001$) (Table 6.4). When follow-up frequency of this behavior was predicted by baseline frequency, these results were significant both before ($p = 0.01$) and after adjustment for age ($p = 0.04$) (Table 6.7). When frequency of parents reported parent difficulty with getting their child to eat new foods at follow-up was predicted by baseline frequency and group, group was significantly associated with this behavior both when age was included in the model (OR=0.05, 95% CI: 0.004-0.62), and when it was not (OR=0.09, 95% CI: 0.009-0.83) (Table 6.8).

Despite being a topic featured in all four of the newsletters, parental role modeling did not show an intervention effect. Several questions were included on both the Parenting Survey and the Healthy Home Checklist to assess parental modeling (Table 6.8). Baseline levels of parental modeling were high, which may indicate a ceiling effect (Tables 6.5 and 6.6).

Process Data

All parents rated the newsletters four or five, out of five (about 25%), and all but five parents cited the recipes and foods preparation suggestions to be the most helpful aspect of the newsletters. Many parents (nine) also mentioned they found the ideas on serving their child vegetables multiple times if they are rejected the first time, allowing their child to choose vegetables from a list, and involving their child in food preparation to be helpful suggestions. Additionally many parents found the suggestion to pre-prepare vegetables so they are cleaned and ready to eat to be helpful.

The phone calls ranged in length from 11-45 minutes, and the average call lasted 34 minutes. There was no relationship between call length and vegetable intake at baseline or change in vegetable intake. Fourteen out of the 21 parents who completed

program evaluations rated the phone calls as ‘very helpful’. In general, these parents liked the more personalized feel and the opportunity to talk about their goals as well as the professional information. Some parents, particularly those not reporting the calls as ‘very helpful’, found the calls to be time-consuming and not offering much new information.

The self-assessments were helpful as a reflective tool for all but five of the parents in the intervention. The parents found this to be useful in identifying areas for improvement as well as tracking how they had done over the course of the program. Additionally, all but one parent responded ‘yes’ when asked if the self-assessment helped them recognize areas for improvement in their home. Some parents did comment that the questions were confusing, so improvement to item wording may be necessary.

VI. E. Discussion

This evaluation of the FTH program adds to the literature by showing that an intervention requiring minimal resources, which is feasible for dissemination, can have positive effects on the home environment. These findings are consistent with other home environment interventions which have found improvements in both the home environment and child and parent diets (Haire-Joshu et al., 2008). Though the increase in vegetable intake seen in the children in the current study was small and not statistically significant, the increase of 0.10 servings was somewhat greater than the value seen in the study by Haire-Joshu et al. (0.01 servings), though both are extremely small. In that study, however, baseline intake was much higher than in the current study, 2.30 vs. 0.61 servings, respectively. These differences, however, may have been due to differences in measurement of diet in these two studies. Though both studies used FFQs, the FFQs

used were not identical. Unlike previous studies focused on both fruits and vegetables, the current intervention focused on vegetables only, as vegetables are a particular area of need. Further, due to the minimal nature of the intervention, selecting one, specific behavior was hypothesized to be more manageable.

The relative increase in the types of non-potato vegetables available in intervention homes compared to the control homes is consistent with previous intervention research targeting the home environment (Haire-Joshu et al., 2008). This increase is important, as the majority of research looking at home food availability and dietary intake in children has shown that if fruits and vegetables are available in the home, children are more likely to eat them (Baranowski et al., 1999; K. Cullen et al., 2003; Fulkerson et al., 2008; Hanson et al., 2005; M. Hearn et al., 1998; Pearson et al., 2008; Spurrier et al., 2008; van der Horst et al., 2007). Further, in the current study, at baseline, availability of vegetables in the home was correlated with total intake of vegetables ($r=0.32$, $p=0.04$). Food availability in the home environment may be crucial to determine the ability of a child to self-select an adequate diet and has been shown to influence eating behavior (Fulkerson et al., 2008; M. Hearn et al., 1998). Food selection is determined, in part, by social learning, experience, and exposure (Ogen, 2004) especially in young children, for whom availability is largely dependent upon the environment established by others, therefore the focus of this study on parents may be particularly effective (Baranowski et al., 1999; M. Bryant & Stevens, 2006; Glanz et al., 2005; Resnicow et al., 1997).

The collection of process measures enhances the lessons learned from this study, and allows for additional interpretation of the results collected with the survey data.

Parents in this study appreciated the recipes and food preparation suggestions found in the newsletters and they wanted more of these. They reported using the vegetable preparation suggestions (such as washing and cutting up vegetables when they get home from the grocery store, so they are ready to eat for snacks), and this may help explain why parents in the intervention group were able to increase the number of times per week they suggested fruits and vegetables as snacks. Further, parents in this group reported less difficulty getting their child to try new foods and increased their confidence in getting their child to eat multiple servings of vegetables every day and a variety of vegetables each week. This may be explained by several comments parents made in their process evaluations. Intervention parents' reported learning about offering foods to their child many times if it is rejected initially, about involving their children in meal preparation, and about offering vegetable selections and choices. Wardle et al. showed that changing parental feeding practices when offering vegetables and offering the vegetables multiple times after an initial rejection can increase children's acceptance of and preference for vegetables (J. Wardle et al., 2003).

This work is strengthened by the use of randomized design. The population included in this work had relatively high income and education, which somewhat limits the generalizability of the results. This may have contributed to the goals parents selected for focus. Despite the option to work on modeling, meal environments, picky eating, or availability, all parents selected either picky eating or availability. It may be that in this higher income/education population, issues of role modeling and meal environments were not important issues. This was supported by the high baseline scores for these factors at baseline in both groups. Further studies should investigate whether

modeling and meal environments are important parents with more diverse education and economic backgrounds. The sample enrolled in the current study brings to light two important points. First, it is important to note that, the goal for this study was to recruit a convenience sample, and it was individuals from higher income and education groups who responded first, likely due to the advertisement through a university listserve. Response to this advertisement was larger than expected, and many parents were interested. This brings up a second point. Though the sample was highly educated and relatively wealthy, they had considerable challenges with their children's diets, and were seeking advice. This is important to remember when developing interventions: parents of all socioeconomic groups may be seeking out assistance with getting their children to eat vegetables.

Dietary assessment in this study was limited by use of an FFQ. The FFQ was completed by parents, and therefore may not accurately reflect children's diets, especially when they are away from home. An additional limitation to this study was the collection of home environment data by self-report; this makes the results subject to social desirability bias. Since this study recruited a convenience sample, largely using a university listserve, participants in this study may not be representative of other populations. The income and education levels of study participants were generally high, and a majority of the population was Caucasian. The power to detect significant results in this study may have been limited by its small study size and pilot nature. Finally, though this project was informed by self-determination theory, measures of theory constructs such as autonomy were not included in the current study.

Despite these limitations, and the lack of significant findings on child vegetable intake, this study makes use of a low-resource design that is feasible to disseminate, and demonstrated that interventions aimed at the parent can lead to changes to the home environment. Further studies with larger samples, over a longer period may be able to create greater changes to the home environment as well as dietary intake. This study adds to the growing literature in the area, providing support for the hypothesis that the home environment is a malleable and potentially important influence on child intake.

Consistent with previous research, this study has demonstrated that parents can be targeted as agents of change to create home environments thought to encourage healthy dietary intakes. However, intervening over only a short period of four months may not be sufficient for these environmental changes to create important, measureable behavior changes in dietary intake. Future intervention studies should investigate efforts to alter the home environment to determine the long-term effect of this change on child intake.

Table 6.1: Sample Characteristics

Variable	Category	Total Sample (n=43) N (%)	Intervention (n=22) N (%)	Control (n=21) N (%)	p- value
Race/Ethnicity	White (non-Hispanic)	37 (86.1)	18 (81.8)	19 (90.5)	0.41
	Non-White	6 (13.9)	4 (18.2)	2 (9.5)	
Child Weight Status ^a	BMI<85%	32 (74.4)	17 (77.3)	15 (71.4)	0.88
	BMI≥85%	11 (25.6)	5 (22.7)	6 (28.6)	
Primary Care Giver BMI	Underweight	1 (2.4)	1 (4.5)	0	0.45
	Normal Weight	18 (43.9)	8 (36.4)	10 (52.6)	
	Overweight	13 (31.7)	8 (36.4)	5 (26.3)	
	Obese	9 (21.9)	5 (22.7)	4 (21.0)	
Income (USD)	Less than \$70,000	29 (67.4)	14 (63.6)	15 (71.4)	0.58
	\$70,000 or higher	13 (30.2)	7 (31.8)	6 (28.6)	
	missing	1 (2.3)	1 (4.5)	0	
Gender-Child	Male	16 (37.2)	9 (40.9)	7 (36.8)	0.61
	Female	27 (62.8)	13 (59.1)	14 (66.7)	
Child Age (y)	2	12 (27.9)	1 (4.5)	11 (52.4)	0.006*
	3	14 (32.6)	10 (45.4)	4 (19.0)	
	4	15 (34.9)	10 (45.4)	5 (23.8)	
	5	2 (4.6)	1 (4.5)	1 (4.8)	
Day/week in Childcare	0	6 (14.6)	3 (13.6)	3 (15.8)	0.6221
	1-4	10 (24.4)	7 (31.8)	3 (15.8)	
	≥5	25 (61.0)	12 (54.5)	13 (68.4)	
Hours/day in Childcare	0	6 (14.6)	3 (13.6)	3 (15.8)	0.9823
	1-7.5	11 (26.8)	6 (27.3)	5 (26.3)	
	≥8	24 (58.5)	13 (59.7)	11 (57.9)	
Marital Status	Married/living with partner	37 (86.0)	18 (81.8)	19 (90.5)	0.41
	Divorced/separated/single	6 (14.0)	4 (18.2)	2 (9.5)	
Education	More than College	26 (60.5)	14 (63.6)	12 (57.1)	0.66
	College or Less	17 (39.5)	8 (36.4)	9 (42.9)	

*p<.05

^aChild BMI based on CDC cutpoint for child overweight and obesity

Table 6.2: Pre-Intervention and Change in Dietary Intakes in Children

Dietary Variable	Baseline					Change (Pre-Post)						
	Control		Intervention			Control		Intervention		Difference ^a		p
	mean	sd	mean	sd	p	mean	sd	mean	sd	mean	sd	
Total Veg, c	0.81	0.45	0.61	0.36	0.11	-0.03	0.54	0.09	0.30	0.12	0.43	0.39
Non-potato Veg, c	0.74	0.43	0.52	0.36	0.09	-0.02	0.52	0.10	0.28	0.12	0.41	0.36
Total Fruit, c	2.52	1.43	2.10	1.14	0.29	-0.45	0.69	-0.08	0.54	0.37	0.62	0.07
Total Fruit & Veg c	3.34	1.70	2.71	1.26	0.18	-0.48	0.98	0.01	0.60	0.48	0.80	0.06
Daily Servings Veg	1.37	0.94	0.94	0.72	0.10	-0.08	1.11	0.17	0.61	0.25	0.88	0.37
Dietary fiber, gms	12.60	5.64	11.62	4.27	0.53	-2.03	4.21	-0.20	2.88	1.83	3.55	0.11
Food energy, kcals	1299.60	286.39	1333.10	357.12	0.74	-119.50	254.24	-98.84	253.08	20.63	253.61	0.80
Fat, gms	44.87	15.52	48.28	15.08	0.47	-3.13	12.56	-3.82	14.18	-0.68	13.46	0.87
Vitamin C, mg	134.70	87.11	114.19	58.13	0.37	-23.80	39.80	-9.63	37.91	14.18	38.80	0.25
Vitamin A, mcg	549.49	159.90	517.66	154.90	0.51	-29.66	273.21	-9.07	132.51	20.59	209.54	0.76

*p<.05

^aDifference = Intervention – Control

c = cups

Table 6.3: Regression of Baseline Dietary Intake on Follow-up Intake With and Without Adjustment for Child Age

Diet Variables ^a	Unadjusted				Adjusted for Age			
	Estimate	SE	t	p	Estimate	SE	t	p
Total Veg, c	0.03	0.17	0.18	0.86	0.09	0.18	0.51	0.61
Non-potato Veg, c	-0.03	0.21	-0.14	0.89	0.05	0.23	0.20	0.84
Total Fruit, c	-0.08	0.17	-0.43	0.67	-0.06	0.19	-0.32	0.75
Total Fruit & Veg, c	0.10	0.07	1.53	0.14	0.11	0.07	1.50	0.14
Daily Servings Veg	0.00	0.30	-0.01	0.99	0.18	0.32	0.55	0.59
Dietary fiber, gms	0.09	0.08	1.17	0.25	0.09	0.08	1.10	0.28
Food energy, kcals	0.01	0.06	0.11	0.91	0.04	0.07	0.51	0.61
Fat, gms	-0.03	0.09	-0.31	0.76	0.02	0.10	0.23	0.82
Vitamin C, mg	0.05	0.11	0.45	0.66	0.10	0.11	0.91	0.37
Vitamin A, mcg	0.00	0.12	0.03	0.97	0.09	0.12	0.71	0.48

*p<.05

^aDiet variables were log-transformed due to non-normality

c = cups

Table 6.4: Pre-Intervention and Change in Continuous Home Environment Variables

	Baseline					Change (pre-post)						
	Control		Intervention			Control		Intervention		Difference ^a		
	mean	sd	mean	sd	p	mean	sd	mean	sd	mean	sd	p
Vegetable Availability	8.43	3.26	7.27	2.43	0.19	-0.14	2.90	1.41	2.72	1.55	2.81	0.08
Non-Potato Vegetable Availability	7.38	2.82	6.00	2.41	0.09	-0.33	2.69	1.55	2.46	1.88	2.58	0.02*
In a typical week, how many days (0-7) do you...												
eat out for dinner	1.45	1.10	1.23	0.81	0.46	-0.10	0.64	0.05	0.72	0.15	0.68	0.50
prepare dinner at home	5.50	1.15	5.50	1.01	1.00	0.25	0.97	-0.09	1.27	-0.34	1.14	0.34
and your child eat dinner together	6.58	1.02	6.38	1.24	0.59	0.06	0.24	0.19	0.75	0.14	0.57	0.47
do you sit with your child when												
(s)he is eating breakfast	4.25	2.71	4.23	2.39	0.98	0.30	2.15	0.23	1.80	-0.07	1.98	0.91
eat dinner while watching TV	0.95	1.57	1.86	1.88	0.10	-0.30	1.03	-0.64	1.40	-0.34	1.24	0.38
prepare a special food because (s)he												
doesn't like what the rest of the												
family is eating	1.90	2.15	2.45	2.74	0.47	0.20	0.70	-0.46	0.67	-0.65	0.68	0.00*
suggest that your child have a fruit												
or vegetable for a snack	5.30	2.03	5.36	1.94	0.92	-0.05	1.88	0.95	1.53	1.01	1.70	0.06

*p<.05

^aDifference = Intervention - Control

Table 6.5: Baseline Distribution for Home Environment Self-Efficacy**Characteristics**

Question	Group	Strongly Agree	Somewhat Agree	Somewhat disagree	Strongly disagree
I Feel confident that I can					
...prepare a healthy dinner for my child.	Control	14 (66.67)	6 (28.57)	1 (4.76)	0
	Intervention	18 (81.82)	4 (18.18)	0	0
...keep a variety of healthy foods available in my home.	Control	17 (80.95)	4 (19.05)	0	0
	Intervention	14 (63.64)	8 (36.36)	0	0
...get my child to eat multiple servings of vegetables (not potatoes) every day.	Control	6 (28.57)	10 (47.62)	3 (14.29)	2 (9.52)
	Intervention	4 (18.18)	5 (22.73)	7 (31.82)	6 (27.27)
...get my child to eat a variety of vegetables (e.g., green, orange, yellow, or red) every week.	Control	9 (42.86)	6 (28.57)	4 (19.05)	2 (9.52)
	Intervention	5 (22.73)	6 (27.27)	5 (22.73)	6 (27.27)
...get my child to try foods that are new to him/her.	Control	11 (52.38)	7 (33.33)	3 (14.29)	0
	Intervention	15 (68.18)	7 (31.82)	0	0
...role model healthy eating for my child.	Control	6 (28.57)	9 (42.86)	5 (23.81)	1 (4.76)
	Intervention	4 (18.18)	7 (31.82)	6 (27.27)	5 (22.73)

Table 6.6: Baseline Distribution and Coding for Home Environment Categorical Characteristics

Question (Original Response Options)	Grouping with options	Group	0	1
Do you talk with your child about trying and enjoying healthy foods? (4: All of the time - Never)	0=All of the time/Most of the time	Control	14 (66.67)	7 (33.33)
	1=Some of the time/Rarely or never	Intervention	11 (50.00)	11 (50.00)
You model healthy eating for your child by eating healthy foods yourself. (5: Never - Always)	0=Always/often	Control	16 (76.19)	5 (23.81)
	1=Sometimes/Rarely/Never	Intervention	20 (90.91)	2 (9.09)
It is hard to get your child to eat new foods. (5: Never - Always)	0=Always/often	Control	8 (38.10)	13 (61.90)
	1=Sometimes/Rarely/Never	Intervention	11 (50.00)	11 (50.00)
I show my child that I enjoy fruits and vegetables, just so that (s)he is more likely to eat them (4: Often - Never)	0=Often	Control	12 (57.14)	9 (42.86)
	1=Sometimes/Rarely/Never	Intervention	14 (63.64)	8 (36.36)
Of the vegetables types counted above, how many are dark green, red, orange or yellow vegetables (4: <3 - >6)	0=<3/3-4	Control	10 (47.62)	11 (52.38)
	1=5-6/>6	Intervention	10 (45.45)	12 (54.55)
How many times do you serve a food your child rejects before you stop offering it? (4: 1 - >10)	>=10/6-9, 1-5/once	Control	11 (52.38)	10 (47.62)
		Intervention	11 (50.00)	11 (50.00)

Table 6.7: Regression of Group (intervention/control) Characteristics on Follow-up Continuous Home Environment

Characteristics Controlling for Baseline With and Without Adjustment for Child Age

	Unadjusted				Adjusted for Age			
	Estimate	SE	t	p	Estimate	SE	t	p
Food Availability								
Vegetable Availability	0.96	0.75	1.27	0.21	0.93	0.83	1.12	0.27
Non-Potato Vegetable Availability	1.12	0.68	1.64	0.11	1.05	0.75	1.41	0.17
In a typical week, how many days (0-7) do you...								
eat out for dinner	0.11	0.21	0.51	0.61	0.03	0.23	0.15	0.88
prepare dinner at home	-0.34	0.31	-1.11	0.27	-0.33	0.34	-0.97	0.34
and your child eat dinner together	0.04	0.15	0.29	0.77	0.00	0.16	0.02	0.99
do you sit with your child when (s)he is eating breakfast	-0.08	0.53	-0.15	0.88	-0.24	0.58	-0.41	0.68
eat dinner while watching TV	-0.12	0.38	-0.31	0.76	-0.20	0.41	-0.48	0.64
prepare a special food for your child because (s)he doesn't like what the rest of the family is eating	-0.62	0.21	-2.96	0.01*	-0.45	0.22	-2.08	0.04*
suggest that your child have a fruit or vegetable for a snack	1.05	0.35	2.97	0.01*	0.79	0.38	2.09	0.04*

*p<.05

Table 6.8: Regression of Group (intervention/control) Characteristics on Follow-up Categorical Home Environment

Characteristics Controlling for Baseline With and Without Adjustment for Child Age

	OR	Unadjusted		Adjusted for Age		
		95%	CI	OR	95%	CI
Do you talk with your child about trying and enjoying healthy foods? (4 All-Never)	0.90	0.18	4.53	2.40	0.30	19.23
You model healthy eating for your child by eating healthy foods yourself (5 Never-Always)	0.58	0.09	3.50	1.12	0.14	8.87
It is hard to get your child to eat new foods (5 Never-Always)	0.09*	0.009	0.83	0.048*	0.004	0.62
I show my child that I enjoy fruits and vegetables, just so that (s)he is more likely to eat them (4 Often-Never)	0.85	0.15	4.77	0.56	0.08	4.07
Of the vegetables types counted above, how many are dark green, red, orange or yellow vegetables (4 (<3->6))	0.34	0.07	1.56	0.41	0.08	2.12
How many times do you serve a food your child rejects before you stop offering it? (4 (1->10))	0.35	0.06	2.13	0.41	0.06	2.66
I Feel confident that I can (0=Strongly Agree-3=Strongly Disagree)						
prepare a healthy dinner for my child	2.26	0.40	12.60	2.56	0.41	16.06
keep a variety of healthy foods available in my home	0.51	0.13	1.93	0.68	0.16	2.92
get my child to eat multiple servings of vegetables (not potatoes) every day	0.24*	0.06	0.99	0.14*	0.03	0.71
get my child to eat a variety of vegetables (e.g., green, orange, yellow, or red) every week	0.43	0.13	1.46	0.53	0.14	1.95
role model healthy eating for my child	0.60	0.13	2.86	0.94	0.17	5.19
get my child to try foods that are new to him/her.	0.23*	0.06	0.87	0.22*	0.05	0.91

*p<.05

CHAPTER VII

SUMMARY AND RECOMMENDATIONS

VII.A. Summary of findings

Taken together, the results of this dissertation suggest that a variety of home environment factors are related to dietary behaviors in young children; current efforts to promote healthy dietary behaviors and healthy weight development should be sure to adequately address these physical and psychosocial influences within the home. It is still unknown whether this setting may be more or less effective than others, such as child care, for changing dietary behavior. Current obesity rates as well as measures of dietary behavior make it clear that interventions are needed to improve dietary behaviors in young children. The home environment is an especially important influence on children, as they are largely dependent on others for provision of food, and are still developing taste preferences and eating habits.

The information presented in this dissertation contributes to design and delivery of dietary interventions with young children in four main ways: (1) by supporting the theory that availability of vegetables within the home is a correlate of intake in children; (2) by increasing understanding of home social environment factors, especially parental modeling, relate to dietary behavior among young children; (3) by evaluating a feasible intervention method and preferences for intervention components among parents of young children; and (4) by assessing the efficacy of a home delivered intervention targeting parents and the home environment on child dietary vegetable intake.

In the first aim, presented in Chapter IV, we analyzed the relationship between child diet and home food availability using an objectively measured open inventory of the home. We found that children living in homes with more vegetables were more likely to consume vegetables than those living in homes with fewer vegetables; the same was true for fruit, but the results were not statistically significant. This analysis supported previous studies which examined the relationship between home food availability and diet behaviors in children, but when parent or child report of food availability was assessed with checklists, rather than objective, open measurements. Our results confirm that food availability in the home should be an important target in dietary interventions.

In the second aim, presented in Chapter V, we attempted to better understand the social environment factors in the home that affect dietary behaviors in young children. We identified three factors, *where eat*, *control*, and *self-serve*, within this environment as well as four individual items which were related to child diet. Only the self-serve factor, measuring how often a child can serve him/herself at and between meals, was related to dietary intake in children. This factor was positively associated with sweet snacks intake. Three of the four items which did not load well on any of the factors, were also found to relate to child diet, specifically, the frequency of dinners eaten away from home was associated with increased fruit/fruit juice and intake and modeling healthy eating was associated positively with vegetable intake and negatively with soda intake. Many of these associations have been seen previously in the literature, however, all, with the exception of the modeling item, show complex relationships with dietary intake, often showing positive associations in some studies and negative associations in others.

In the third aim, (Chapter VI) we designed and pilot tested an intervention to improve vegetable intake in 2-5 year old children. Participants were randomly assigned to either the intervention group, which received two motivational phone calls and four tailored newsletter over four months, or the control group, which received one children's book per month for four months. Both groups completed a healthy home checklist, parenting survey, and Block Food Frequency Questionnaire at baseline and follow-up, had their child's height and weight measured at baseline, and completed a demographics survey at baseline. Parents in the intervention group completed a program evaluation following the intervention along with their post-test measures. We assessed several home environment factors including parent modeling, picky eating, the meal environment, and availability. Parents in the intervention group selected which of these areas they wanted to focus on for the intervention, and their newsletters were tailored accordingly. We had hypothesized that children in the intervention group would consume more vegetables than those in the control group at follow-up, while controlling for baseline intake. While children in the intervention group showed a positive change in vegetable intake, and children in the control group showed a decrease, this difference was not statistically significant. However, other, significant intervention effects were observed. Parents in the intervention group reported positive effects on vegetables availability, which is especially important given that this has been shown to relate to vegetable intake. Intervention group parents were also more likely to increase the number of days per week they suggested their child have a fruit or vegetable for a snack and their confidence in getting their child to eat vegetables. Additionally, parents in the intervention group reported less difficulty getting their child to try new foods as well as decreased frequency

of having to make special meals for their child, compared to the control group. Using the program evaluation, we found that parents especially valued the recipes and meal preparation tips found in the newsletters, and that these intervention components should be included in future studies.

VII.B. Theoretical implications

The environment is conceptualized as consisting of two “sizes:” the microenvironment that refers to settings that individuals interact with, such as homes and schools, and the macro-environment which refers to sectors that influence microenvironments, such as government, education and the food industry. Swinburn et al. further describes four “types” of environments, including the physical environment which refers to “what is available”, the economic environment which refers to costs, the political environment which refers to laws, regulations, and formal and informal policies, and the sociocultural environment which refers to attitudes, beliefs and values (Swinburn et al., 1999). Rozenkranz and Dzewaltowski have reviewed existing research on the home environment and child diet and have developed a model of how the home environment impacts dietary behaviors in children (Rosenkranz & Dzewaltowski, 2008) (Figure 2.1, page). This model highlights the importance of both the physical food environment and the social environment. Aims 1 and 2 investigated how physical and social environments were related to child dietary behaviors. Relationships between both food availability and social environmental factors within this microenvironment were found to be correlated with child intake.

The intervention pilot tested in Aim 3 was designed using theoretical constructs from SCT, Self Determination Theory, and goal setting. In Aim 3, we saw increases in

self-efficacy for parents getting their children to eat multiple servings of vegetables everyday and reduced difficulty getting their children to try new foods, while these did not change in the control group. Changes to the physical environment were also seen, potentially demonstrating the reciprocal determinism seen between individuals and the environment; if children were more willing to try and eat new foods, parents may have been more willing to keep a variety of vegetables in the home. Interestingly, though it was specifically targeted in all four of the newsletters, parental role modeling did not change as a result of the intervention. In the current study, this lack of change may have been due to the high baseline levels of role modeling in both groups. Observational learning is an important construct in SCT, so future interventions, especially those in populations with different socioeconomic characteristics than the current study, should test alternative ways to improve role modeling. Further, from the current study, it was not possible to assess the impact of the intervention on SDT constructs. Future studies should measure these constructs to evaluate whether changes in these constructs may mediate the relationship between the intervention and behavior change.

VII.C. Recommendations

Aim 1.

A growing number of interventions to promote healthy weight behaviors in young children are targeting the home environment (Hesketh & Campbell, 2010). The findings from Aim 1 suggest that availability of vegetables in the home is related to vegetable intake, but no other significant associations between home food availability and child diet were seen. These findings can be incorporated into interventions and programs to help parents.

There has been a significant amount of research to date examining whether availability of food in the home has an impact on child diet. However, this work has been limited by the use of self-report measures. The goal of the current work was to use an objective, researcher conducted, open assessment of food availability to explore this association using availability measures which are subject to less bias. Since young children are dependent on food provision by others, it is reasonable to think that having vegetables available in the home could increase intake of these foods. The results of Aim 1 lend support to inclusion of increasing home availability in intervention studies.

Aim 2.

The results for Aim 2 highlight the complexity of the relationship between the social environment in the home and diet behaviors in children seen in the literature. The relationship between modeling and intake of vegetables and soda is not surprising, as modeling healthy behaviors has been shown to be a strong predictor of child intake in the literature. Similarly, the relationship between food away from home and intake of fruit/fruit juice is also similar to that seen in the literature, as these associations were no longer significant after adjustment for total energy intake. However, other associations seen in Aim 2 are more paradoxical. Both the negative relationship between the “serving item” and all the intake variables and the positive association between sweets intake and the self-serve factor indicate these associations are more complex. This paradox is seen elsewhere in the literature, and there is debate as to the amount of guidance, pressure, or restriction that parents should give their children when it comes to selection of what and how much the child should eat. Though the results from Aim 2 can only add to this debate and further demonstrate the complexity of this relationship, what can be taken

from this aim, to inform future interventions, is support for the strong relationship between parental modeling and child diet and the impact eating meals away from home can have on children's diets. These messages can be incorporated into future interventions aimed at child dietary behaviors.

Aim 3.

Our third aim found that a minimal, low-cost intervention led to small, non-statistically significant, increases in vegetable intake. This lack of significance could be due to the limitations of the measure, diet data were collected by Block Food Frequency Questionnaires, or perhaps the small sample size and/or short duration of the intervention. Although changes in vegetable intake were not statistically significant, changes in non-potato vegetable availability in the home did show a significant increase. Additionally, other home environment characteristics showed significant changes as well. We hypothesize that these changes may have been precursors to changes in child diet and, given a longer intervention period, greater changes in diet may have been seen. Participants in this study were mostly White, well-educated, wealthy families. Future studies should strive to recruit a more diverse sample.

Future vegetable intervention studies aimed at young children should also find ways to encourage parents to improve their role modeling behaviors. Though they started high in this study, this may not be the case in all populations, and, in addition to improving vegetable availability, this has been shown to be another strong predictor of child intake. Parents could be encouraged to engage in specific behaviors, such as modeling intake of certain foods, so their children could observe this behavior. These

studies should also include recipes and suggestions for food preparation, as participants found these very useful by and many requested additional resources on this topic.

The results of this study suggest that intervening in the home environment through parents over a short time period may not be enough to produce dietary changes. Interventions should also find ways to target important social environment variables, such as role modeling in addition to other social and physical environment characteristics, in order for change to occur.

VII.D. Future directions and research needs

This dissertation project suggests several possible areas of future research:

- 1) The factor analysis conducted in Aim 2 showed three factors hypothesized to correspond to constructs in the social environment in the home related to child diet. This analysis, however, was limited by the size of the sample in which these data were collected. Further work to develop tools to accurately measure the social environment in the home should be developed. Cognitive interviewing should be conducted to ensure that parental interpretations of the questions match researcher intentions and additional exploratory and confirmatory factor analyses should be conducted to determine that these questionnaires are valid. There is a lack of accurate tools to measure the social environment in the home, and future intervention studies would benefit from better tools with which to evaluate this environment.
- 2) Our ability to draw conclusions from all three aims was also limited by the measurement of diet in children. Future studies, both those looking at associations between the environment and diet and those looking at the effects of interventions on diet, should utilize more accurate measures of dietary intake. Ideally, 24-hour recall

methods could be used, though even this type of data collection has limitations and is based on self-report.

- 3) Future intervention studies should intervene over longer periods of time, or at least allow for longer follow-up. Though changes to the home environment, especially the increase in vegetable availability seen in Aim 3 were encouraging, significant changes in diet were not seen. It may be that these environmental changes needed to precede the dietary changes, and the short course of the intervention did not allow for dietary changes to follow.
- 4) In future intervention studies targeting the home environment, it may be interesting to examine child dietary behavior in different strata of home environment changes. For example, exploring whether children's diets changed more if they lived in homes where availability changed more. While this type of study would require a much larger sample size, demonstrating that greater dietary change occurred in homes with greater environmental changes, would provide strong evidence for a causal association.
- 5) In recent years, use of web and other media has increased both for casual use as well as for delivery of health behavior interventions. Comparing the intervention from Aim 3 with that of a web-based intervention may provide an additional means for delivery of such interventions targeting the home environment. It is possible that this delivery method may be more successful, particularly in subgroups of parents especially used to utilizing these types of communication.

In summary, this research has provided insight into the complex relationship between parents, the home environment, and dietary behaviors in children. This research supports the need for more work into how parents can create a home environment which encourages healthy dietary intake in their children. It is likely that the home environment can strongly influence child dietary behaviors, and that changes to this environment may improve these behaviors. Parents will continue to seek out ways to help their children develop healthy dietary habits, and it is important for public health professionals to be able to provide sound advice. Further research in larger, more diverse samples, using tools with strong reliability and validity evidence is necessary to more completely understand this complex relationship and use this knowledge to help promote healthy diets in children.

APPENDIX A

HEALTHY HOME SURVEY: PHONE SURVEY OPERATOR MANUAL

Script and procedures for administration of the HEALTHY HOME SURVEY

The following text presents the script that should be followed during telephone interviews in which the Healthy Home Survey (HHS) is administered. Interviewers should not attempt to perform interviews with participants until they have received training and have had the opportunity to practice administration of the interview on the telephone.

Italicized text indicates spoken script.
All other text indicates instructions or advice.

Making the call

Before calling, make sure you have the participants name, phone number, and name of the reference child participating in the study. Record all attempts to contact participant, including those that were not answered and those that were inconvenient, using the participant's "call log" form.

The script

Good morning/evening. This is <your name> from the XXX project at the University of North Carolina. Could I please speak to <participant name>?

[Participant responds]

Hello <participant name>. We are calling to complete an interview about your home environment. As we described in the consent form, this interview should take approximately 30-40 minutes. Is now a good time to conduct that interview with you?

If no *No problem. Is there a better time for me to call you back?*

[If possible schedule a time to complete the telephone interview.]

Thank you. Goodbye.

If yes..... *Okay. I'll begin with a few general questions and then move on to more specific questions about your family home environment. Please feel free to stop me at any point or ask me to clarify any questions that you don't understand. Remember, there are no right or wrong answers. Please answer honestly. You are not being judged on any of your responses.*

[Confirm name of reference child that is participating in the study. Refer to the child's name throughout when <child's name> appears.]

Please remember that when we ask you questions about "your child", we are referring to this child only.

GENERAL INFORMATION QUESTIONS

1. *Do you have a child between the ages of 2 and 7? Yes / No*
2. *What is the name of that child?.....*

[refer to the child's name throughout when <child's name> appears]

Please remember that when we ask you questions about "your child", we are referring to this child only.

3. Are you the primary caregiver for < child's name> that you indicated as being suitable for this study? Yes /No

If no... We need to conduct this interview with the primary caregiver. Are they available now?

If no... Ok, I will call back another time and try to get hold of that person. Thank you. Goodbye.

If yes... [continue with question 2]

4. What is your relationship with <child's name>?
[If participant does not understand the question]: *For example, are you the mother, father, sibling, or grandparent to <child's name>?*
[Record participant relationship with child.]

5. How many adults older than 17 years live in your home?
[Participant may ask if this includes people who only live in the home for some of the time (e.g. grandparents): *Only include people who live in your home all of the time.*

6. For each adult living in your home, beginning with you, please tell me:
- What their relationship is with <child's name>? [not required for the participant]
 - Whether they are male or female [not required for the participant]
 - What is your / their age?

[Begin by asking all questions (a-c) at once and then repeat each question and get a response before moving onto the next question. Fill in responses into Table 1]

Adult	Relationship to reference child	Gender (M/F)	Age (yr)
1			
2			
3			
4			

7. How many children (under 18 years of age) live in your home?
[Participant may ask if this includes children who only live in the home for some of the time (e.g. if parents are separated)]: *Only include people who live in your home all of the time.*

8. For each child, beginning with <child's name>, please tell me:
- What their relationship is with <child's name>? [not required for the reference child]
 - Whether they are male or female
 - What is their age?

[Begin by asking all questions (d-f) at once and then repeat each question and get a response before moving onto the next question. Fill in responses into Table 2]

Child	Relationship to reference child	Gender (M/F)	Age (yr)
Reference child	N/A		
2			
3			
4			

9. From the following options, how would you describe your race? You can choose more than one? [circle response]

- a) Black or African-American
- b) White (non-Hispanic)
- c) Hispanic
- d) Asian
- e) American Indian and Alaska Native
- f) Native Hawaiian and other pacific islander

[Possible response maybe that the participant does not describe themselves as being any of the options]: *Ok, could you tell me which race you would describe yourself as?* [print answer below]

10. How would you describe the race of <child's name> (you can choose more than one)? [circle response]

- a) Black or African-American
- b) White (non-Hispanic)
- c) Hispanic
- d) Asian
- e) American Indian and Alaska Native
- f) Native Hawaiian and other pacific islander

[Possible response maybe that the participant does not describe their child as being any of the options]: *Ok, could you tell me which race you would describe <child's name> as being?* [print answer below]

11. The next question will help us organize our study results. Please do not feel obliged to answer this question if you feel uncomfortable. From the following options, please tell me which describes your annual household income? [circle response]

- a) less than \$10,000
- b) \$10,000 - \$19,000
- c) \$20,000 - \$50,000
- d) \$50,000 - \$100,000
- e) Greater than \$100,000

12. Which of the following options best describes your occupation? [circle response]

- a) Full time working outside home
- b) P/T working outside home
- c) Working from home for a salary
- d) Stay at home mom (working without a salary)

13. Please can you confirm the following address as your home address [read address entered prior to telephone call; make alternations if necessary]

.....
.....

14. These are the directions we got from MapQuesting your address. Are they correct? [read directions entered using MapQuest prior to telephone call; make alternations if necessary]

.....
.....

NEIGHBORHOOD

15. Which of the following options best describes the type of home you live in? [circle response]
- a) Apartment
 - b) Mobile home
 - c) Town house, duplex or condo
 - d) Detached home

[If needed] A detached home is one that is not connected to any other properties, with its own boundaries.

[Record type of home.]

16. Would you say that your home was on a busy street with lots of traffic?

[If needed, prompt the participant with examples] “How does it compare to other streets, like Franklin Street”?

[Record response Yes/No.]

17. Are there parks, walking trails or outdoor recreation areas within safe walking of your home?

[Possible responses may be that these facilities are within walking distance, but that they never walk there – for any reason, like safety, time, etc. – or that, they consider it to be walking distance, but others do not (or the opposite). Record whether or not THE PARTICIPANT BELIEVES THEY ARE in walking distance, even if they do not walk there themselves.]

[Record response Yes/No/Don’t Know.]

18. Are there in-door recreation centers that you could use within safe walking of your home (e.g. YMCA, community recreation centers, school gyms)?

[Possible response may be that these facilities are within walking distance, but that they never walk there – for any reason, like safety, time etc. – or that, they consider it to be walking distance, but others do not (or the opposite). Record whether or not the participant believes they ARE in walking distance, even if they do not walk there themselves.]

[Record response Yes/No/Don’t Know.]

19. *Does the street that you live on have a side walk?*

[A possible response maybe that only part of it has a side walk. If so, treat this as a YES response. The participant may also respond by saying “no, but the street just around the corner does”. If so, treat this as a NO response. They may ask you to define a side walk. If so, this is a paved path, not a gravel track.]

[Record response Yes/No.]

HEALTH BEHAVIORS

20. *Are you or anyone else in the home following a weight loss diet?*

[A possible response may be that they are supposed to be on a diet, but not good at keeping to it. If so, report YES. They may also report that they have just finished (or are about to start) a diet. If so, report NO.]

[Record response Yes/No/Don't Know.]

If yes... *Which family members?*

[Record members initials and relationship with child in table provided, e.g. participant, reference child, brother, father etc.]

21. *Are you or anyone else in the home a member of a gym, YMCA or community center?*

[A possible response may be that they are members, but not good at going. If so, report YES. They may also say that their membership has just expired (or is about to start). If so, report NO.]

[Record response Yes/No/Don't Know.]

If yes... *Which family members?*

[Record members initials and relationship with child in table provided, e.g. participant, reference child, brother, father etc.]

22. *Do you or anyone else in the home currently smoke?*

[A possible response may be that they suspect other people to smoke, but do not know for sure. If so, report NO for that person. They may also say that they are trying to give up, and are only smoking 1 or 2 cigarettes a day. If so, report YES.]

[Record response Yes/No/Don't Know.]

If yes... *Which family members?*

[Record members initials and relationship with child in table provided, e.g. participant, reference child, brother, father etc.]

23. *Do you allow smoking in your home?*

[A possible response could be that they only allow it in 1 room. If so, report YES.]

[Record response Yes/No.]

24. *Do you or anyone else in the home have any medical conditions that impact your diet or physical activities behaviors?*

[Provide examples if necessary] *Examples of medical conditions that would impact your diet or physical activity would include hypertension, lactose intolerance.*

[Record response Yes/No.]

If yes... Which family members?

[Record initials and relationship with child in the first column of table provided, e.g. participant, reference child, brother, father etc.].

For each person, please describe:

- a) *what their medical condition is*
- b) *whether this affects their diet*
- c) *whether it increases or decreases their level of physical activity*

[Begin by asking all questions (a-c) at once about the first person on the list. Get a response to each (a-c) for that person before moving onto the next person. Fill in responses into table provided. See example below.]

Family member (e.g. brother, father, etc.)	Medical condition	Diet (Y/N)	PA- increase (I) vs. decrease (D)

HOME ENVIRONMENT MEASURES

Now I'm going to ask you some questions about your home. There may be questions that you are unsure of the answer. It might be that you have to leave the phone and go and look to see what is in your home. This is fine. Please answer as honestly as possible and remember that there are no right or wrong answers. You may find some of the questions difficult to answer, but please choose the option that most closely describes your response. The first few questions are going to focus on your family shopping and eating behaviors.

FRUIT

25. *Do you have any **fresh fruit** in your home?*

[Record response Yes/No.]

26. *Can you tell me what **fresh fruits** you have in your home? For each type of fruit, I will also ask you for the size and quantity.*

[Record the fresh fruits reported using the table below. For type of fruit, specify apples, oranges, grapes, etc. If it is a whole fruit (like apples and oranges), ask participant to estimate the size (S, M or L) and provide the quantity they have on hand. For fruits that come in bags (like grapes and cherries), ask participant to estimate how many cups they have on hand and record that under size with a quantity of 1. For fruits that come in cartons

(like strawberries and blueberries), ask participant to report the size of the container and the number of containers they have on hand.]

[When the respondent finishes, prompt her by reminding her of places she may have forgotten:] *Have you remembered fruits in your refrigerator, in a fruit bowl and in your cupboards?*

Type of fruit	Size	Quantity

27. *Would you say that the amount of **fresh fruit** you currently have in your home is more than usual, less than usual, or about the same?*

[Record response.]

28. *Without opening any doors (including doors to your garage, refrigerator, or pantry doors) would you be able to see **fresh fruit** in your home now; displayed out in the open?*

[A possible response may be that the fresh fruit is behind a door, but that it is glass and can be seen. If so, report YES. Another response could be that the fresh fruit is out, but that it is stored very high and can only be viewed with a stool. Is so, report NO.]

[Record response Yes/No.]

29. *Do you have any **canned or jarred fruits** in your home?*

[Record response Yes/No.]

30. *Can you tell me what **cans or jars of fruits** you have in your home now? For each type, please include the size of the can or jar as well as the quantity.*

[Record the canned or jarred fruits reported using the table below. Under type, be sure to know if fruit was packed in heavy syrup (HS), light syrup (LS), or juice (J).]

[When the respondent finishes, prompt her by reminding her of places she may have forgotten:] *Have you remembered canned fruits in your garage?*

Type of canned or jarred fruit	Size	Quantity

31. Would you say that the amount of **canned or jarred fruit** you currently have in your home is more than usual, less than usual, or about the same?

[Record response.]

32. Do you have any **dried fruit**, such as raisins, dried apricots, or dates in your home now? This does not include dried fruit that is part of a trail mix.

[Record response Yes/No.]

33. Can you tell me what **dried fruit** you have in your home? For each type, please include the size of the container as well as the quantity.

[Record the canned or jarred fruits reported using the table below. If dried fruit was not pre-packaged, ask participant to estimate the number of cups they have on hand and record quantity as 1.]

[You may have to prompt the participant to get an idea of the amount of each dried fruit:]
Roughly how many cups of raisins do you think there are in your bag?

Type of dried fruit	Size	Quantity

34. Would you say that the amount of **dried fruit** you currently have in your home is more than usual, less than usual, or about the same?

[Record response.]

35. Do you have any **frozen fruit** in your home now?

[Record response Yes/No.]

36. Can you tell me what **frozen fruit** you have in your home? For each type, please include the size of the bag or container as well as the quantity.

[Record the frozen fruits reported using the table below. If frozen fruit was not pre-packaged, ask participant to estimate the number of cups they have on hand and record quantity as 1.]

[You may have to prompt the participant to get an idea of the amount of each frozen fruit:]
Roughly how many cups of frozen strawberries do you think there are in your bag?

Type of frozen fruit	Size	Quantity

37. *Would you say that the amount of **frozen fruit** you currently have in your home is more than usual, less than usual, or about the same?*

[Record response.]

VEGETABLES

38. *Do you have any **fresh vegetables** in your home now?*

[Record response Yes/No.]

39. *Can you tell me what **fresh vegetables** you have in your home? For each type of vegetables, I will also ask you for the size and quantity.*

[Record the fresh vegetables reported using the table below. For type of vegetables, specify squash, corn, broccoli, asparagus, carrots, lettuce, spinach, etc. Many can be described as whole, individual vegetables (like squash, corn, potatoes, and heads of lettuce or broccoli). For these, ask participant to estimate the size (S, M or L) and provide the quantity they have on hand. For broccoli, be sure to specify the number of HEADS of broccoli, they may come from the store with 2-3 heads in a bunch. For vegetables that come in bunches (like asparagus), ask participant to estimate how many cups or pounds they have on hand and record that under size with a quantity of 1. For pre-packaged vegetables (like carrots, lettuce, and spinach), ask participant to report the size of the container and the number of containers they have on hand. For loose greens, ask the participant to estimate the number of cups or pound they have on hand and record that under size with a quantity of 1. BE SURE TO INCLUDE POTATOES AND ONIONS UNDER FRESH VEGETABLES INCLUDE, BUT NOT GARLIC.]

[When the respondent finishes, prompt her by reminding her of places she may have forgotten:] *Have you remembered vegetables in your refrigerator, or in your garage?*

Type of fresh vegetable	Size	Quantity

40. *Would you say that the amount of **fresh vegetables** you currently have in your home is more than usual, less than usual, or about the same?*

[Record response.]

41. Do you have any ready to eat **fresh vegetables** on a shelf in the refrigerator or on the kitchen counter now? These include baby carrots, cherry tomatoes, or vegetables that you have sliced to make them ready to eat.

[Record response Yes/No.]

42. Do you have any **canned vegetables** in your home?

[Record response Yes/No.]

43. Can you tell me what **cans of vegetables** you have in your home now? For each type, please include the size of the can as well as the quantity.

[Record the canned vegetables reported using the table below. Be sure to note special preparations like fat-free (FF), reduced fat (RF), and low-sodium (LSod). If the participant has canned their own vegetables, ask them to report size of the container (quart, pint, etc). If they can not, ask them to estimate in cups.]

[When the respondent finishes, prompt her by reminding her of places she may have forgotten:] *Have you remembered canned vegetables in your garage?*

Type of canned vegetable	Size	Quantity

44. Would you say that the amount of **canned vegetables** you currently have in your home is more than usual, less than usual, or about the same?

[Record response.]

45. Do you have any **frozen vegetables** in your home?

[Record response Yes/No.]

46. Can you tell me what **frozen vegetables** you have in your home? For each type, please include the size of the bag or container as well as the quantity.

[Record the frozen vegetables reported using the table below.]

[You may have to prompt the participant to get an idea of the amount of each frozen vegetable:] *Roughly how many cups of frozen peas do you think there are in your bag?*

Type of frozen vegetable	Size	Quantity

47. *Would you say that the amount of **frozen vegetables** you currently have in your home is more than usual, less than usual, or about the same?*

[Record response.]

SNACKS

Now I'm going to ask you about what snacks you have in your home. Again, please respond as accurately as possible and remember that you are not being judged on your answers.

48. *Do you have any **savory snacks** in your home? This includes snacks like peanuts, chips, tortillas and pretzels, but not popcorn.*

[Record response Yes/No.]

49. *Can you tell me what **savory snacks** you have in your home? For each type, please include the size of the bag or container as well as the quantity.*

[Record the savory snacks reported using the table below. Be sure to note special preparations like fat-free (FF), reduced fat (RF), and low-sodium (LSod).]

[When the respondent finishes, prompt her by reminding her of places she may have forgotten:] *Have you remembered snacks in your refrigerator, or in your garage?*

Type of savory snacks	Size	Quantity

50. *Would you say that the amount of **savory snacks** you currently have in your home is more than usual, less than usual, or about the same?*

[Record response.]

51. *Would it be possible for your child to and get any **savory snacks** on their own, without your help?*

[A possible response may be that they do not allow their child to do that without asking, but that they could get if they were permitted. If so, report YES.]

[Record response Yes/No.]

52. Do you have any **sweet snacks** in your home? This includes snacks like cookies, ice-cream, Twinkies, muffins and cake. Do not include candy.

[Record response Yes/No.]

53. Can you tell me what **sweet snacks** you have in your home? For each type, please include the size of the bag or container as well as the quantity.

[Record the sweet snacks reported using the table below. Be sure to note special preparations like fat-free (FF), reduced fat (RF), and low-sodium (LSod).]

[When the respondent finishes, prompt her by reminding her of places she may have forgotten:] *Have you remembered snacks in your refrigerator, or in your garage?*

Type of sweet snacks	Size	Quantity

54. Would you say that the amount of **sweet snacks** you currently have in your home is more than usual, less than usual, or about the same?

[Record response.]

55. Would it be possible for your child to and get any **sweet snacks** on their own, without your help?

[A possible response may be that they do not allow their child to do that without asking, but that they could get if they were permitted. If so, report YES.]

[Record response Yes/No.]

56. Do you have any **candy** in your home? This includes candy such as hard candy and chocolate bars

[Record response Yes/No.]

57. Can you tell me what **candy** you have in your home? For each type, please include the size of the bar or bag of candy as well as the quantity.

[Record the candy reported using the table below. If the participant has a container or bowl of mixed candies, try to capture a general type (hard candies, chocolates, peppermints, etc.) and ask the participant to report either the size of the bag or estimate the number of cups.]

[When the respondent finishes, prompt her by reminding her of places she may have forgotten:] *Have you remembered candy in your refrigerator, in your garage, or in a bowl?*

Type of candy	Size	Quantity

58. *Would you say that the amount of **candy** you currently have in your home is more than usual, less than usual, or about the same?*

[Record response.]

59. *Would it be possible for your child to and get any **candy** on their own, without your help?*

[A possible response may be that they do not allow their child to do that without asking, but that they could get if they were permitted. If so, report YES.]

[Record response Yes/No.]

60. *Do you have any **soda** in your home? Please do not include diet sodas.*

[Record response Yes/No.]

61. *Can you describe to me what **soda** you have in your home? For each type, please include the size of the bottle or cans as well as the quantity.*

[Record the soda reported using the table below. Again, do not include diet sodas.]

[When the respondent finishes, prompt her by reminding her of places she may have forgotten:] *Have you remembered soda in your refrigerator, or in your garage?*

Type of soda	Size	Quantity

62. *Would it be possible for <child's name> to and get **soda** on their own, without your help?*

[A possible response may be that they do not allow their child to do that without asking, but that they could get if they were permitted. If so, report YES.]

[Record response Yes/No.]

MEALS

63. *How many days a week does <child's name> eat breakfast at home?*

[Breakfast includes snacks as well as cereal or toast. Weekly estimates include week days and weekend days. Breakfasts that are prepared at home, but not eaten at home are a “no” response.]

[Record response 0 1 2 3 4 5 6 7]

64. *How many days a week does <child’s name> eat breakfast at school or preschool?*

[This includes food prepared at home, foods purchased on the way to school and food prepared by the school or pre-school – provided they are eaten at school or preschool.]

[Record response 0 1 2 3 4 5 6 7]

65. *How many days a week often does <child’s name> eat breakfast somewhere else, not including home, school or preschool?*

[This includes breakfasts that are purchased from a store, garage or fast food restaurant. It does not include breakfast that are eaten at a friends or another family home.]

[Record response 0 1 2 3 4 5 6 7]

66. *How many days a week do your family sit at a table to eat dinner together? This includes occasions when it is just <child’s name> and yourself.*

[Give credit to mothers or fathers who find time to sit down and eat with their child at a table, even if it is just a quick affair with just 1 adult present. A possible response might be that they sit down as a family to eat dinner, but it is not a dining table. This is not included.]

[Record response 0 1 2 3 4 5 6 7]

67. *How often does <child’s name> eat **breakfast** in front of the TV each week?*

[For items 55-58: If child sits at a dining table in the kitchen, but there is a TV on in the room, this is included]

[Record response 0 1 2 3 4 5 6 7]

68. *How often does <child’s name> eat **lunch** in front of the TV each week?*

[Record response 0 1 2 3 4 5 6 7]

69. *How often does <child’s name> eat **dinner** in front of the TV each week?*

[Record response 0 1 2 3 4 5 6 7]

70. *How often does <child’s name> eat **snacks** in front of the TV each week?*

[Record response 0 1 2 3 4 5 6 7]

71. *How often does <child’s name> eat dinner away from home each week?*

[This is only for **dinner**, and does not include meals eaten during the day at school. Do not include dinners eaten at another family home (e.g. if parents are separated)]

[Record response 0 1 2 3 4 5 6 7]

72. *From the following options, please tell me where are most meals eaten in your home:*
- a) *At the dinning table*
 - b) *On the sofa or couch*
 - c) *At the coffee table*
 - d) *Somewhere else*

[A possible response might be that it is varied, or dependent on the meal. Ask participants to take into account meals not eaten at home, and meals eaten during the weekend so that they can best estimate which place food is most commonly eaten.]

[Record response.]

73. *Do you ask <child's name> to eat everything on their plate at dinner...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[This includes participants who make their child eat a majority of foods on their plate. It does not include participants who ask their child to eat certain foods.]

[Record response]

74. *Do you restrict dessert if <child's name> does not eat the food on their plate at dinner...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[For items 62-64: Include if restriction occurs where: all foods must be finished; a majority of foods must be finished; and certain foods must be finished.]

[Record response.]

75. *Do you reward <child's name> with desserts, snacks or candy if they finish foods from their plate at dinner...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[Record response.]

76. *Do you allow <child's name> to have seconds if they finish foods from their plate at dinner...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[Record response.]

77. *Do you generally only allow <child's name> to eat at set meal times...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[Record response.]

78. *Do you allow <child's name> to serve themselves at dinner...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[Include if the child is allowed to serve themselves some foods, with the help of others.]

[Record response.]

79. *Do you allow <child's name> to help themselves to snacks, including salty and sweet snacks, or candy when they are at home...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[Refer back to the section on snacks if the participant asks you to describe or clarify snacks. This does not include if the child has to ask for permission first. Only include if the child is free to help themselves without asking permission.]

[Record response.]

80. *Would you say that you serve the "same amount", "more" or "less" dinner to <child's name> compared to what you serve yourself?*

[Response should be for a majority of time. If the child eats completely different meals from the participant, ask the participant to consider serving sizes, or portion sizes, or how big the meal looks on the plate. You could also ask the participant to imagine eating the same foods and whether they think they would eat the same amount, more or less of it.]

[Record response.]

81. *Do you ever avoid eating savory or sweet snacks, candy or soda in front of <child's name>...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[Refer back to the snack sheets if the participant asks you to describe or clarify snacks. Participant may say that they have to eat in front of the child, because they are always together, but that they try to make it discrete. This response counts as avoiding eating in front of the child.]

[Record response.]

82. *When eating in front of <child's name>, do you try to eat healthy...*

- a) *all of the time*
- b) *most of the time*
- c) *some of the time*
- d) *rarely*
- e) *never*

[A possible response may be, “what do we consider ‘healthy’? This is a subjective answer. It includes what the participant thinks is ‘healthy’.]

[Record response.]

83. *Would you say that you have adequate counter space to prepare food in your kitchen?*

[Participant may say that they would like more, but that what they have is adequate. If so, report YES. Another response may be that they have space, but it is covered with equipment / jars / junk. If so, report NO.]

[Record response Yes/No.]

84. *Which of the following options most closely resembles the way you shop for food?*

- a) *Monthly big trip*
- b) *Biweekly, big trip, no small trips*
- c) *Biweekly, big trip, few small trips*
- d) *Weekly, big trip, no small trips*
- e) *Weekly, big trip, few small trips*
- f) *No big trip, all small as needed*

[You will probably have to repeat this list a number of times before the participant is able to respond.]

[Record response.]

85. *Does <child's name> help you shop for groceries at the store? For example, you may get them to pick their own foods, or give them their own grocery list. Please consider this for one of the following options...*

- a) *all of the time*
- b) *most of the time*
- c) *some of the time*
- d) *rarely*
- e) *never*

[Participants may respond before you get a chance to read them the options. Let them finish and then say, “ok, can you tell me whether this happens a) all of the time....”]

[Record response.]

OK, that was the last question about food and shopping. The next few questions will ask you about space and equipment in your home.

- 86.** *Do you have yard or open play space that <child's name> can play in?*

[This includes shared yard space for people living in apartments, but does not include park space, even if it is very close to the home.]

[Record response Yes/No.]

If no... go straight to question 78 and skip question 81.

If yes... go to 75

- 87.** *Would you say that your yard space is small, medium or large?*

[This is a subjective question. Try to get the participant to answer what they feel the size of their yard is.]

[Record response.]

- 88.** *Do you share your yard with other households?*

[This does not include park land.]

[Record response Yes/No.]

- 89.** *Do you have any usable play equipment such as swings, slides, climbing or ladders in your yard?*

[Usable means that it is ready to use. For example, swings are well grounded and have chairs.]

[Record response Yes/No.]

- 90.** *Does <child's name> have a useable tricycle, bike, scooter or wheeled toy?*

[Usable means that it is ready to use. For example, bikes have tires that are pumped up and chains that are not broken.]

[Record response Yes/No.]

The next couple of questions are about active play. By “active play” we mean when <child's name> is physically moving during playing, like running, jumping, peddling, or climbing.

- 91.** *To what extent would you agree that <child's name> has adequate room to play actively inside the home...*

- a) *strongly disagree*
- b) *somewhat disagree*
- c) *somewhat agree*
- d) *strongly agree*

[A possible response maybe that there is space in some rooms, but not in others. Get the participant to consider this with their response. For example, if there is only space in 1 room, the answer might be c) somewhat agree.]

[Record response.]

- 92.** *Would you say that you restrict active play indoors...*

- a) *all of the time*

- b) *most of the time*
- c) *some of the time*
- d) *rarely*
- e) *never*

[Explanations for items 80-82 are irrelevant. It might be that participants restrict play most of the time because they do not feel that it is safe. This response should remain as b) most of the time.]

[Record response.]

93. *Would you say that you restrict outdoor play in your yard...*

- a) *all of the time*
- b) *most of the time*
- c) *some of the time*
- d) *rarely*
- e) *never*

[Potential response may be that the child is only allowed to play outside if an adult is present. If play is never restricted within that parameter, circle “e) never”.]

[Record response.]

94. *Would you say that you restrict outdoor play in your immediate neighborhood...*

- a) *all of the time*
- b) *most of the time*
- c) *some of the time*
- d) *rarely*
- e) *never*

[Record response.]

95. *During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening or walking for exercise?*

[Record response Yes/No.]

If no... go straight to question 85.

If yes... go to question 84.

96. *From the following responses, how often would you say that you are active in the presence of your child...*

- a) *all of the time*
- b) *most of the time*
- c) *some of the time*
- d) *rarely*
- e) *never*

[This includes if the participant takes the child to the gym with them, even if the child is in a crèche where they are not able to actually see them exercise.]

[Record response.]

Ok, now we're on to the last set of questions, which will be about TV and media in your home.

97. *How many working TV's do you have in your home?*

[Include TV's that are temporarily broken if there is a plan to get them fixed.]

[Record response 0 1 2 3 4 >4]

98. *Do you have cable or satellite?*

[Record response Yes/No.]

If no... go straight to question 88.

If yes... go to question 87.

99. *Can you estimate the number of channels you have available to you?*

[This may be a difficult question to answer. If the participant is having problems, prompt them with questions related to the categories above. For example: "would you say that you have more than 100 channels?"]

[Record response 0 1-4 5-10 11-30 31-49 50-100 >100]

100. *How many working VCR or DVD players do you have in your home?*

[Include VCR's or DVD players that are temporarily broken if there is a plan to get them fixed. Also include DVD's within computers if they are used to watch movies on.]

[Record response 0 1 2 3 4 >4]

101. *How many DVDs or Video tapes do you have in your homes that are specifically for your child to watch?*

[DVD's or tapes that are shared by the whole family are not included. Only include those which are exclusively for the child. Do not include ones that are exclusive for other children, unless the target child also watches them.]

[Record response 0 1 2 3 4 >4]

102. *Does <child's name> have a working TV in their bedroom?*

[Include TV's if it is a shared bedroom and the TV belongs to another child.]

[Record response Yes/No.]

103. *Do you have any working TV's that are viewable from your dining area (or the food where most meals are eaten)?*

[Include even if the participant says, "yes, but it is never switched on during meal time."]

[Record response Yes/No.]

104. *How many working computers or laptops do you have in your home?*

[Include computers or laptops that are temporarily broken if there is a plan to get them fixed.]

[Record response 0 1 2 3 4 >4]

- 105.** Does <child's name> have a computer or laptop in their bedroom?

[Include computers, if it is a shared bedroom and the TV belongs to another child.]

[Record response Yes/No.]

- 106.** How many working games consoles, such as Play Station or X-Box, do you have in your home?

[Include computers or laptops that are temporarily broken if there is a plan to get them fixed.]

[Record response 0 1 2 3 4 >4]

- 107.** Does <child's name> have a games console in their bedroom?

[Include games consoles that are temporarily broken if there is a plan to get them fixed.]

[Record response 0 1 2 3 4 >4]

- 108.** From the following options, how often would you say that you restrict the amount of time <child's name> spends watching TV...

- a) *all of the time*
- b) *most of the time*
- c) *some of the time*
- d) *rarely*
- e) *never*

[For items 96-98: restriction means that they do not allow their child to watch TV / use the computer / play games consoles, for what ever reason. This includes evenings and weekends. Participants may say that they only restrict TV time in the morning. If so, ask them if they would therefore respond as some of the time? Participants who restrict during the week, but not at weekends should respond as most of the time. Those that restrict only certain TV programs should report rarely.]

[Record response.]

- 109.** From the following options, how often would you say that you restrict the amount of time <child's name> spends using a computer or laptop...

- a) *all of the time*
- b) *most of the time*
- c) *some of the time*
- d) *rarely*
- e) *never*

[Record response.]

- 110.** From the following options, how often would you say that you restrict the amount of time <child's name> spends playing games on the games console...

- a) *all of the time*
- b) *most of the time*
- c) *some of the time*
- d) *rarely*

- e) *never*

[Record response.]

- 111.** *From the following options, how often would you say that you reward good behavior with extra TV time...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[For items 99-101: good behavior is subjective and depends on what the participant considers to be good behavior. It may be that they have been quiet or that they have eaten their vegetables.]

[Record response.]

- 112.** *From the following options, how often would you say that you reward good behavior with extra computer time...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[Record response.]

- 113.** *From the following options, how often would you say that you reward good behavior with extra computer time...*
- a) *all of the time*
 - b) *most of the time*
 - c) *some of the time*
 - d) *rarely*
 - e) *never*

[Record response.]

That's the end of the interview now. Thank you very much for your time. Goodbye.

APPENDIX B

HEALTHY HOME SURVEY: HOME VISITATION OPERATOR MANUAL

Procedures for in-home administration of the HEALTHY HOME SURVEY

Italicized text indicates instructions

Home ID:
Administered By:
Date:
Start Time:

ANTHROPOMETRICS

Child height should be measured twice using the stadiometer. Record both measures below, and use the higher of the two measures for final height. If measures are more than ¼ inch off, take a third measurement.

Child Height1
Child Height2
Child Height3
Child Height

Child Weight

Child BMI [*calculated*]

Primary Caregiver Height1
Primary Caregiver Height2
Primary Caregiver Height3
Primary Caregiver Height

Primary Caregiver Weight

Primary Caregiver BMI [*calculated*]

NEIGHBORHOOD

Type of home: apartment / mobile home / townhouse, duplex, or condo / detached home

Presence of a sidewalk: yes / no

Is home on a busy street w/ a lot of traffic: yes/no

SEDENTARY BEHAVIOR

Administer the Dennison questionnaire using an interview format. Record hrs/day in each of the boxes below.

During the past week, how much time did this child spend...

	Sleeping	Watching TV or videos	Playing video or computer games	Moving or dancing to music	Light activity (puzzles, arts and crafts, etc.)	Moderate activity	Active play (running, jumping, etc.)
Average weekday							
Saturday							
Sunday							

HOME ENVIRONMENT MEASURES

Complete the table below for each food item using the serving size sheets to help quantify amounts. Ask participant permission to look for foods in places such as the garage. Remember fruit bowls, or foods stored in work-top containers. Shaded cells are not applicable. Categories should be circled AFTER the home visit.

Report whether there is more, less or about the same amount of each item by asking the following question:

Would you say the amount of fresh fruit you currently have in your home is more than usual, less than usual, or about the same?

For the ability to see items without doors, respond whether you, as the researcher can see items (including those behind glass doors) without having to use a stool.

For the ability of a child to retrieve items, make a decision based on whether you believe a child of that age could reach the item, with or without the use of a stool.

Fresh fruit

Would you say that the amount of fresh fruit you currently have in your home is more than usual, less than usual, or about the same? More than usual / Less than usual / The same

Fruit in View: yes / no

*Reference Question: Without opening any doors (including doors to your garage, refrigerator or pantry doors), would you be able to see **fresh fruit** in your home now; displayed out in the open?*

Cans / jars of fruit

Would you say that the amount of **canned or jarred fruit** you currently have in your home is more than usual, less than usual, or about the same? More than usual / Less than usual / The same

Dried fruit

Would you say that the amount of **dried fruit** you currently have in your home is more than usual, less than usual, or about the same? More than usual / Less than usual / The same

Frozen fruit

Would you say that the amount of **frozen fruit** you currently have in your home is more than usual, less than usual, or about the same? More than usual / Less than usual / The same

Fresh vegetables

--

Mark the responses in the box below. Make a mark for each cup in the left column. You will need to prompt participants to let you know how much of each vegetable they have. **FRESH VEGETABLES INCLUDE POTATOES AND ONIONS, BUT NOT GARLIC.**

Would you say that the amount of **fresh vegetables** you currently have in your home is more than usual, less than usual, or about the same? More than usual / Less than usual / The same

Vegetables Ready to Serve: yes / no

*Reference Question: Do you have any ready to eat **fresh vegetables** on a shelf in the refrigerator or on the kitchen counter now? These include baby carrots, cherry tomatoes, or vegetables that you have sliced to make them ready to eat.*

Cans of vegetables

Would you say that the amount of **canned vegetables** you currently have in your home is more than usual, less than usual, or about the same? More than usual / Less than usual / The same

Frozen vegetables

Would you say that the amount of **frozen vegetables** you currently have in your home is more than usual, less than usual, or about the same? More than usual / Less than usual / The same

Savory/salty snacks

Would you say that the amount of **savory snacks** you currently have in your home is more than usual, less than usual, or about the same? More than usual / Less than usual / The same

Savory Retrievable: yes / no

*Reference Question: Would it be possible for your child to and get any **salty snacks** on their own, without your help?*

Sweet snacks

Would you say that the amount of **sweet snacks** you currently have in your home is more than usual, less than usual, or about the same? More than usual / Less than usual / The same

Sweet Retrievable: yes / no

*Reference Question: Would it be possible for your child to and get any **sweet snacks** on their own, without your help?*

Candy (hard and chocolate)

*Would you say that the amount of **candy** you currently have in your home is more than usual, less than usual, or about the same?* More than usual / Less than usual / The same

Candy Retrievable: yes / no

*Reference Question: Would it be possible for your child to and get any **candy** on their own, without your help?*

Soda (not diet)

Would you say that the amount of **soda** you currently have in your home is more than usual, less than usual, or about the same? More than usual
/ Less than usual / The same

Soda Retrievable: yes / no

*Reference Question: Would it be possible for <child's name> to and get **soda** on their own, without your help?*

EATING BEHAVIORS

Presence of a dining table: Yes / no

Usability of dining table: very usable / somewhat useable / heavily cluttered but usable / heavily cluttered and not usable

Adequate counter space to prepare food on: yes / no

How many days since you last shopped for food:

Was the last trip big or small? big / small

PLAY

Presence of a yard that a child can play in? yes / no

Yard size is: small / medium / large

Does yard appear to be shared with other homes? yes / no / don't know

Presence of any usable play equipment (e.g., swings, slides, climbing frames):
yes / no

Presence of a useable tricycle, bike, scooter or wheeled toy: yes / no

Adequate room to play actively indoors:

- a) strongly disagree
- b) somewhat disagree
- c) somewhat agree
- d) strongly agree

MEDIA USE

Number of TVs in the home (include all rooms): 0 / 1 / 2 / 3 / 4 / >4

Ask participant to show you each room and indicate if the TV is usable.

Presence of cable or satellite: yes / no

Ask participant to show you cable box or satellite dish

Number of VCR or DVD players in the home: 0 / 1 / 2 / 3 / 4 / >4

Ask participant to show you each one (including those within computers) and say whether each TV is usable.

Number of children's DVDs or video tapes: 0 / 1-4 / 5-10 / 10-25 / >25

Ask participant to point out ones that are not watched by reference child.

Presence of TV in child's bedroom? yes / no

Include those in shared bedroom.

Presence of working TV that can be viewed from dining room: yes / no

Number of computers or laptops in the home (include all rooms): 0 / 1 / 2 / 3 / 4 / >4

Ask participant to show you each room and say whether each one is usable. Do not include laptops which are not in the home (e.g. if participant says one has been taken to work for the day).

Presence of computer or laptop in child's bedroom? yes / no

Include those in shared bedroom.

Number of game consoles in the home (include all rooms): 0 / 1 / 2 / 3 / 4 / >4

Includes X-Box and Playstation. Ask participant to show you each room and say whether each one is usable.

Presence of games console in child's bedroom: yes / no

Include those in shared bedroom.

FFQs and ACTIVITY MONITOR

Provide participant with 2 FFQ's to be completed within 1 week (one for themselves and one for their child).

Re-schedule a convenient time to collect the FFQ's and monitors for participants doing only 1 visit.

For those with 2 visits, inform the participant that they will be contacted within the next 14 days for their next telephone interview and that you will collect the FFQ's and monitor in the following home visit.

Thank the participant for their time.

End time:

APPENDIX C
FTH SAMPLE NEWSLETTER



FAMILY TIES
TO HEALTH

Newsletter 1

FAMILY NAME

RESOURCES

For more information visit:

<http://www.webmd.com/diet/healthy-eating/portion-size-plate>
www.fda.gov/oc/ohrt/ohrt.html
www.healthykids.org

INSIDE THIS ISSUE:

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Tips for Policy Makers 2

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Reaper: Sweet 'n' Hot Green Beans and Carrots 3

Feedback based on: Self-Assessment 4

Good Eating 4

Welcome

Congratulations you have taken the first step toward building a healthier home environment for your family. Based on your self-assessment and our first phone call, you selected to work on availability of vegetables to help your family follow a healthier diet.

Healthy eating is not only important for weight control, but it is linked to better behavior and academic performance in kids; therefore it is important to provide an environment that supports healthy eating. Parents that provide healthy foods in a supporting environment will be the most successful in

increasing healthy life-long eating habits for their children. After all, you want your family to have energy, be healthy and stay well!



Food Availability in Your Home

Eating Healthy fits a Budget

Healthy eating does not have to be expensive. Follow these tips to leave a little extra money in your wallet:

1. Buy produce that is in season and visit your local farmers' market. When your favorite produce goes out of season consider frozen or canned fruit and vegetables.
2. Shop with a list to reduce impulse purchases.
3. Compare prices between stores and brands. Don't rule out the generic brands.
4. Buy what is on sale. Before going to the grocery store look at the sale flyers or online and plan your menu around the weekly specials.
5. Use coupons to buy items that you normally buy. This can save a lot of money especially if your grocery store doubles or triples your coupons.
6. Make a little extra when preparing dinner, so you have leftovers for later in the week.
7. Make some meals vegetarian such as vegetable lasagna or black bean tacos. They are very satisfying, high in protein and much less of a cost.
8. Try cutting back on a few unnecessary items such as chips, soda, cookies, ice cream, etc.
9. Watch out for flashy packaging, you are probably paying more for the container than the food itself.
10. Try not to shop when you are hungry, you often buy more than you need.
11. When you buy vegetables such as bring them home, cut them up and put them in baggies or Tupperware right away, this way they'll get eaten and won't go to waste.



Be a Positive Role Model

- You can tell your child over and over what is right and what is wrong, what to do and what not to do, but the lessons that really stick are the ones you don't know you're teaching.
- Your child is watching and learning from you all the time. Young children want to be just like their parents, so they imitate the behaviors they see their parents doing.
- As children get older, they continue to want their parents' approval, so they

will notice the things that are important to their parents and adopt the same priorities.

- The best way to teach your children healthy eating habits is to keep healthy habits you want.
- Here are some healthy habits you can try to model for your children:
 - Giving new veggies a try
 - Even if the foods are new to you, try a little, your kids will want to do it too
 - Having Healthy Attitudes about food

Putting it into practice

- Think about your current eating habits and attitudes you have and what they might be teaching your child.
- Is there an area where you might need to think about being a better role model?
- Pick one or two areas and make an effort to demonstrate healthy eating and food attitudes to your child.

Failure is success if we learn from it.

~Malcolm Forbes

Tips for Picky Eaters

~Don't force your child to eat or appear concerned about what gets eaten

~Provide non-calorie beverages such as water with meals so your child does not fill up on liquids

~Be persistent! It may take 15 or more exposures before a child accepts a new food.

~Set a good ex-

ample! Eat the foods you want your child to eat.

~Involve your child at the grocery store and allow them to pick out healthy foods (fruits, vegetables) and encourage them to find something new.

~Introduce new foods with familiar favorites.

~Eliminate distractions

such as TV, toys and reading materials while eating.

~Maintain a routine with meals; children feel more comfortable with routines



Newsletter 1

Meal Planning Made Simple

Helpful Hints as You Get Started

Stay flexible: Even your "final" menu plan is not written in stone. If you have a bad day at work or you are not feeling well, make adjustments. Cut yourself a break and make one of the easy meals, saving a more complicated one for later in the week. You can also build flexibility into your plan by incorporating a "Cook's Choice" dinner the night before grocery shopping, where you decide, based on what's available in the pantry, fridge, or freezer, what's on the menu. This way you can make use of those leftover ingredients.

Make it a habit: Get into the habit of making a meal plan before your big weekly shopping trip. Plan some time for this task into your week.

Get your kids involved: One way is to ask them for dinner ideas. This way you don't have to keep coming up with menu ideas, and they get to plan for their favorite meal one night the following week. However, you don't want them asking for pizza every week, so provide some guidance. If chicken is on sale, ask them what kind of chicken they would like to have for dinner. They can also help make the shopping list. As you review recipes, have kids check the pantry and freezer for ingredients to

see if anything needs to be added to your list. Getting kids involved in the planning can ultimately result in time savings and easier meal preparation.

Don't reinvent the wheel: Save your meal plans and shopping lists. After a few weeks, you'll have a re-



source you can refer back to. If chicken is on sale this week, pull one of the meal plans - and the shopping list that goes with it - that will allow you to make use of this bargain.

Easy, Healthy Recipe

Sweet 'n' Hot Green Beans and Carrots

Ingredients

- ½ cup Splenda
- ½ cup white wine vinegar
- ¼- ½ tsp dried, crushed red pepper
- 1 garlic clove, minced
- ½ pound fresh green beans, trimmed
- ½ pound carrots, cut into 4 inch x ½ inch strips

Directions

- Whisk together Splenda and vinegar until Splenda dissolves.
- Stir in red-pepper and garlic, cover, and let stand 4 hours.
- Cook green beans and carrots in boiling water 1 minute, drain.
- Plunge into ice water to stop cooking process, drain.

- Pour vinegar mixture over vegetables, tossing to coat.
- Let stand an hour before serving.



Individual Feedback based on Self-Assessment

Your Response	Best Practice	Recommendation
What parent responded to a question:	What we consider to be best practice	How the parent can change to make their home closer to best practice
Veggies are some times stored cleaned and prepared so they are ready to be served	We encourage you to always have vegetables cleaned and prepared	When you buy veggies such as celery and bell peppers and bring them home, immediately cut them up and put them in Tupperware- they will be easier to incorporate into snacks
You currently offer your child vegetables everyday	Offering your child vegetables 3 or more times a day may help increase the variety she is eating	Try including at least one type of vegetable during snack time; she might be more likely to try something newer if she is really hungry and that is what you offer
Currently, when you are in front of Stephanie, you try to eat healthy some of the time	Eating healthy and trying new foods in front of Stephanie will set an example for her to follow	Even if there are new foods that you think you may not like, it is important for you to show Stephanie that you can try, and even enjoy, new foods

Goal Setting

Instructions: Please describe the area you would like to improve upon over the next 4 months for the project.



Goal	Actions to reach goal	Persons involved	Target Date for Completion

APPENDIX D

FTH HEALTHY HOME CHECKLIST



Parent's Name _____ Today's Date: _____

Please read each statement or question carefully and check the response that best fits your family. Your honest responses will help you to build a healthy nutrition environment in your home.

Fruits and Vegetables

1. Is **fruit** in your home stored so that it can be easily seen (either on a shelf in the refrigerator or out on the counter)?

No
☐

Sometimes
☐

All the time
☐

2. Is **fruit** in your home stored cleaned and prepared so it is ready to be served?

No
☐

Sometimes
☐

All the time
☐

3. How is most of the **fruit** in your home stored right now?

Canned or jared
with added sugar
☐

Dried
☐

Canned or jared
without added
sugar
☐

Fresh or Frozen
☐

4. How many types of **fruit** (not juice) are available in your home right now? (For example if you have apple and grape juice, you would answer "2 to 4")

Less than 2
☐

2 to 4
☐

4 to 6
☐

more than 6
☐

5. How often do you offer your children **fruit** (not including juice)?

Several times a
month
☐

Several times a
week
☐

Every Day
☐

2 or more times
per day
☐

6. Are **vegetables** in your home stored so that it can be easily seen (either on a shelf in the refrigerator or out on the counter)?

Never/Rarely
☐

Sometimes
☐

All the time
☐

7. Are **vegetables** in your home stored cleaned and prepared so they are ready to be served?

Never/Rarely
☐

Sometimes
☐

All the time
☐

8. How are most of the **vegetables** in your home stored right now?

Canned or in jars with
added salt
☐

Canned or in jars
without added
salt
☐

Fresh or Frozen
☐

9. How many types of **vegetables** (not including French fries or other fried potatoes) are available in your home right now? (For example, if you have carrots, lettuce, bell peppers, celery, and cucumbers, you would answer "4")

Less than 4
☐

4
☐

5
☐

more than 6
☐

10. Of the vegetables types counted above, how many are dark green, red, orange or yellow vegetables (peppers, broccoli, carrots, cooked greens, etc.)?

Less than 3
☐

3 to 4
☐

5 to 6
☐

more than 6
☐

11. How often do you offer your children **vegetables** (not including French fries or other fried potatoes)?

Several times a
week
☐

Every Day
☐

2 times per day
☐

3 or more times
per day
☐

12. How often do you offer your children dark green, red, orange or yellow vegetables (peppers, broccoli, carrots, cooked greens, etc.)?

Several times a
month
☐

Several times a
week
☐

Every Day
☐

2 or more times
per day
☐

13. Which best describes the availability of **sweet** snacks (cookies, candy, ice cream, etc.) in your home?

Openly
available at
almost all times

☐

Available only
during meals,
snacks, and
special
occasions

☐

Available only
during snacks
and special
occasions

☐

Available only
during special
occasions, not
everyday

☐

14. Where are **sweet** snacks located in your home? (select all that apply)

On the counters

☐

On child level
shelves

☐

Out of reach of
young
children

☐

In a cupboard
or pantry and
out of view

☐

15. How many different types of **sweet** snacks do you have in your home right now? (For example if you have ice cream, oreos, chocolate chip cookies, and cup cakes, you would answer "3 to 5")

More than 5

☐

3 to 5

☐

1 to 2

☐

none

☐

16. Which best describes the availability of **salty** snacks (chips, Doritos, cheese doodles, etc.) in your home?

Openly
available at
almost all times

☐

Available only
during meals,
snacks, and
special
occasions

☐

Available only
during snacks
and special
occasions

☐

Available only
during special
occasions, not
everyday

☐

17. Where are **salty** snacks located in your home?

On the counters

☐

On child level
shelves

☐

Out of reach of
young
children

☐

In a cupboard
or pantry and
out of view

☐

18. How many different types) of **salty** snacks do you have in your home right now? (For example if you have pretzels, Doritos, potato chips, and crackers, you would answer "3 to 5")

More than 5
☐

3 to 5
☐

1 to 2
☐

none
☐

19. How are **sodas (regular AND diet) or other sweet drinks** (fruit punch, sweet-tea, Kool Aid, etc.) available in your home?

Openly
available at
almost all times

☐

Available only
during meals,
snacks, and
special
occasions

☐

Available only
during snacks
and special
occasions

☐

Available only
during special
occasions, not
everyday

☐

20. How many different types of **soda (regular AND diet) or other sweet drinks** do you have in your home right now?

More than 5
☐

3 to 5
☐

1 to 2
☐

none
☐

21. Most of the **milk** available in your home right now is...

No milk
available

☐

Whole Milk

☐

2% Milk

☐

1% low-fat or
Skim Milk

☐

22. What drink is usually consumed by your children during meals and snacks?

Soda or
other sweet
drink

☐

100% fruit
juice

☐

2% milk or
whole milk

☐

1% or skim milk

☐

Water

☐

23. How often do you offer your children 100% fruit juice to drink?

More than once
per day
☐

Every Day
☐

Several times a
week
☐

Rarely or never
☐

24. Please rank the following drinks 1 to 5 based how often your child consumes them during meals or snacks (1 = **most often**, 5 = **least often**)

Soda or
other
sweet
drink

100% fruit
juice

2% or whole
milk

1% or skim milk

water

For each item choose the response which best describes your household

	Rarely or never	Several times a month	Several times a week	Every Day
25. How often do you offer your children a new food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. How often do you offer your children a less favorite food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. How often does your child participate in the preparation of family meals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. Which best describes how you provide meals and snacks?

Children are free
to eat at any time
and anyplace
☐

Children eat at
scheduled times and
places without
flexibility
☐

Children eat at
scheduled times
and places with
flexibility
☐

29. When are children allowed to eat in front of the television?

Children may
eat meals and
snacks in front of
the TV
☐

Children may
eat snacks in
front of the TV
☐

Children may
eat meals in
front of the TV
☐

Children may
never eat in
front of the TV
☐

For each item choose the response which best describes your household

	Rarely or never	Some of the time	Most of the time	All of the time
30. Do you avoid eating snack foods, sugar drinks or sweets in front of your children?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31. When eating in front of your children, do you try to eat healthy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32. Is your child a picky eater?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

33. How many times do you serve a food your child rejects before you stop offering it?

Once
☐

1 to 5
☐

6 to 9
☐

10 or more
☐

In a normal week, how many days do you...	0	1	2	3	4	5	6	7
34.... prepare a special food for your child because (s)he doesn't like what the rest of the family is eating?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35....eat out for dinner?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36....prepare dinner at home?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37....and your child eat dinner together? (at least one adult present)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38....do you sit with your child when (s)he is eating breakfast?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39....suggest that your child have a fruit or vegetable for a snack?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40.... eat dinner while watching TV?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FOOD AVAILABILITY

Have these foods been present to your child in your home within the last 7 days? Please check if yes, if not, please leave that line blank.

The items can be fresh, frozen, canned or dried.

Juice		Vegetables	
Grape juice (100% juice)	<input type="checkbox"/>	Carrots	<input type="checkbox"/>
Apple juice	<input type="checkbox"/>	Celery	<input type="checkbox"/>
Orange juice	<input type="checkbox"/>	Greens	<input type="checkbox"/>
Fruit		Spinach	<input type="checkbox"/>
Peaches	<input type="checkbox"/>	French fries (Including Tater Tots)	<input type="checkbox"/>
Bananas	<input type="checkbox"/>	Potato salad	<input type="checkbox"/>
Apples	<input type="checkbox"/>	Mashed potatoes	<input type="checkbox"/>
Cantaloupes	<input type="checkbox"/>	Other potatoes	<input type="checkbox"/>
Grapes	<input type="checkbox"/>	Corn	<input type="checkbox"/>
Oranges	<input type="checkbox"/>	Green peas	<input type="checkbox"/>
Pears	<input type="checkbox"/>	Tomatoes	<input type="checkbox"/>
Plums	<input type="checkbox"/>	Broccoli	<input type="checkbox"/>
Kiwi	<input type="checkbox"/>	Lettuce	<input type="checkbox"/>
Fruit salad	<input type="checkbox"/>	Green beans	<input type="checkbox"/>
Applesauce	<input type="checkbox"/>	Cole slaw	<input type="checkbox"/>
Dried fruit	<input type="checkbox"/>	Other cabbage	<input type="checkbox"/>
Watermelon	<input type="checkbox"/>	Cooked beans	<input type="checkbox"/>
	<input type="checkbox"/>	Refried beans	<input type="checkbox"/>

Thanks for completing this home checklist! Your honest answers will allow you to choose areas in which you would like to make improvements. A home educator will be contacting you soon to arrange this visit. If you have any questions about this checklist or about any other parts of the project please call 919-843-0603.

APPENDIX E
FTH PARENTING SURVEY

Parent's Name _____

Child's Name _____

Child's Date of Birth _____ Today's Date: _____

As the **primary caregiver** to your child, please take a few moments to complete this survey. If you have more than one child, please think about your **2-5 year old** participating in this project when responding. All answers are confidential and used only for research purposes. We greatly appreciate your responses!!

The next set of items asks about your confidence in certain situations. Respond by marking how much you agree or disagree with each statement."

I feel confident that I can...	strongly agree	somewhat agree	somewhat disagree	strongly disagree
1. ...prepare a healthy dinner for my child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. ... get my family to eat meals together as a family.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. ... get my child to eat multiple servings of vegetables (not potatoes) every day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. ...get my child to eat a variety of vegetables (e.g., green, orange, yellow, or red) every week.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. ... get my child to eat multiple servings of whole fruit every day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. ... get my child to drink mostly water or low-fat milk.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. ... provide healthy snacks for my child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. ...get my child to try foods that are new to him/her.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. ... eat healthy foods in front of my child, even if they are not my favorite	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. ... role model healthy eating for my child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. ... encourage my child to eat healthy foods before unhealthy ones	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. ... keep a variety of healthy foods available in my home.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. ... teach my child that it is important to eat healthy foods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate how often you do the following:

	Often	Some times	Rarely	Never
14. I show my child that I enjoy fruits and vegetables, just so that (s)he is more likely to eat them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I try new foods so that my child will try them too				
16. I tell my child that vegetables taste good.				
17. I tell my child that eating too many sweets is unhealthy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. I tell my child that drinking too many soft drinks is unhealthy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. I tell my child that some foods are good and other foods are bad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. I encourage my child to see trying new foods as an adventure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. I encourage my child to try different types of fruits and vegetables by providing new foods for family meals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. I let my child choose what (s)he wants for dinner or choose from a few suggestions, when I make a meal.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. I tell my child (s)he won't get dessert if (s)he doesn't clean his/her plate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. I let my child decide when(s)he has had enough to eat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate how often you do the following

	All of the time	Most of the time	Some of the time	Rarely or never
25. How often do you ask your child to eat everything on their plate?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. When your child requests seconds, how often do you help him/her determine if (s)he is still hungry before serving more food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. When your child eats less than half of a meal or snack, how often do you help him/her decide if (s)he is full before removing his/her plate or excusing him/her from the meal?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	All of the time	Most of the time	Some of the time	Rarely or never
28. Do you use food to control behavior (reward desired behavior or withhold as punishment)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29. I tell my child "no dessert" if (s)he doesn't behave well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30. I praise my child for eating fruits and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31. Do you encourage your child to help you shop for groceries by making a list and providing tasks for them at the store?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32. Do you talk with your child about trying and enjoying healthy foods?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33. During meals and snacks, how often do you allow your child to fix his/her own plate (with guidance)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate how often you experience the following

	Never	Rarely	Some times	Often	Always
34. Your child is a picky eater.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35. It is hard to get your child to eat new foods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36. You have to make special meals for your child because (s)he is a picky eater.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37. It is a struggle to get your child to eat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38. Your child has a poor appetite.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39. You get upset if your child does not eat enough.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40. You model healthy eating for your child by eating healthy foods yourself.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
41. You try to eat healthy foods in front of your child, even if they are not your favorite.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42. You try to show enthusiasm about eating healthy foods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43. You show you child how much you enjoy eating healthy foods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

44. My child is free to take foods from the refrigerator or pantry
☐ All of the time ☐ Most of the time ☐ Some of the time ☐ Rarely or never

45. I have so little free time, that I worry about convenience more than whether foods are healthy
☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree

46. How much influence do you think you can have on your child's weight?
☐ a lot ☐ some ☐ a little ☐ none

Please provide us with a little information about you. All answers are confidential (no names required) and used only for research purposes

47. What is your age? _____years

48. What is your role in the home?

- ☐ Mother
- ☐ Father
- ☐ Grandmother
- ☐ Grandfather
- ☐ Male Guardian
- ☐ Female Guardian
- ☐ Other [please describe] _____

49. What is your race/ethnicity?

- ☐ Black or African American (Non-Hispanic)
- ☐ White or Caucasian (Non-Hispanic)
- ☐ Hispanic or Latino/a
- ☐ Asian American/Pacific Islander
- ☐ Native American
- ☐ Mixed race
- ☐ Other [please describe] _____

50. What is your current marital status?

- ☐ Married or living with a partner
- ☐ Single
- ☐ Divorced or Separated
- ☐ Widowed

51. What is the highest grade or year of school you have completed?

- ☐ Less than high school
- ☐ Some high school
- ☐ High school graduate
- ☐ Some college or technical school
- ☐ College graduate
- ☐ Masters/Doctoral degree

52. What is your household's total annual income?

- ☐ Less than \$10,000
- ☐ \$10,000 - \$19,999
- ☐ \$20,000 - \$29,999
- ☐ \$30,000 - \$44,999
- ☐ \$45,000 - \$49,999
- ☐ \$50,000 - \$59,999
- ☐ \$60,000 - \$69,999
- ☐ \$70,000 or higher

53. What is your height ____ft ____in?

54. What is your weight ____lbs?

55. How many adults (18 and over) are currently living in your house?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 or more

56. On average, how many days per week does your 2-5 year old spend in child care (care outside the home)?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ My child does not attend child care

57. On average, how many hours per day does your 2-5 year old child spend in child care (care outside the home)? _____hours/day

APPENDIX F

FTH PROGRAM EVALUATION



Parent's Name _____ Today's Date: _____

We want to make this program better, so we are looking for your feedback. As the **primary caregiver** to your child, please take a few moments to complete this survey. Everything you say will be kept confidential (no names required) and used only for research purposes. Completion of this survey is completely voluntary and you may chose not to answer certain questions if you feel uncomfortable. **We need and greatly appreciate your feedback!**

Part 1. Newsletters

1. Please rate the newsletters on a 5-point scale, where 5 means **Excellent** and 1 means **Poor**.

Score

Why did you give this rating?

2. What part or parts of the newsletter did you find **most** helpful?
3. What part or parts of the newsletters did you find **least** helpful?
4. Do you remember any strategies that were presented in the newsletters?

Yes

No

5. Of the strategies, which did you feel were the **most** helpful and relevant for you?
6. Of the strategies, which did you feel were the **least** helpful and relevant for you?

7. How confident are you that you can put the strategies you learned about into practice in your home?
- ☐ I am confident I can put them into practice
 - ☐ I am reasonably confident I can put them into practice
 - ☐ I don't know whether or not I will be able to put them into practice
 - ☐ I am only slightly confident I can put them into practice
 - ☐ I am confident I can not put them into practice
8. Are there any topics that you wish would have been included that were not?
9. How could the newsletters be improved?

Part 2. Phone Calls

10. Please rate the phone calls on a 5-point scale, where 5 means **Excellent** and 1 means **Poor**.

Score

Why did you give this rating?

11. How helpful were the phone calls as a component of the intervention?
- ☐ Very helpful
 - ☐ Somewhat helpful
 - ☐ Only slightly helpful
 - ☐ Not at all helpful
 - ☐ No opinion

Part 3. Self-Assessment

12. Please rate the items in the self-assessment on a 5-point scale, where 5 means **Excellent** and 1 means **Poor**.

Score

Why did you give this rating?

13. Did it help you recognize areas for improvement in your home?

14. Were there items you thought were unnecessary? Why?

15. Were there you would have like to have included?

Any additional comments?

--

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