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Associations Between Child Feeding Practices and Child Dietary Intake Among Families in Low-Income, Rural Communities in Appalachian East Tennessee

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To the Graduate Council:

I am submitting herewith a thesis written by Mikaela McIver entitled "Associations Between Child Feeding Practices and Child Dietary Intake Among Families in Low-Income, Rural Communities in Appalachian East Tennessee." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

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Associations Between Child Feeding Practices and Child Dietary Intake Among Families in Low-Income, Rural Communities in Appalachian East Tennessee

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ABSTRACT

***Objective*:** Low-income children and children living in rural areas in the United States have low adherence to federal dietary guidelines and have a higher risk of obesity than their higher income, non-rural counterparts. This study aimed to examine associations between child feeding practices (caregiver modeling, caregiver dietary intake, and home food availability) with child dietary intakes of fruit consumption, vegetable consumption, and high-sugar/high-fat snack food consumption (e.g. candy, doughnuts, cookies, and ice cream) among families with young children in low-income, rural areas in Appalachian East Tennessee.

***Design*:** Using cross-sectional data, descriptive statistics and multiple linear regression analyses were run using SPSS software version 25.

Setting: Low-income, rural communities in Appalachian, East Tennessee.

Subjects: Participants (n=178) were caregivers of children 2-10 years old who regularly shop at convenience stores. Caregiver participants identified as predominantly white (97%), non-Hispanic (99%) females (78%) with a mean age of 35 years (±Standard Deviation (SD)=9.8).

***Results*:** After adjusting for potential confounders of child age, gender, and household income, results indicated that higher use of caregiver modeling positively predicted child vegetable consumption (Beta=1.1; SE=0.51; P<0.05). Higher caregiver dietary intake of fruits and vegetables positively predicted child fruit consumption (Beta=0.29; SE=0.01; P<0.05) and vegetable consumption (Beta=1.6; SE=0.28; P<0.01), respectively. Higher home availability of healthier foods positively predicted child fruit consumption (Beta =0.06; SE=0.02; P<0.01). Similarly, Higher home availability of less healthy foods positively predicted child consumption of high-sugar/high-fat snack foods (Beta=0.61; SE=0.20; P<0.05).

***Conclusion*:** The use of health-promotive child feeding practices, such as caregiver modeling, healthy caregiver dietary intake, and maintaining healthful home food availability may promote healthier child dietary intake in families with young children in low-income, rural, Appalachian areas. Practitioners who work with low-income, rural, Appalachian families should consider working with caregivers to incorporate the use of these practices as an approach to potentially improve child diet quality, prevent obesity, and reduce nutrition-related chronic disease risk.

***Keywords*: Rural, Appalachia, caregiver modeling, caregiver dietary intake, home food availability, child dietary intake.**

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CHAPTER I: LITERATURE REVIEW

Introduction and Background

The majority of children in the United States fail to meet federal dietary recommendations.[1] Most children do not consume enough dairy, whole grains, fruit, vegetables, or fish and consume excess energy from solid fats and added sugars.[1,2] In fact, data from the National Health and Nutrition Examination Survey (NHANES) showed that grain desserts and sugar sweetened beverages (SSB) were among the most prevalent sources of energy among 2-18 year olds.[3] Furthermore, 60% and 93% of children fall short of recommendations for fruits and vegetables, respectively,[4] and few children meet even half of the recommended intake for total vegetables per 1,000 calories.[2] While low adherence to federal dietary recommendations is problematic across all age groups, diet quality has been found to decrease as children age.[2] To prevent excessive weight gain and reduce the risk of chronic disease, it is recommended that children consume a diet rich in fruits and vegetables and limit consumption of added sugars.[5] Therefore, children's poor adherence to federal dietary recommendations is a leading public health concern in the United States as unhealthy eating patterns are major contributors to excessive weight gain and may be predictive of disease risk and overall health status.[6] Promoting healthy eating patterns during early childhood is an important public health priority as weight status and eating patterns established in childhood are linked to obesity and nutrition-related chronic disease risk later in life.[7]

Unhealthy eating patterns are of concern for children in the United States as the prevalence of childhood obesity has increased in recent decades.[8] Previous reports indicated that childhood obesity rates had begun to level off and even reported decreases in prevalence among certain groups, including children aged 2-5 years.[9] However, recent reports using data from the 2015-2016 NHANES show an upward trend in childhood obesity among children aged 2-19

years, with a prevalence of 18.5%.[10] Additionally, data from the NHANES survey show a sharp increase in obesity prevalence among children aged 2-5 years from 9.3% in the 2013-2014 cycle to 13.7% in 2015-2016.[10]

Unhealthy eating patterns can contribute to childhood obesity and an increased risk of many preventable health problems. These include complications from a range of health conditions including hypertension, dyslipidemia, insulin resistance or diabetes, fatty liver disease, and psychosocial complications such as depression, loss of control in eating, and impaired peer-relationships.[11–13] In adulthood, common comorbidities with overweight or obesity include hypertension, dyslipidemia, type two diabetes, coronary heart disease, stroke, gall bladder disease, osteoarthritis, sleep apnea, and some cancers.[14–16] Complications from these comorbidities can reduce lifespan and overall quality of life and are a major contributor to otherwise preventable death.[16] Therefore, it is essential to identify effective methods for promoting healthy eating patterns and preventing obesity during childhood. Because poor diet quality poses significant health concerns, such as obesity and chronic disease risk, and children are not adhering to federal dietary recommendations, further study of potential methods to improve child diet quality are needed.

Diet-Related Health Disparities in the United States

While poor adherence to federal dietary recommendations are problematic among all children, certain population groups have lower adherence than others. Research indicates that adherence to fruit and vegetable recommendations is higher among some populations, such as higher-income groups, while Americans consume excess calories from added sugars, regardless of income.[17] Furthermore, certain ethnic, racial, geographic, and socioeconomic groups are disproportionately impacted by obesity, suggesting differences in diet quality among these

groups. Health disparities occur when there are variations in the rate of disease and/or disability between groups defined by factors such as race/ethnicity, socioeconomic status (SES), geographic location, age, gender, disability status, and/or sexual orientation.[18] Disparities in childhood obesity and diet-related chronic disease exist in the United States and are linked to multiple factors, including SES, income, and geographic location.[18]

Socioeconomic Status and Nutritional Health Factors

Disparities related to SES impact child diet quality and the distribution of childhood obesity in the US population. SES is defined as a combination of factors such as income, education level, and employment.[21] Research indicates a higher prevalence of obesity,[22,23] and 3.4-4.3 times higher odds of obesity among children from low-income communities in the United States.[24] Children from low-income communities also tend to have poorer diet quality, including lower adherence to fruit and vegetable recommendations and higher consumption of added sugars, fried foods, and poorer physical activity behaviors, such as higher TV/video viewing time and lower levels of moderate/vigorous exercise. Alternatively, intake of fruits and vegetables has been found to be higher among higher-income populations.[17] At the household level, the United States Department of Agriculture (USDA) reports that in households with at least one obese child, parents are more likely to be unmarried, have lower education levels, be financially constrained, and obese themselves.[20] These nutritional health factors are related to SES and can influence overall child diet quality and may contribute to a higher prevalence of obesity seen in low-income communities.[17,22]

Rural Residency and Child Nutritional Health

Beyond SES, research has documented poorer diet quality[25] and consistently higher rates of childhood obesity[26–31] in rural areas of the United States. The USDA defines a rural area as

any non-urban or non-highly rural area. An urban area is classified as any block or block group having a population density of at least 1,000 people per square mile and a highly rural area is classified as having < 7 civilians per square mile.[32] According to national data, rural children consume an average of 90 more kilocalories per day and are less likely to consume any fruit or meet the daily recommendation for fruit when compared to urban children.[25] In addition,, more children are obese in rural communities than in urban communities[33] and rural residency is considered to be an important risk factor for the development of childhood obesity.[20,34–37] Studies have found that rural youth have 26-30% higher odds of obesity than urban youth, even after controlling for sociodemographic factors, health, diet, and exercise behaviors. [25,36] The rural food environment may play a role in the higher odds of obesity that occur among rural youth as low-income, rural and areas tend to have increased access to corner and convenience stores.[38] These stores tend to stock more calorie-dense, nutrient-poor foods and drinks than grocery stores.[39] Furthermore, it is estimated that almost half of the US population shops at convenience stores one time per day or more.[40] Together, these urban-rural differences, suggest that rural communities are at a high risk for poor diet quality and diet-related health disparities, and therefore should be considered as an important sub-population in future research.

Rural, Appalachian East Tennessee

The Appalachian region, which is 42% rural, experiences higher than average rates of adult obesity and diet-related chronic disease, such as diabetes and cardiovascular disease.[41] The prevalence of child obesity is also higher than average in rural areas in the United States.[41] However, there is currently no data to indicate whether these levels are higher among Appalachian, rural children compared to rural, non-Appalachian children. During the 2016-2017 academic year, 22.4% of school aged children enrolled in public schools in Tennessee were

obese and the prevalence of obesity among rural students was 23.6% compared to 19.8% in metropolitan students.[42] These differences are consistent with reports of urban-rural differences in obesity across the United States.[36]

Historically, the Appalachian region has been encumbered by high rates of poverty. Despite recent progress, the region as a whole continues to experience higher than national averages for both poverty and unemployment rates, thus widening the gap in health disparities between Appalachian communities and other regions of the United States.[43] The combined burden of high poverty and obesity rates, coupled with limited healthy food access warrant the development of interventions focused on promoting healthier eating patterns among the highly vulnerable populations of rural, Appalachian counties in East Tennessee.

Child Feeding Practices and Child Diet Quality

Child feeding practices and the home food environment have the potential to contribute to the development of children's long-term eating habits, preferences, diet quality, and weight status.[44–47] Based on the use of these practices, parents and caregivers can influence their child's eating habits.[44,48–50] Current literature suggests that educating caregivers of young children about the use of child feeding practices may promote healthy eating and prevent unhealthy eating.[51–53] While a variety of child feeding practices exist in the literature, caregiver role modeling, home food availability, and caregiver dietary intake appear to be important predictors for child diet.[45] However, these practices are currently understudied in low-income, rural communities. Further examination of these child feeding practices in a rural population would provide a significant contribution to the literature surrounding child diet quality and obesity prevention. The current literature related to practices of caregiver role modeling and home food availability are discussed in more detail in the following sections.

Caregiver Role Modeling

Caregiver role modeling is rooted in Bandura's Social Learning Theory, which suggests that behaviors are learned by observing others.[54] Caregiver role modeling, referred to as modeling from here on, has been investigated in child obesity research for its potential role in influencing child diet quality. Researchers suggest that children's observations of others will influence their beliefs of what they should eat, when, and how much is appropriate.[55] Previous studies have defined modeling in two ways: 1) the frequency in which caregivers report modeling behaviors and the importance they place on modeling of healthy eating behaviors,[51,56–60] and 2) caregiver dietary intake of certain food items.[61,62] In both cases, modeling has been found to be positively associated with child dietary intake of fruits and vegetables, lower consumption of SSB, sweets, and snacks, and is inversely associated with child BMI z-score.[51,56–60,62,63]

The majority of studies of modeling have defined the construct as the frequency in which caregivers report modeling behaviors and the importance that they place on modeling healthy eating behaviors to their children. However, these studies have primarily been conducted in non-rural settings with ethnic minorities and in higher-income populations. For example, a 2014 cross sectional study of families in Minneapolis, Minnesota found that children aged 8-12 years were not only aware of their parents' eating behaviors, but children whose parents reported modeling the consumption of fruit as a snack were more likely to meet daily fruit and vegetable consumption recommendations. However, participants in this study were not from low-income or rural communities.[51] In addition, a 2014 study of primarily well-educated, mothers in the United Kingdom found that parent-reported modeling of unhealthy food consumption was associated with less healthy child food consumption, which led the study authors to conclude that

increasing mothers' awareness of food intake behaviors may be a beneficial strategy to improving child diet.[64] These findings are consistent with a 2017 study, which found that modeling of healthy eating behaviors was associated with lower consumption of sweets and snack foods.[60] A cross-sectional study conducted by Goldman and colleagues examined several elements of the family food environment specifically in low-income and ethnic minority families in New York and New Jersey.[57] Findings showed that parent-reported modeling was associated with higher fruit and vegetable consumption by preschoolers in this sample,[57] which is consistent with previous findings.[50,51,57–59,62,63] Although this study provides insight into the influence of modeling by low-income ethnic minority families, no studies to this date have examined this relationship among low-income, rural communities in Appalachia. It is important to note that most studies in this body of research have been completed among predominantly white, well-educated, and higher-income families, leading to conclusions that may lack generalizability to low-income, rural populations. Further study of this construct of modeling in low-income, rural communities is needed to determine if these relationships are consistent across socioeconomic and geographic groups.

To date, only one study of modeling has assessed the construct as caregiver dietary intake of certain food items. Loth and colleagues assessed the relationship between modeling and adolescents' food consumption in a diverse, non-rural sample of adolescent-caregiver dyads.[61] This study measured caregiver dietary intake of fruit, vegetables, sugar sweetened beverages, and fast-food as self-reported frequency of consumption. Caregiver modeling of healthier dietary intake patterns (higher fruit and vegetable intake, lower SSB and fast food intake) was found to be positively associated with adolescent consumption of fruits and vegetables and negatively associated with sugar sweetened beverage consumption.[61]

In addition, Østbye and colleagues conducted a child obesity prevention intervention that sought to utilize caregivers as change agents for child weight status. The intervention provided instruction on modeling healthy eating behaviors to caregivers of young children.[62] The results suggested that educating caregivers about the benefits of modeling significantly increased caregiver diet quality, which may have longer-term downstream effects on child diet quality as well.[62] Overall, findings from studies that assessed modeling as caregiver dietary intake are reflective of the greater findings in this body of literature. However, further study of this construct of modeling is needed as the current findings are not generalizable to low-income, rural communities.

Home Food Availability

Research suggests that parental control of the types of food available at home may influence child diet quality.[45] Child feeding researchers suggest that parents should be responsible for providing a selection of healthy foods and determining when to serve them to their children and that children should be allowed to choose which and how much food from the provided selection they will eat.[44,64] Because children's food preferences develop with multiple exposures to foods,[65] availability of healthier foods at home may play a powerful role in developing child preferences for healthier foods. Studies of home food availability in non-rural populations have linked the availability of healthy food at home to higher child consumption of fruits and vegetables[56,65,70] and lower consumption of less healthy foods.[61,66] Additionally, limiting the availability of less healthy food is associated with reduced consumption of less healthy food[67] and high availability of less healthy food may be inversely associated with fruit and vegetable consumption.[58] For example, a 2012 study examined home food availability among low-income and ethnic minority families.[57] Findings suggested that the availability of

healthy food at home was positively associated with higher child fruit and vegetable consumption,[57] which is consistent with previous findings. Additionally, a 2013 study among caregivers with low education levels from a metropolitan area in North Carolina found that child consumption of healthy foods was higher in households in which the availability of unhealthy foods was lower and availability of healthy food was higher.[67] However, studies of home food availability have examined this relationship primarily in samples of higher SES, higher-income, and generally well-educated families living in metropolitan areas.[50,57,58,61,66] Low-income populations living in rural areas tend to have limited economic resources[20,36] and often experience a less healthy community food environment,[68] both of which have potentially negative impacts on home food availability. Improving healthy home food availability may be an important strategy for preventing childhood obesity, but this has yet to be examined in low-income, rural communities. Thus, further study of the role of home food availability and its relation to child diet in a low-income, rural Appalachian population is warranted.

Gaps in the Literature and Specific Aims

The current literature indicates a need for further study of caregiver modeling, caregiver dietary intake, and home food availability among families in a low-income rural, Appalachian setting. Specifically, little is known regarding this population's use of caregiver modeling, caregiver dietary intake, and home food availability and how each of these factors relates to child consumption of fruit, vegetables, and high-sugar/high-fat snack foods (e.g. candy, doughnuts, cookies, ice cream). Childhood obesity rates in the United States continue to increase[10] and are higher in rural communities,[26–31] the Appalachian region,[41] and East Tennessee.[69] Additionally, rural communities experience a disproportionately higher risk of childhood obesity compared to urban populations.[36] Therefore, it is important to examine the use of these child feeding practices

to contribute to current knowledge regarding their potential use in efforts to improve child diet quality among low-income, rural communities. The aims of this study are:

1) To describe the use of modeling, caregiver dietary intake, and home food availability among families with young children in low-income, rural areas in Appalachian East Tennessee who shop at convenience stores one time per week or more.
2) To examine associations between modeling, caregiver dietary intake, and home food availability with child fruit consumption, child vegetable consumption, and child high-sugar/high-fat snack food consumption among families with young children in low-income, rural areas in Appalachian East Tennessee who shop at convenience stores one time per week or more.

Based on previous literature conducted in non-rural communities,[51,57,59,62,70,71] it is anticipated that parents and caregivers who report the use of modeling, have high fruit and vegetable consumption themselves, and have healthy foods available at home will report higher child intakes of fruit and vegetables and lower child consumption of high-sugar/high-fat snack foods. Because research of this type has not been completed in a low-income, rural setting in Appalachian East Tennessee, it is essential to identify the potential role of child feeding practices in promoting a healthy child diet. After identifying associations of these child feeding practices and child diet in a low-income rural, Appalachian setting, researchers may potentially target child feeding practices as a strategy to promote healthy eating in this population.

CHAPTER II: MANUSCRIPT

Introduction

Currently, few children in the United States meet federal dietary recommendations.[1] Sixty percent and 93% of children fall short of recommendations for fruits and vegetables, respectively.[4] The majority of children also consume excess energy from solid fat and added sugars.[1] Unhealthy eating patterns are a major contributor to excessive weight gain and may be predictive of disease risk and overall health status.[6] To prevent excessive weight gain and reduce the risk of chronic disease, it is recommended that children consume a diet rich in fruits and vegetables and limit consumption of added sugars and saturated fat.[5]

Children living in rural areas consume diets that are consistent with the national trends of inadequate fruit and vegetable intake and excessive intake of added sugars and solid fats.[33] Despite these similarities, the prevalence of obesity is higher among low-income[20] and rural populations.[36] Compared to urban children, children living in rural areas have been found to have 26% greater odds of obesity.[36] The Appalachian region, which has a higher than average rural population, and experiences rates of adult obesity and chronic disease, such as diabetes and cardiovascular disease, that exceed national averages, indicating that obesity rates may be higher among rural, Appalachian children as well.[41] The rural food environment may play a role in the observed higher odds of obesity among rural youth as low-income, rural and areas tend to have increased access to corner and convenience stores[38] which tend to stock more calorie-dense, nutrient-poor foods and drinks.[39] It is estimated that almost half of the US population shops at convenience stores one time per day or more, representing a large proportion of the general US population.[40] Thus children living in rural areas may be particularly vulnerable to obesity and nutrition-related chronic disease and therefore should be further studied. Though no single factor has been identified as the primary contributor to higher rates of obesity and chronic disease in

rural Appalachian communities, further investigation of child dietary intake and potential strategies for improving it in this population is warranted.

Child feeding practices and home environmental factors including caregiver role modeling of dietary behaviors, caregiver dietary intake, and home food availability have been found to be predictive of child diet.[45] Current literature suggests that educating caregivers of young children about the use of child feeding practices may promote healthy eating and prevent unhealthy eating.[51–53] However, these relationships have not been explored among low-income, rural, Appalachian communities and require further study.

Caregiver role modeling of dietary behaviors appears to be an important predictor for child dietary intake in some populations.[45] Rooted in Bandura's Social Learning theory,[54] caregiver role modeling (from here on referred to as modeling), is based on the influence that children's observations of caregiver eating behaviors can have on child diet.[54] Previous studies have defined modeling in two ways: 1) the frequency in which caregivers report modeling behaviors and the importance they place on modeling healthy eating behaviors,[51,56–60] and 2) caregiver dietary intake of certain food items.[61,62]

When modeling has been defined as the frequency in which caregivers report modeling behaviors and the importance they place on modeling, studies have found modeling to be positively associated with child dietary intake of fruits and vegetables, lower consumption of sugar sweetened beverages (SSB), sweets, and snacks, and is inversely associated with child BMI z-score. [51,56–60,62,63] However these studies have primarily been conducted in non-rural settings with ethnic minorities and in higher-income populations.[5751,58–60,62] No studies have identified this relationship among caregivers and children in low-income, rural communities.

To date, only one study has assessed the modeling construct as caregiver dietary intake of certain food items. Healthier caregiver dietary intake was found to be positively associated with adolescent consumption of fruits and vegetables and negatively associated with SSB consumption,[61] which is consistent with literature in which modeling is defined as the frequency of modeling behaviors reported by caregivers. Further study of this construct of modeling is needed as the current findings are limited and are not generalizable to low-income, rural communities.

Home food availability refers to caregiver control over the types of food made available at home. Previous studies have linked the availability of healthy food at home to higher consumption of fruits and vegetables[57,61,66,72–74] and lower consumption of high-sugar/high-fat snack foods among children in some populations,[61,66] indicating that the availability of healthier foods in the home may play a role in developing child preferences for healthier foods in some populations.[45] Further, low child fruit and vegetable consumption was associated with both low availability of fruits and vegetables in the home and low caregiver socio-economic status.[75] These relationships have been measured in ethnic minority,[57,61] European,[66,73] Australian,[72] and highly educated caregiver populations,[74] but to date, no studies have previously examined these relationships among children and caregivers from low-income, rural communities.

The aims of this study, therefore, were 1) to describe the use of modeling, caregiver dietary intake, and home food availability among families with young children in low-income, rural areas in Appalachian East Tennessee who shop at convenience stores one time per week or more and 2) to examine associations between modeling, caregiver dietary intake, and home food availability with child fruit consumption, child vegetable consumption, and child high-

sugar/high-fat snack food consumption among families with young children in low-income, rural areas in Appalachian East Tennessee who shop at convenience stores one time per week or more.

Methods

Study Design and Sample

This analysis used cross-sectional data from the baseline sample of a larger study, Shop Smart Tennessee (SSTN). SSTN was a multi-level intervention implemented in six low-income, rural, Appalachian communities that aimed to increase both access to and demand for healthier items in convenience stores. Data related to home food availability, modeling, and caregiver and child dietary intake were collected from caregivers of young children via survey. Inclusion criteria for the study required that participants were the primary caregiver of a child ages 2-10 years old, were over the age of 18 themselves, and regularly shopped at a participating convenience store ($\geq$1 time per week). One caregiver/child dyad per household was eligible to participate. When caregivers had more than one eligible child in their household, they were asked to select the child with dietary habits that they felt they were most familiar with (i.e. a younger child that does not receive meals from a school or daycare). For example, caregivers may be more familiar with the dietary intake of a younger child versus an older child that receives most meals at school.

Caregivers were recruited from participating convenience stores across six low-income communities in rural, Appalachian counties through in-person recruitment. The research team visited local convenience stores weekly to recruit caregivers, screened potential participants for eligibility, and collected contact information from individuals who expressed interest in participating. The research team also placed recruitment materials (flyers, posters, table tents,

and gas pump signage) in stores and at nearby community locations (see A-1). All participants signed an IRB-approved informed consent form prior to taking the SSTN survey.

Surveys were administered either in-person at the point of recruitment in-store or by phone. Data were collected by trained, graduate-level nutrition students and research staff. Paper surveys were checked by the research team following survey administration and were entered into Qualtrics software (Qualtrics, Provo, UT) while surveys that were conducted over-the-phone were entered directly into Qualtrics. This study was approved by the University of Tennessee Institutional Review Board (UTK IRB-17-03870-XP). Upon survey completion, participants received $25 gift cards. Participants who completed the survey over-the-phone were mailed gift cards within one week of completion.

Measures

The SSTN survey (see A-2) consisted of caregiver and child sociodemographic questions (caregiver age, gender, race/ethnicity, marital status, education level, household income, and child age, gender, and race/ethnicity), the HomeSTEAD caregiver modeling questionnaire,[60] a modified Home Food Inventory[76] to assess home food availability, the National Cancer Institute's Dietary Screener Questionnaire (DSQ)[77] to assess child dietary intake, and the Behavioral Risk Factor Surveillance System (BRFSS) fruit and vegetable module[78] to assess caregiver dietary intake. All survey instruments were drawn from existing literature and pilot tested for use in the present study.

Caregiver role modeling was measured with a scale from the HomeSTEAD Family Food Practices survey.[60] The HomeSTEAD tool has been previously validated for use among caregivers of children 3-12 years old in a Southeastern US population.[60] For the purpose of this study, a five-item modeling scale was used. One question was removed from the original six-

item scale in order to increase internal consistency. The modeling scale[60] measures self-reported role modeling of healthy eating behaviors by caregivers. Two items assessed level of agreement with role modeling statements on a 5-point Likert scale from 'strongly disagree' (1) to 'strongly agree' (5) including statements such as, "I try to eat healthy foods in front of my child, even if they are not my favorite." The remaining three items measured self-reported frequency of modeling behaviors on a 5-point Likert scale from 'never' (1) to 'always' (5) including statements such as "I eat food I want my child to eat." Responses for all five items were averaged to obtain a mean score for caregiver modeling with a possible range of 0-5. A higher score reflects greater use of caregiver modeling.[60] After removing one item from the original scale, internal consistency for the modeling scale was measured at 0.63.

Home food availability was measured using a modified version of the Home Food Inventory (HFI).[76] For the purpose of this study, the HFI was tailored to include healthier foods promoted in the SSTN study and their less healthy counterparts (e.g. low sugar cereals vs. sugary cereals). Foods promoted in the SSTN study were identified through formative research as being both culturally relevant and palatable to members of the target population. The modified HFI assessed the home availability of a total of 59 items. Five categories of food and drink were assessed (see A-3): beverages, fruits and vegetables, meat/poultry/fish/proteins, cereals and bread, and condiments/others. Items were listed by category with a 'yes/no' response option (yes=1, no=0). Sums were calculated for the availability of healthier items (42 items; Cronbach's α=0.85) and less healthy items (14 items; Cronbach's α=0.58). For both sums, a higher score indicates higher availability in the home.[76] A higher score for healthier home food availability and a lower score for less healthy food availability indicates a more healthy home food environment.

Child consumption of fruits, vegetables, and high-sugar/high-fat snack foods was measured using the National Cancer Institute's DSQ.[77] This 19-item questionnaire measures the frequency of consumption of foods and beverages over the previous 30-day period. For the purpose of this study, frequencies of consumption for fruit, vegetable, and high-sugar/high-fat snack food were summed and analyzed. These variables were selected for analysis based on their significance in examining overall diet quality, their influence on health, and their use as dietary outcomes in similar studies.[51,57,58,61,79] Responses for all items assessed were reported on a 9-item scale including and scored as follows: never (0), 1 time last month (1), 2-3 times last month (2), 1 time per week (3), 2 times per week (4), 3-4 times per week (5), 5-6 times per week (6), 1 time per day (7), or 2 or more times per day (8).[77] The vegetable scale included a sum of three items: lettuce/green salads; non-fried potatoes; and 'other' vegetables with possible scores ranging from 0-24 (Cronbach's α= 0.55). The high-sugar/high-fat snack foods scale included a sum of four items: candy; doughnuts and pastries; and cookies, cake, pie, and brownies; and ice cream or other frozen desserts with possible scores ranging from 0-32 (Cronbach's α= 0.80). The fruit variable included one item measuring frequency of consumption of all varieties of fresh, frozen, or canned fruit with possible scores ranging from of 0-8.

Caregiver dietary intake was measured using the BRFSS fruit and vegetable module.[78] The module measures the frequency of consumption of all fruit (fresh, frozen, or canned), salads, fried potatoes, non-fried potatoes, and any other vegetables. Responses were recorded as the number of times per day, week, or month consumed in the last 30 days. From these measures, servings per day were calculated. Caregiver daily vegetable consumption was calculated by summing all reported vegetables into a caregiver vegetable variable.[78] Similarly to the child vegetable intake scale, the caregiver vegetable scale included a sum of three items: the daily

consumption of lettuce/greens salads, non-fried potatoes, and "other" vegetables (Cronbach's α= 0.40). The caregiver fruit variable included one item measuring frequency of consumption of fresh, frozen, or canned fruit.

Statistical Analysis

Following data collection, data were downloaded from the Qualtrics data entry platform, cleaned, and checked for missing or incomplete data or entry errors. Participants with missing data were re-contacted to collect the data, and if they could not be re-contacted, were removed from linear regression models (n=4). Descriptive statistics were run to assess the study population and outcomes of interest.

Three multiple linear regression analyses were conducted to examine the relationships between child feeding practices of interest and child dietary variables (fruit, vegetable, and high-sugar/high-fat snack food consumption). The first multiple linear regression was calculated to predict child fruit consumption based on modeling, healthy home food availability, and caregiver fruit intake. The second multiple linear regression was calculated to predict child consumption of vegetables based on modeling, healthy home food availability, and caregiver vegetable intake. The third multiple linear regression was calculated to predict child consumption of high-sugar/high-fat snack foods based on modeling and home food availability of less healthy foods. Caregiver intake of high-sugar/high-fat snack foods was not measured and therefore was not included in statistical models. In each model, child age, gender and household income were controlled for, as these factors may influence child dietary intake, as seen in similar studies.[58,59,61] For each of the three models, steps were taken to ensure that assumptions of multiple linear regression were met (that dependent variables are continuous and there is no multicollinearity among independent variables). Following analysis, scatterplots and histograms

were used to confirm that independent and dependent variables were linearly related, and residuals were normally distributed. Data analyses were conducted using SPSS software, version 25 (IBM Corp. Released 2017. IBM SPSS Statistics for Mac, Version 25.0. Armonk, NY: IBM Corp.).

Results

Sample Characteristics

The final sample included 178 participants. The majority of participants identified as female (78%) with an average age of 35 (±9.8). Children were 54% female with an average age of 6.5 (±2.7). The sample was primarily white (97% caregivers and 96% children) and non-Hispanic (99% caregivers and 98% children). The majority of the sample (66%) reported an annual household income of $30,000 or less, which is similar to the Federal Poverty Level for a family of five. The average household size for the sample was 4.4 (±1.8) individuals. Of the sample, 59% of households were food insecure. Further descriptive characteristics of the sample are shown in **Table 1**.

Modeling, Caregiver Dietary Intake, and Home Food Availability

Scores for caregiver use of modeling behaviors and home food availability of healthy and less healthy foods are shown in **Table 2**. The average score for caregiver modeling was 3.6 (±0.63) on a scale of 0 to 5. A score of 3.6 (±0.63) on the modeling scale indicates that, on average, caregivers reported that they 'agree' with statements about their use of modeling behaviors when given a scale of strongly disagree, disagree, neutral, agree, or strongly agree or that they 'often' engage in modeling behaviors when given a scale of never, rarely sometimes, often, or almost always. The average score for home food availability of healthy foods was 20

Table 1. Sample Characteristics (n=178)

Variable	Caregiver Age (±SD)	Child Age (±SD)
Mean Age in Years (±SD)	35 ± 9.8	6.5 ± 2.7
	Caregiver % (n)	**Child % (n)**
Female	78 (138)	54 (96)
Race		
White	97 (173)	96 (171)
Not White[a]	2.8 (5)	3.9 (7)
Ethnicity, % not H/L[b]	99 (176)	98 (175)
Education,		
Less than HS[c]	16 (28)	
HS[c] or GED	53 (95)	
Some College	20 (35)	
College Degree or higher	11 (20)	
Marital Status		
Never Married	24 (43)	
Married	47 (83)	
Separated	8.4 (15)	
Divorced	17 (31)	
Widowed	3.4 (6)	
Income		
$0-10,000	21 (38)	
$10,001-20,000	24 (43)	
$20,001-30,000	21 (37)	
$30,001-40,000	11 (19)	
$40,001-50,000	6 (11)	
$50,001-60,000	6 (11)	
$60,001+	7 (12)	
Declined to answer	4 (7)	
SNAP Participants[d]	61 (109)	
WIC Participants[e]	23 (41)	
Food Insecure Households	59 (103)	

[a] Not White includes American Indian/Alaskan Native, Asian, Black/African American, and Other
[b] H/L refers to Hispanic or Latino
[c] HS refers to high school
[d] SNAP refers to the Supplemental Nutrition Assistance Program
[e] WIC refers to the Special Supplemental Nutrition Program for Women, Infants, and Children

Table 2. Caregiver Modeling and Home Food Availability Scores

Modeling (n=178)	**Mean (SD)**
I try to eat healthy foods in front of my child, even if they are not my favorite[a]	4.1 ±0.94
My child learns to eat healthy snacks from me[a]	3.9 ±0.93
How often do you try not to eat unhealthy foods when your children are around?[b]	3.2 ±1.2
How often do you drink soda (regular or diet) or other sweetened beverages at meals and snacks with your child?[b,c]	2.6 ±1.3
I eat food I want my child to eat[c]	4.2 ±0.94
Modeling Scale Total Score	3.6 ±0.63

Home Food Availability Scores	**Mean (SD)**
Healthy Home Food Availability[d] **(n=174)**	20 ±7.2
Less Healthy Home Food Availability[e] **(n=178)**	10 ±2.3

[a] Responses were measured on a 5-point Likert scale from strongly disagree – strongly agree
[b] Responses were measure on a 5-point Likert scale from never – always
[c] Responses were reverse scored, per the scoring protocol of the validated survey instrument
[d] Healthy Home Food Availability is represented by a sum of the availability of 42 healthier foods in the household such as bananas, apples, carrots, low sugar cereals, whole grain bread, etc.
[e] Less Healthy Home Food Availability is represented by a sum of the availability of 14 less healthy items in the household such as sugary cereals, cookies or candy, chips, soda, etc.

(±7.2) items out of a total possible score of 42 healthier items. The average score for less healthy home food availability was 10 (±2.3) items out of a total possible score of 14 less healthy items.

Caregiver Self-Reported Child and Caregiver Dietary Intake

Caregiver-reported measures of child and caregiver dietary intake are shown in **Table 3**. The mean child fruit consumption frequency score was 7.1 (±1.8) on a scale of 0-8, indicating that on average in a 30-day period, children ate fruit about one time per day. The mean child vegetable consumption frequency score was 15 (±4.7) on a scale of 0-24, indicating that on average in a 30-day period, children ate vegetables 3-4 times per week. The mean child high-sugar/high-fat snack food consumption frequency score was 18 (±6.3) on a scale of 0-32, indicating that on average in a 30-day period, children ate high-sugar/high-fat snack foods about 2 times per week. The mean caregiver fruit consumption frequency was 1.0 (±1.1) times per day in a 30-day time period. The mean caregiver vegetable consumption frequency was 1.8 (±1.2) times per day in a 30-day time period.

Multiple Linear Regression Predicting Child Fruit Consumption

After adjusting for confounders (child age, child sex, household income), higher healthy home food availability and caregiver fruit consumption frequency were significant predictors of child fruit consumption frequency (**Table 4**). Higher availability of healthy foods at home was associated with higher child fruit consumption frequency (Beta =0.06; SE=0.02; P<0.01). Similarly, caregivers who reported consuming more fruit had children with higher fruit consumption frequency (Beta=0.29; SE=0.01; P<0.05). Modeling was not a significant predictor of child fruit consumption frequency. Overall, the full model explained 18% of the variability in child fruit consumption frequency.

Table 3. Self-Reported Caregiver and Child Dietary Intake

Child Dietary Intake (n=178)	Mean Score (SD)	Possible Range of Scores
Fruit[a]	7.1 ±1.8	0-8 (0 = never, 8 = 2+ times/day)
Vegetables[b]	15 ±4.7	0-24 (0 = never, 24 = 2+ times/day)
High-sugar/high-fat snack foods[c]	18 ±6.3	0-32 (0 = never, 32 = 2+ times/day)
Caregiver Dietary Intake (n=178)	**Mean Times per Day (SD)**	**--**
Fruit[d]	1.0 ±1.1	N/A
Vegetables[e]	1.8 ±1.2	N/A

[a] The child fruit variable includes frequency of consumption of fresh, frozen, or canned fruit with possible scores ranging from 0-8, where 0 = never and 8 = two or more times per day

[b] The child vegetable variable includes a sum of the daily consumption of lettuce/green salads, non-fried potatoes, and "other" vegetables with possible scores ranging from 0-24, where 0 = never and 24 = a report of two or more times per day for each vegetable category

[c] The child high-sugar/high-fat snack food variable includes a sum of the daily consumption of candy; doughnuts and pastries; cookies, cake, pie, and brownies; and ice cream or other frozen desserts with possible scores ranging from 0-32, where 0 = never and 32 = a report of two or more times per day for each of the high-sugar/high-fat snack foods

[d] The caregiver fruit variable includes frequency of consumption of fresh, frozen, or canned fruit reported in the number of times per day

[e] The caregiver vegetable variable includes frequency of consumption of salads, non-fried potatoes, and "other" vegetables reported in the number of times per day

Table 4. Multiple Linear Regression Predicting Child Fruit Consumption[a]

Variable (n=174)	Beta	Standard error	p-value
Modeling	0.27	0.21	0.20
Caregiver fruit consumption	0.29	0.13	0.02*
Healthy home food availability	0.06	0.02	0.00*
Child age[b]	-0.10	0.05	0.04*
Child gender[c]	0.27	0.26	0.31
Household income[d]	-0.04	0.06	0.44

*Indicates a statistically significant p-value

[a]Overall model significance P<0.001* ; R square = 0.18

[b]Child age at time of survey was calculated using date of birth

[c]Child gender was coded as Male=0 and Female=1

[d]Household income was included in the model as a categorical variable, categories were as follows: (0-10,000, 10,001-20,000, 20,001-30,000, 30,001-40,000, 40,001-50,000, 50,001-60,000, 60,001-70,000, 70,001-80,000, 80,001+)

Multiple Linear Regression Predicting Child Vegetable Consumption

After adjusting for confounders, modeling and caregiver vegetable consumption frequency were found to be statistically significant predictors of child vegetable consumption frequency (**Table 5**). Caregivers who reported higher frequency of vegetable consumption had children with higher vegetable consumption frequency (Beta=1.6; SE=0.28; P<0.01). Similarly, modeling was associated with higher child vegetable consumption frequency (Beta=1.1; SE=0.51; P<0.05). Healthy home food availability was not a significant predictor of child vegetable consumption frequency. The full model explained 27% of the variability in child vegetable consumption frequency.

Multiple Linear Regression Predicting Child High-Sugar/High-Fat Snack Food Consumption

After adjusting for confounders, home food availability of less healthy foods was a statistically significant predictor for child high-sugar/high-fat snack food consumption frequency (**Table 6**). A greater presence of less healthy foods in the home was associated with higher child high-sugar/high-fat snack food consumption frequency (Beta=0.61; SE=0.20; P<0.05). Modeling was not a significant predictor of child high-sugar/high-fat snack food consumption frequency. The full model explained 10% of the variability in child high-sugar/high-fat snack food consumption frequency.

Discussion

This study offers a significant contribution to the literature as it is the first study to assess the use of caregiver modeling, caregiver dietary intake, and home food availability as measures of child feeding practices in a rural, Appalachian population sampled from low-income communities. Prior to the completion of this study, little was known about the relationship between these factors and child food consumption in this vulnerable population. These findings

Table 5. Multiple Linear Regression Predicting Child Vegetable Consumption[a]

Variable (n=174)	Beta	Standard error	p-value
Modeling	1.08	0.51	0.04*
Caregiver vegetable consumption	1.56	0.28	0.00*
Healthy home food availability	0.08	0.05	0.07
Child age[b]	0.03	0.12	0.82
Child gender[c]	1.64	0.64	0.01*
Household income[d]	-0.13	0.14	0.35

*Indicates a statistically significant p-value
[a]Overall model significance P<0.001*; R square = 0.27
[b]Child age at time of survey was calculated using date of birth
[c]Child gender was coded as Male=0 and Female=1
[d]Household income was included in the model as a categorical variable, categories were as follows: (0-10,000, 10,001-20,000, 20,001-30,000, 30,001-40,000, 40,001-50,000, 50,001-60,000, 60,001-70,000, 70,001-80,000, 80,001+)

Table 6. Multiple Linear Regression Predicting Child High-Sugar/High-Fat Snack Food Consumption[a]

Variable (n=178)	Beta	Standard error	p-value
Modeling	-1.34	0.74	0.07
Less healthy home food availability	0.61	0.20	0.00*
Child age[b]	-0.03	0.18	0.87
Child gender[c]	-1.32	0.95	0.17
Household income[d]	-0.17	0.19	0.38

*Indicates a statistically significant p-value
[a]Overall model significance P<0.001*; R square = 0.10
[b]Child age at time of survey was calculated using date of birth and was reported as a continuous value
[c]Child gender was coded as Male=0 and Female=1
[d]Household income was included in the model as a categorical variable, categories were as follows: (0-10,000, 10,001-20,000, 20,001-30,000, 30,001-40,000, 40,001-50,000, 50,001-60,000, 60,001-70,000, 70,001-80,000, 80,001+)

help to identify potential child obesity prevention strategies for use among low-income, rural Appalachian families.

As a whole, the mean score of caregivers' report of modeling behaviors was consistent with findings from a previous study by Vaughn and colleagues in which their modeling scale was validated for use in a non-rural sample of highly educated families with higher-income.[60] Despite population differences, the reported use of modeling in this population was similar to a previous study conducted in a non-rural setting.

Caregiver modeling significantly predicted child consumption of vegetables, which is consistent with the current literature for other population groups.[51,56–62] Modeling also predicted fruit and high-sugar/high-fat snack food consumption but did not reach statistical significance for either outcome. Previous studies have reported that caregiver modeling is a predictor of higher child consumption for both fruits and vegetables,[58] and lower consumption of less healthy foods, such as soda or high-sugar/high-fat snack foods.[60,61] However, an important gap in the literature is that most studies have not analyzed fruits and vegetables as individual outcomes as was done in the present study.

Caregiver dietary intakes of fruits and vegetables were found to be significant predictors of child fruit and vegetable consumption, respectively. This is consistent with current literature on caregiver modeling when measured as caregiver dietary intake.[61,62] However, the literature assessing the relationship between caregiver dietary intake and child dietary intake patterns is limited when compared to other food-related parenting factors. While this is an important and novel finding of our study, further research is needed using more diverse groups in order to further generalize the influence of caregiver dietary intake.

The present study found that higher home availability of healthy foods was positively associated with child fruit consumption, which is consistent with reports from multiple previous studies.[57,61,66,72–74] High availability of healthy foods was positively associated with child vegetable consumption, but did not reach statistical significance in the present study (p=0.07). In a 2014 study by Loth and colleagues, home availability of healthy foods was associated with observed differences in child consumption of both fruits and vegetables.[61] Similarly, another study found that overall higher diet quality, including high intake for both fruits and vegetables, was associated with home availability of healthy foods.[58]

Similar to a study by Hendy and colleagues,[74] the present study found that home availability of less healthy foods was associated with high child consumption of high-sugar/high-fat snack foods. Based on this knowledge, limiting the availability of unhealthy snack foods in the home may be a useful strategy to limit children's consumption of high-sugar/high-fat snack foods. Because children's preferences develop over time and through multiple exposures to foods,[65] promoting a healthy home food environment may influence their dietary intake patterns both inside and outside of the home. While child feeding practices such as home food availability and caregiver modeling may influence child dietary intake both inside and outside of the home, it is important to note that the relationships driving childhood obesity are complex and multi-faceted. Therefore, these results should be considered within the greater context of childhood obesity and the various factors at play.

Strengths and Limitations

This study is among the first to investigate modeling, caregiver dietary intake, and home food availability in a rural, Appalachian population in low-income communities. Despite the fact that this target population experiences nutrition-related health disparities, this population is also

one that can be difficult to reach and may not be well represented in the current literature. Therefore, the assessment of these relationships in this understudied, vulnerable population is a strength of this study. Another strength is the novel assessment of modeling as two constructs. Measuring modeling as both the frequency in which caregivers reported using modeling behaviors and as caregiver dietary intake is a novel approach and should be further explored in future research. Additionally, most of the previous studies in this body of literature have not analyzed fruits and vegetables separately. This is an important strength of the present study as children's consumption patterns of fruit and vegetables differ, with the general consensus being that among children, fruit consumption is easier to modify than vegetable consumption.[4,80]

Though this study has a number of key strengths, there are a few limitations that should be noted. The target population of this sample included caregivers of children aged 2-10 years old. There may be significant developmental and dietary differences among children across these age groups, which is a limitation to the present study.[81] The use of a convenience sample in the present study is also a limitation as it could potentially introduce selection bias, thus resulting in a less representative study sample. Furthermore, additional statistical significance of variables may have been seen if a larger sample size was used. The use of diet screeners for caregiver and child diet, though common in this type of research, may lead to both underreporting and over reporting of certain food groups, resulting in an inaccurate representation of dietary intakes.[82] This is a common barrier to this type of research in which dietary intake is assessed.[83] However, the dietary assessment tools used in this study are validated and frequently used in the literature and national surveys.[77,84] Additionally, Cronbach's alpha values for some scales were low indicating potential for unreliability in the scale.[85] When indicated, steps were taken to increase alpha values by removing items from scales. However, the scales used were drawn from

validated measures that are commonly used in the literature. Because of the low internal consistency of some scales, these results should be interpreted with caution. Finally, participants in the present study shopped at convenience stores one time per week or more, which may suggest that their food shopping and eating habits are different from those of others who do not frequent convenience stores. However, it is estimated that almost half of the U.S. population shops at convenience stores one time per day or more,[40] indicating that these findings shed an important light on a large proportion of the general population.

Conclusion

As a whole, the present study suggests that caregivers in low-income, rural Appalachian communities engage in similar patterns of modeling when compared to findings from previous studies. Because this population has higher rates of childhood obesity and adult chronic disease than the general US population, the use of health-promotive strategies, such as modeling and home food availability may be beneficial to improve child health and combat childhood obesity. Practitioners who work with low-income families in rural, Appalachian communities should consider the use of modeling and home food availability as potential health-promotive practices for children. This would include encouraging caregivers to increase the number of healthy foods and reduce the number of less healthy foods available in their home and encouraging caregivers to engage in modeling of healthy eating behaviors to their children as well as increasing their actual consumption of healthier items, such as fruits and vegetables.

CHAPTER III: EXPANDED METHODS

Home Food Availability Instrument

The Home Food Availability Instrument (see A-2) was created using a modified Home Food Inventory (HFI)[76] to contain the healthier foods promoted in the Shop Smart Tennessee parent study and their less healthy counterparts (e.g. reduced fat hot dogs versus regular hot dogs, low-sugar cereals versus sugary cereals). Foods promoted in Shop Smart Tennessee were identified through formative research as being both culturally relevant and palatable to members of the target population. The modified HFI assessed the home availability of a total of 59 items at the time of survey completion. Five categories of food and drink were assessed: Drinks (12 items), Fruits and Vegetables (17 items), Meat/Poultry/Fish/Proteins (11 items), Cereals and Bread (9 items), and Condiments and Others (10 items). Items were listed by category with a 'yes/no' response option (yes=1, no=0). Two availability scores were obtained by calculating the sum for availability of healthier items as well as the sum for less healthy items.

Child Diet Scoring Methods

In order to allow for separate analyses of fruit and vegetables, alternative scoring methods to the DSQ scoring algorithms[77] were used. For the purpose of this study, frequencies of consumption for fruit, vegetables, and high-sugar/high-fat snack food consumption were summed and analyzed. This scoring method allowed for separate analysis of fruit and vegetables rather than simply assessing summed fruit and vegetable consumption. Though this was a strength of the present study, this scoring method may have omitted certain foods that are normally included in the DSQ scoring methods for fruits and vegetables, if these items were consumed by the child. Omitted foods included 100% pure fruit juice and tomatoes found in sauce on pizza, in spaghetti sauce, and salsa. This method also omitted measures of intake for fried potatoes and beans (refried beans, baked beans, beans in soup, pork and beans, or any other

type of cooked dried beans) which are normally included in the category of vegetables. Beans were not included in the vegetable score due to their nutrient composition, which differs from vegetables include in the score. High-sugar/high-fat snack foods were summed in order to assess the frequency of consumption of energy-dense foods, such as chocolate or candy, doughnuts and pastries, cookies and other baked goods, and ice cream and other frozen desserts. This category was included due to its relevance to diet quality as added sugars and solid fats are among the greatest contributors to excess energy intake in the diet of most Americans.[1,2] Despite the omissions of certain foods from the fruit and vegetable scores, this scoring method allowed for a novel analyses of child fruit, vegetable, and high-sugar/high-fat snack food consumption frequency that has not previously been assessed.

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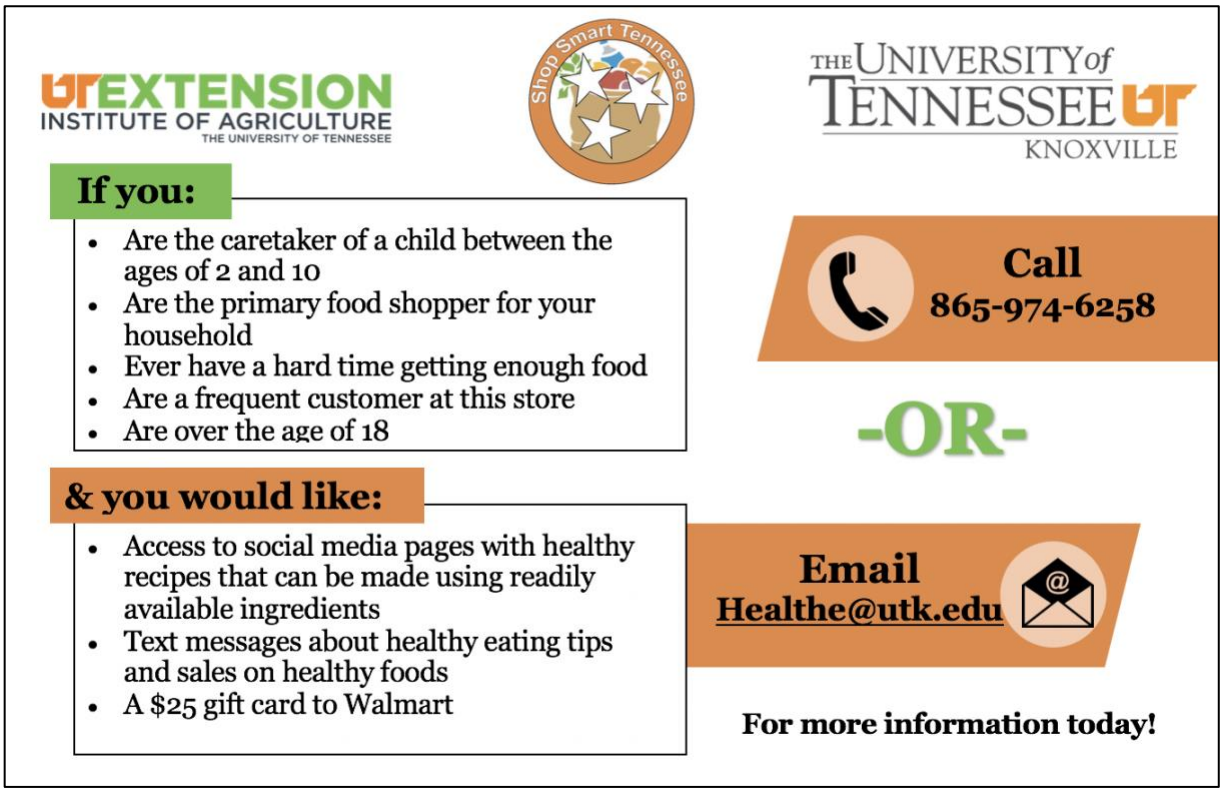
APPENDICES

Appendix A-1: Participant Recruitment Flyer



Appendix A-2: Family Caregiver Assessment Interview

***Survey components used in this thesis are demarcated in blue text**

Shop Smart Tennessee
Family Caregiver Assessment Interview

Your Name: _____

Your Child's First Name: _____

Address: _____

_____

Phone Numbers:

Cell Phone: _____

Home Phone: _____

Work Phone: _____

Other Phone: _____

Email address: _____

Facebook name: _____

****

To be completed by Shop Smart Tennessee staff:

Interviewer Name: _____

Date: _____/_____/_____
MM DD YY

Interview start time: ____ :____AM/PM

Store name: _____

****

Section 1. Information About Your Household & Your Child

D9. In the last 30 days, how many adults (ages 18 years old or older) were living in your household, including yourself?	_____ adults
D10. In the last 30 days, how many children (ages 17 years old or younger) were living in your household?	_____ children
D11. What are the ages of the children in your household?	_____

If you have multiple children between the ages of 2 and 10, please complete the next portions about ONE of your children. You may pick the child whose diet you are most familiar with, as following portions will ask you to report what your child ate in the last 30 days. Make sure that you write the correct name of child you choose on the front page of the survey.

D1a. What is your child's date of birth? ____/_____/____

D2a. What is your child's gender?: Male…..☐ Female...☐

D3a. What is your child's race?

American Indian/Alaskan Native….....☐

Asian…….…☐

Black or African American…….……☐

Native Hawaiian/Other Pacific Islander……....☐

White……..☐

Other……..……☐

D4a. What is your child's ethnicity?

Hispanic or Latino……..……...☐

Not Hispanic or Latino……...☐

Section 4: Information about How Families Eat

These questions are about how much you agree or disagree with the following statements. Please check one box from the following choices: Strongly Disagree, Disagree, Neutral (meaning that you don't disagree or agree), Agree, or Strongly Agree. Please only choose one answer for each question by marking an "X" or "✓".

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I try to eat healthy foods in front of my child, even if they are not my favorite.					
My child learns to eat healthy snacks from me.					
How I eat does not particularly influence my child's habits.					

Please check the box that indicates how often you do the following things. You can respond with the following choices: Never, Rarely, Sometimes, Often, or Always. Please only choose one answer for each question by marking an "X" or "✓".

	Never	Rarely	Some-times	Often	Always
How often do you try **not** to eat unhealthy foods when your children are around?					
How often do you drink soda (regular or diet) or other sweetened beverages at meals and snacks with your child?					
I eat food I want my child to eat.					

These questions are about how much you agree or disagree with the following statements. Please check one box from the following choices: Strongly Disagree, Disagree, Neutral (meaning that you don't disagree or agree), Agree, or Strongly Agree. Please only choose one answer for each question by marking an "X" or "✓".

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I praise my child if he or she eats what I give him or her.					
I praise my child if she or he eats a new food.					
I praise my child for choosing a healthy snack.					
I praise my child for drinking water.					
I praise my child if he or she eats fruits and vegetables.					

Section 5: What Your Child Eats and Drinks

These questions are about the different kinds of foods **your child** ate or drank during the past month, that is, the past 30 days. When answering, please include meals and snacks eaten at home, at school, in restaurants, at church, and any other place.

Mark an "X" to indicate your answer. Your answers are important to us.

The following questions ask about how many times **your child** ate or drank each food in the last 30 days.

---

1. During the past month, how often did your child eat **hot or cold cereals**? *Mark one.*

   ☐ Never → **Go to question 4.**

   ☐ 1 time last month

   ☐ 2-3 times last month

   ☐ 1 time per week

   ☐ 2 times per week

   ☐ 3-4 times per week

   ☐ 5-6 times per week

   ☐ 1 time per day

   ☐ 2 or more times per day

2. During the past month, what kind of cereal did your child usually eat? – *Print cereal.*

   [ ]

3. If there was another kind of cereal that your child usually ate during the past month, what kind was it? *Print cereal. If none, leave blank.*

   [ ]

4. During the past month, how often did your child have any **milk** (either to drink or on cereal?) Include regular milks, chocolate or other flavored milks, lactose-free milk, buttermilk. Please do **not** include soy milk or small amounts of milk in coffee or tea. *Mark one.*

   ☐ Never → **Go to question 6.**

   ☐ 1 time last month

   ☐ 2-3 times last month

   ☐ 1 time per week

   ☐ 2 times per week

   ☐ 3-4 times per week

   ☐ 5-6 times per week

   ☐ 1 time per day

   ☐ 2-3 times per day

   ☐ 4-5 times per day

   ☐ 6 or more times per day

5. During the past month, what kind of milk did your child usually drink? *Mark one.*

   ☐ Whole or regular milk

   ☐ 2% fat or reduced-fat milk

   ☐ 1%, ½ %, or low-fat milk

   ☐ Fat free, skim, or non-fat milk

   ☐ Soy milk

   ☐ Other kind of milk – *Print milk.*

   [ ]

6. During the past month, how often did your child drink **regular soda or pop** that contains sugar? Do **not** include diet soda. *Mark one.*

   ☐ Never

   ☐ 1 time last month

   ☐ 2-3 times last month

   ☐ 1 time per week

   ☐ 2 times per week

   ☐ 3-4 times per week

   ☐ 5-6 times per week

   ☐ 1 time per day

   ☐ 2-3 times per day

   ☐ 4-5 times per day

   ☐ 6 or more times per day

7. During the past month, how often did your child drink **100% pure fruit juices** such as orange juice, mango, apple, grape, and pineapple juices? Do **not** include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to. *Mark one.*

   ☐ Never

   ☐ 1 time last month

   ☐ 2-3 times last month

   ☐ 1 time per week

   ☐ 2 times per week

   ☐ 3-4 times per week

   ☐ 5-6 times per week

   ☐ 1 time per day

   ☐ 2-3 times per day

   ☐ 4-5 times per day

   ☐ 6 or more times per day

8. During the past month, how often did your child drink coffee or tea that had **sugar** or **honey** added to it? Include coffee and tea that you sweetened yourself and pre-sweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. Do **not** include artificially sweetened coffee or diet tea. *Mark one.*

   ☐ Never

   ☐ 1 time last month

   ☐ 2-3 times last month

   ☐ 1 time per week

   ☐ 2 times per week

   ☐ 3-4 times per week

   ☐ 5-6 times per week

   ☐ 1 time per day

   ☐ 2-3 times per day

   ☐ 4-5 times per day

   ☐ 6 or more times per day

9. During the past month, how often did your child drink **sweetened** fruit drinks such as Kool-Aid, lemonade, Hi-C, cranberry drink, Gatorade, Red Bull, or Vitamin Water? Include fruit juices you made at home and added sugar to. Do **not** include diet drinks or artificially sweetened drinks. *Mark one.*

   ☐ Never

   ☐ 1 time last month

   ☐ 2-3 times last month

   ☐ 1 time per week

   ☐ 2 times per week

   ☐ 3-4 times per week

   ☐ 5-6 times per week

   ☐ 1 time per day

   ☐ 2-3 times per day

   ☐ 4-5 times per day

   ☐ 6 or more times per day

10. During the past month, how often did your child eat **fruit**? Include fresh, frozen, or canned fruit. Do **not** include juices. *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

11. During the last month, how often did your child eat a green leafy or lettuce **salad**, with or without other vegetables? *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

12. During the past month, how often did your child eat any kind of **fried potatoes**, including French fries, home fries, or hash brown potatoes? *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

13. During the past month, how often did your child eat any **other kind of potatoes**, such as baked, boiled, mashed potatoes, sweet potatoes, or potato salad? *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

14. During the past month, how often did your child eat refried beans, baked beans, beans in soup, pork and beans, or any other type of cooked dried beans? Do **not** include green beans. *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

15. During the past month, how often did your child eat **brown rice** or other cooked whole grains, such as bulgur, cracked wheat, or millet? Do **not** include white rice. *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

16. During the past month, not including what you just told me about (green salads, potatoes, cooked dried beans), how often did your child eat **other vegetables**? *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

17. During the past month, how often did your child have Mexican-type **salsa** made with tomato? *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

18. During the past month, how often did your child eat **pizza**? Include frozen pizza, fast food pizza, and homemade pizza. *Mark one.*

☐ Never

☐ 1 time last month

☐ 2-3 times last month

☐ 1 time per week

☐ 2 times per week

☐ 3-4 times per week

☐ 5-6 times per week

☐ 1 time per day

☐ 2 or more times per day

19. During the past month, how often did your child have **tomato sauces** such as with spaghetti or noodles or mixed into foods such as lasagna? Do not include tomato sauce on pizza? *Mark one.*

☐ Never

☐ 1 time last month

☐ 2-3 times last month

☐ 1 time per week

☐ 2 times per week

☐ 3-4 times per week

☐ 5-6 times per week

☐ 1 time per day

☐ 2 or more times per day

20. During the past month, how often did your child eat any kind of **cheese**? Include cheese as a snack, cheese on burgers, sandwiches, and cheese in foods such as lasagna, quesadillas, or casseroles. Do **not** include cheese on pizza. *Mark one.*

☐ Never

☐ 1 time last month

☐ 2-3 times last month

☐ 1 time per week

☐ 2 times per week

☐ 3-4 times per week

☐ 5-6 times per week

☐ 1 time per day

☐ 2 or more times per day

21. During the past month, how often did your child eat **red meat**, such as beef, pork, ham, or sausage? Do not include chicken, turkey or seafood. Include red meat your child had in sandwiches, lasagna, stew, and other mixtures. Red meats may also include veal, lamb, and any lunch meats made with these meats.

☐ Never

☐ 1 time last month

☐ 2-3 times last month

☐ 1 time per week

☐ 2 times per week

☐ 3-4 times per week

☐ 5-6 times per week

☐ 1 time per day

☐ 2 or more times per day

22. During the past month, how often did your child eat any **processed meat**, such as bacon, lunch meats, or hot dogs? Include processed meats your child had in sandwiches, soups, pizza, casseroles, and other mixtures.
Processed meats are those preserved by smoking, curing, or salting, or by the addition of preservatives. Examples are ham, bacon, pastrami, salami, sausages, bratwursts, frankfurters, hot dogs, and spam.

☐ Never

☐ 1 time last month

☐ 2-3 times last month

☐ 1 time per week

☐ 2 times per week

☐ 3-4 times per week

☐ 5-6 times per week

☐ 1 time per day

☐ 2 or more times per day

23. During the past month, how often did your child eat **whole grain bread** including toast, rolls and in sandwiches? Whole grain breads include whole wheat, rye, oatmeal and pumpernickel. Do **not** include white bread.

☐ Never

☐ 1 time last month

☐ 2-3 times last month

☐ 1 time per week

☐ 2 times per week

☐ 3-4 times per week

☐ 5-6 times per week

☐ 1 time per day

☐ 2 or more times per day

24. During the past month, how often did your child eat **chocolate** or any other types of candy? Do **not** include sugar-free candy.

☐ Never

☐ 1 time last month

☐ 2-3 times last month

☐ 1 time per week

☐ 2 times per week

☐ 3-4 times per week

☐ 5-6 times per week

☐ 1 time per day

☐ 2 or more times per day

25. During the past month, how often did your child eat **doughnuts**, sweet rolls, Danish, muffins, pan dulce, or pop-tarts? Do **not** include sugar-free items.

☐ Never

☐ 1 time last month

☐ 2-3 times last month

☐ 1 time per week

☐ 2 times per week

☐ 3-4 times per week

☐ 5-6 times per week

☐ 1 time per day

☐ 2 or more times per day

26. During the past month, how often did your child eat **cookies, cake, pie or brownies**? Do not include sugar-free kinds. *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

27. During the past month, how often did your child eat **ice cream or other frozen desserts**? Do **not** include sugar-free kinds? *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

28. During the past month, how often did your child eat **popcorn**? *Mark one.*

- ☐ Never
- ☐ 1 time last month
- ☐ 2-3 times last month
- ☐ 1 time per week
- ☐ 2 times per week
- ☐ 3-4 times per week
- ☐ 5-6 times per week
- ☐ 1 time per day
- ☐ 2 or more times per day

Section 6: Adult Demographics

D1. What is your age?: _____

D2. What is your gender?: Male…..☐ Female...☐

D3. What is your race?

American Indian/Alaskan Native….....☐

Asian…….…☐

Black or African American…….……☐

Native Hawaiian/Other Pacific Islander……...☐

White……..☐

Other……..……☐

D4. What is your ethnicity?

Hispanic or Latino……..……...☐

Not Hispanic or Latino……..☐

D5. What is your current marital status? (<u>Check ONE response.</u>)

Never married ..... ☐

Married..... ☐

Separated..... ☐

Divorced..... ☐

Widowed..... ☐

D6. What is the highest degree or level of school you completed? (<u>Check ONE</u>)

Less than high school diploma…….☐

High school diploma or GED…….☐

Some college…….……..☐

Associate's degree…….☐

Bachelor's degree……...☐

Graduate school……..☐

Other…….….☐ If Other, specify: _____

D8. In which range is your annual household income? (Check ONE response.)

0-10,000…….. .☐

10,001-20,000……..☐

20,001-30,000……..☐

30,001-40,000……..☐

40,001-50,000……..☐

50,001-60,000……..☐

60,001-70,000……..☐

70,001-80,000……..☐

80,001+……..☐

Refused to answer...☐

D12. Does your household receive food stamps / SNAP?	Yes □	No □	
D13. Does your household receive WIC?	Yes □	No □	Not Applicable □

****

The next pages are to be completed either over-the-phone or in-person with Shop Smart Tennessee staff. You must talk with a Shop Smart Tennessee staff member to complete this section & get your gift card.

TO BE COMPLETED BY SHOP SMART TENNESSEE STAFF:

The next question asks about how often <u>YOU</u> eat certain foods. Think about what you usually eat, including all meals, snacks, and eating out.

PE21. In the last 30 days think about how often YOU ***usually*** eat or drink each of the following items? *Only fill in one column for each question.*

	# times per day	# times per week	# times per month	Never
PE21a. Regular soda or pop that contains sugar. Do not include diet drinks.				
PE21b. Sugar-sweetened fruit drinks (Kool Aid, lemonade, sweet tea, sports drinks, energy drinks).				
PE21c. Fresh, frozen or canned fruit (not including juice or dried fruit).				
PE21d. 100% fruit juice				
PE21e. A green leafy or lettuce salad				
PE21f. Fried potatoes (French fries, hash browns,				
PE21g. Any other potatoes (sweet, baked, mashed, boiled)				
PE21h. Any other vegetables (besides the potatoes, salads)				

Getting & Availability of Non-Prepared Foods for the Household

Now I want to get an idea of how often you get some foods and if you have those foods available in your house right now. Please think back over the last 30 days. I'm going to name some foods and I want you to tell me how often you got these foods for your household in the last 30 days/4 weeks. You may have gotten these foods by buying them, using food stamps or WIC, or receiving them for free. After that I will ask you if you have these foods available in your house right now. Do not include prepared foods from vendors, delis, carry-outs, and restaurants.

In the last 30 DAYS, how many times did you get these foods?	# of times	Available in your house right now?
DRINKS	----------	----------
1. Whole Milk/Vitamin D milk and/or 2% Milk (or Lactaid)		
2. 1% or skim milk (or Lactaid)		
3. Regular soda or energy drinks (Coke, Pepsi, Mt. Dew, Monster, Red Bull, etc.)		
4. Diet soda or diet energy drinks (Coke Zero, Sprite Zero, Pepsi Max etc.)		
5. Regular fruit drinks, sports drinks, fruit punch, lemonade		
6. Low-calorie fruit drinks or sports drinks (ICE drinks, Body Armor, diet Snapple)		
7. Bottled water (any size bottle/jug)		
8. Flavored water (Brand: _____)		
9. 100% Fruit Juice		
10. Sugar free drink mixes (Crystal Light, Wyler's Light, Sugar free Kool Aid mix)		
11. Sweetened Iced Tea (sweet tea)		
12. Unsweetened or diet iced tea		
FRUIT AND VEGETABLES	----------	----------
13. Apples		
14. Oranges		
15. Bananas		
16. Grapes		
17. Other Fresh Fruit (Types: _____)		
18. Frozen Fruit		
19. Applesauce		
20. Fruit cups or canned fruit in juice, water or light syrup (peaches, pears, mixed)		
21. Raisins or other dried fruit		
22. Tomatoes		
23. Carrots		
24. Onions		
25. Dark Green leafy vegetables		
26. Other fresh Vegetables (Types: _____)		
27. Frozen Vegetables		

28. Low sodium Canned Vegetables		
29. Canned vegetables		
MEAT/ POULTRY/ FISH/ PROTEINS	----------	
30. Tuna (fresh, frozen, or canned/pouches)		
31. Chicken breast (fresh, frozen or canned)		
32. Reduced fat hot dogs, sausage or bacon		
33. Regular hot dogs, sausage, or bacon		
34. Beans, dried or canned, no salt or sugar		
35. Baked beans, pork and beans, beans with salt added		
36. Nuts (any type: peanuts, cashews, almonds, etc.)		
37. Seeds (any type: sunflower, pumpkin, etc.)		
38. Peanut butter		
39. Low-fat lunch meat (like turkey or ham)		
40. Regular lunch meat (like bologna, salami, pepperoni)		
CEREALS & BREAD	----------	
41. Sugary cereals (Ex. Fruit Loops, Crunch Berries, Corn Pops, Lucky Charms)		
42. Low-sugar cereals (Ex. Corn flakes, Cheerios, Rice Crispies, Chex, Kix)		
43. High fiber cereals (Ex. Bran flakes, shredded wheat, raisin bran, granola)		
44. White bread or buns		
45. 100% Whole grain bread or buns		
46. Sweetened/flavored hot cereal (oatmeal, grits)		
47. Plain hot cereal (oatmeal, grits)		
48. White rice		
49. Brown rice		
CONDIMENTS & OTHERS	----------	----------
50. Chips (Potato chips, Doritos, Tortilla chips, Cheetos, pork rinds)		
51. Cookies or candy		
52. Reduced fat butter or margarine		
53. Regular butter or margarine, lard or shortening		
54. Low-fat cheese (shredded, string, or block)		
55. Regular cheese (shredded, string, or block)		
56. Eggs		
57. Low-fat yogurt		
58. Light or low-fat sour cream		
59. Light or low-fat cream cheese		

Appendix A-3: Home Food Availability Scoring: Healthier and Less Healthy Items

Healthier Foods	Less Healthy Foods
Drinks	
1% or skim milk (or Lactaid)	Whole/Vitamin D Milk and/or 2% Milk (or Lactaid)
Diet soda or diet energy drinks (Coke Zero, Sprite Zero, Pepsi Max etc.)	Regular soda or energy drinks (Coke, Pepsi, Mt. Dew, Monster, Red Bull, etc.)
Low-calorie fruit drinks or sports drinks (ICE drinks, Body Armor, diet Snapple)	Regular fruit drinks, sports drinks, fruit punch, lemonade
Bottled water (any size bottle/jug)	Sweetened Iced Tea (sweet tea)
Flavored water	
100% Fruit Juice	
Sugar free drink mixes (Crystal Light, Wyler's Light, Sugar free Kool Aid mix)	
Unsweetened or diet iced tea	
Fruit and Vegetables	
Apples	
Oranges	
Bananas	
Grapes	
Other fresh fruit	
Frozen fruit	
Raisins or other dried fruit	
Applesauce	
Fruit cups or canned fruit in juice, water or light syrup	
Tomatoes	
Carrots	
Onions	
Dark green leafy vegetables	
Other fresh vegetables	
Frozen vegetables	
Low sodium canned vegetables	
Meat/Poultry/Fish/Proteins	
Tuna (fresh, frozen, or canned/pouches)	Regular lunch meat (like bologna, salami, pepperoni)
Chicken breast (fresh, frozen or canned)	Regular hot dogs, sausage, or bacon
Reduced fat hot dogs, sausage, or bacon	
Beans, dried or canned, no salt or sugar added	
Nuts (any type: peanuts, cashews, almonds, etc.)	
Seeds (any type: sunflower, pumpkin, etc.)	
Low-fat lunch meat (like turkey or ham)	
Cereals and Bread	
Low-sugar cereals (Ex. Corn flakes, Cheerios, Rice Crispies, Chex, Kix)	Sugary cereals (Ex. Fruit Loops, Crunch Berries, Corn Pops, Lucky Charms)
High fiber cereals (Ex. Bran flakes, shredded wheat, raisin bran, granola)	White bread or buns
100% Whole grain bread or buns	Sweetened/flavored hot cereal (oatmeal, grits)
Plain hot cereal (oatmeal, grits)	White rice
Brown Rice	

Condiments and Others	
Reduced fat butter or margarine	Cookies or candy
Low-fat cheese (shredded, string, or block)	Regular butter or margarine, lard or shortening
Eggs	Regular cheese (shredded, string, or block)
Low-fat yogurt	Chips (Potato chips, Doritos, Tortilla chips, Cheetos, pork rinds)
Light or low-fat sour cream	
Light or low-fat cream cheese	
Total possible healthier food score = 42	*Total possible less healthy food score = 14*

VITA

Kaela McIver graduated from Baylor University in May 2017 with a Bachelor of Science in Family and Consumer Science. She began graduate school at the University of Tennessee in August 2017. During graduate school, Kaela has served as a graduate teaching assistant for Nutrition 100, Nutrition 415, and Nutrition 416 while also assisting on research projects in the Healthful Eating and Active Living Through Healthy Environments (HEALTHE) Lab. Kaela is pursuing a dual master's degree: Master of Science (MS) in Public Health Nutrition and Master of Public Health (MPH) with a concentration in Community Health Education. She will also complete a Dietetic Internship in 2020. Her interests include healthy food access in low-income communities, childhood obesity, and the home food environment. Kaela's long-term career goal is to work to prevent childhood obesity and improve healthy food access among low-income populations.