# The Home Environment and Childhood Obesity

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(ABSTRACT)

The prevalence and severity of childhood overweight has climbed dramatically in the past three decades and is recognized as a serious public health concern that requires urgent action. The home environment has been identified as a key influence on the diet and physical activity of children. Furthermore, low-income families experience obesity at higher rates and current interventions have not been translated from research to practice settings. Therefore, there is a need to evaluate the potential for evidence-based obesity treatment strategies to be translated into community or clinical delivery settings that reach broadly into the population of low-income families. In addition, while the home environment has successfully been targeted to treat childhood obesity, there is a paucity of measurement tools available to provide a comprehensive assessment of the home physical and social environment as it pertains to physical activity and dietary intake. This dissertation includes: (1) a mixed-methods study to determine the feasibility and effectiveness of a childhood obesity treatment intervention based on a partnership with a Health Care Organization and delivered through Cooperative Extension, (2) a systematic review of home environmental measures related to physical activity and dietary intake, and (3) a home environment measure development and validation study.

Smart Choices for Healthy Families (SC) was developed through a research-practice partnership that included a local healthcare provider (Carilion Clinic), Virginia Cooperative Extension (VCE), and an interdisciplinary research team. The aim of this study was to assess the reach, implementation, and effectiveness of SC to reduce the BMI z-scores of overweight and obese children from low-income families. The resultant intervention, based on an evidence-based social-ecological model, included brief physician counseling and referral, six-biweekly group

sessions taught by VCE lay leaders, and six automated telephone counseling calls on alternate weeks. Twenty-six of 264 eligible children (50% boys; mean age=10.5 years) were recruited and 78% completed baseline and 3-month assessments. Over the 6 class sessions, there was an average 65% attendance rate and an average 58% completion rate for the automated telephone calls. Results revealed a significant reduction in children's BMI z-score ($p<0.01$), an increase in lean muscle mass ($p<0.001$) and weight ($p<0.05$), and an increase in Health Related Quality of Life (HRQL; $p<0.0001$). The participating group had a higher income ($p<0.05$) and also participated in fewer food assistance programs ($p<0.05$). Despite this small difference, Smart Choices reached a sample that was representative of the larger target population and was effective in reducing BMI z-score, increasing lean muscle mass, and improving HRQL of low-income obese children.

A systematic review was conducted of the measures of the home environment in order to collect and synthesize the current body of literature. It was found that some authors choose to use non-validated measures and that there is an inconsistent use of measures across the field, making comparisons between studies difficult and conclusions regarding parental influence on childhood obesity difficult to discern. The psychometric properties that were reported on these studies are reported in this review.

Through the systematic review of literature a number of measures were identified that assessed different aspects of the home environment. These measures were compiled and combined to generate a comprehensive tool to assess the physical and social aspects of the home environment that could influence eating and physical activity. This measure plus a social-ecological framework for the measure were provided to experts in the field who provided information on potential areas that had been overlooked and advice on additions or contractions

of items and scales. The modified measure, the Comprehensive Home Environment Survey (CHES), was then tested for reliability and validity in a low-income audience. Parent-child dyads (n=132; Children 47% girls, age range 5 to 17; Parent 82% mothers; mean age=36) were recruited through a pediatric clinic in Roanoke, Virginia, that serves a primarily low-income audience (i.e., 95% eligible for Medicaid). Each of these parents completed the assessment tool and additional surveys to assess concurrent and predictive validity. Height and weight was assessed in each child, and children between the ages of 9 and 17 also completed nutrition and physical activity self-report surveys. Test-retest reliability was assessed in 43 parents who complete the survey a second time one-to-two-weeks following the initial assessment. Inter-rater reliability was assessed in 36 cases by having a spouse or second care-giver complete the assessment tool. Internal consistency, test-retest, inter-rater reliability, and predictive validity all showed promising results. Across the scales internal consistency was adequate to high with Cronbach's Alphas ranging from 0.67-0.92, test-retest reliability was high with Pearson Correlations ranging from 0.73-0.97 and inter-rater reliability was higher with Pearson Correlations ranging from 0.42-0.92. Finally, the CHES displayed predictive validity with subscale scores predicting outcome behaviors (e.g., parents who modeling more physical activity had children who were more active).

This dissertation demonstrated that the home environment is a key factor in the treatment of childhood obesity and provides avenues for both intervention and measurement in this field of study.

TABLE OF CONTENTS

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LIST OF APPENDICES

LIST OF TABLES

## INTRODUCTION AND STATEMENT OF THE PROBLEM

Childhood obesity has reached alarming rates where 32% of children are either overweight or obese (Ogden et al., 2006; Ogden, Carroll, & Flegal, 2008). Over the last several years this trend may have reached a plateau yet the high rates remains steady (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Overweight and obesity in childhood presents many threats in terms of negative health consequences as well as psychosocial difficulties. Formative childhood years are crucial for the development of health behaviors and health outcomes that continue through adulthood. The majority of children who develop obesity during childhood will become obese adults and the resultant health outcomes of experiencing long-term obesity are documented (Dietz, 1997; Nicklas, Baranowksi, Cullen, & Berenson, 2001). Children and adolescents who are overweight or obese are diagnosed with conditions that were previously only observed in adults such as cardiovascular disease, dyslipidemia, type II diabetes and nonalcoholic fatty liver disease (Daniels, 2006; Lee, 2009; Must & Strauss, 1999; Spiotta & Luma, 2008). Considering the current trend in overweight and obesity and the negative health sequelae, by the year 2014 it is estimated that 20% of all health care dollars will be devoted to treating obesity related diseases (Heffler, Smith, Keehan, Clemens, Won, & Zezza, 2003). Additionally, obese children tend to use medical services such as hospitalizations and clinic visits more often than their healthy weight counterparts (Estabrooks & Shetterly, 2007; Hering, Pritsker, Gonchar, & Pillar, 2009; Janicke et al., 2008). Beyond physical complications, children who are obese tend to have poorer health related quality of life (Wake et al., 2009), lower self-esteem (Strauss, 2000), and poor body image and related health risk behaviors (e.g., dieting; Vander Wal & Thelen, 2000).

Obesity is attributed to an energy imbalance, and is likely not due to recent changes in genetics but rather a result of changes in the food and physical activity environments

(Spiegelman & Flier, 2001). A shift in the availability of food and changes in the composition of our diet includes a lack of fruit and vegetable consumption, and increasing amounts of juices, sweetened beverages, condiments, snacks, cheese, and meals eaten at restaurants, in particular, fast food (Helms, 2007; Nicklas, Baranowski, Cullen, & Berenson, 2001). The other side of the energy balance equation is decreased physical activity (Spiegelman & Flier, 2001), obese children engage in significantly less moderate and vigorous physical activity, more sedentary screen time, and participate in less physical education in school than their normal weight counterparts (Datar & Sturm, 2004; O'Brien, Nader, & Houts, 2007; Trost, Kerr, Ward, & Pate, 2001). Some of the environmental causes of decreases in physical activity include urban sprawl (Ewing, Schmid, Killingworth, Ziot, & Raudenbush, 2003), limited free play in children due to real or perceived safety concerns (Burdette & Whitaker, 2005), and jobs that reward more for sedentary position (Philipson & Posner, 2003).

For children under the age of 12 years, the home environment has also been suggested as critical for providing access to healthful foods and opportunities for physical activity (Kumanyika, 2008; Kumanyika, Parker, & Sims, 2010). The parental influence on the development of obesity is apparent. Children of parents who are overweight are more likely to be overweight themselves (Danielzik, Langnäse, Mast, Spethmann, & Müller, 2002; Hunter, Steele, & Steele, 2008; Melgar-Quiñonez & Kaiser, 2004). In particular, a child's weight seems to be influenced most by same sex parents (Perez-Pastor, Metcalf, Hosking, Jeffery, Voss, & Wilkin, 2009) and even grand-parents (Davis, McGonagle, Schoeni, & Stafford, 2008). While genetic factors may be at play, home environmental factors such as the presence of healthy role models, the availability and accessibility of food items and physical activity opportunities are also potential mechanisms that could explain the parent-child overweight relationship. Indeed,

research has found that parents serve as role models for both physical activity (Pugliese & Tinsley, 2007) and diet behaviors (Hood & Ellison, 2000; Orlet Fisher, Mitchell, Wright, & Birch, 2002). Further, parent's control over the availability and accessibility to food items and physical activity opportunities as well as parenting strategies have been related to childhood obesity (Golan & Weizman, 2001). For example, children consume more unhealthy foods if they are available in the home (Campbell et al., 2007; Haerens, Craehnest, Deforche, Maes, Cardon, & De Bourdeaudhuij, 2007; Kristjansdottir et al., 2006) and participate in more physical activity, when the equipment is available (Fees, Stewart Trost, Bopp, & Dzewaltowski; Spurrier, Anthea Magarey, Golley, Curnow, & Sawyer, 2008; Stucky-Ropp, 1993; Timperio et al., 2008). Conversely when more media opportunities are available, children are more likely to engage in these sedentary activities (Dennison, Erb, & Jenkins, 2000; Saelins et al., 2002; Salmon, Timperio, Telford, Alison Carver, & Crawford, 2005; Zutphen, Bell, Kremer, & Swinburn, 2007). In addition to making foods available in the home, parents need to make them accessible to their children by having items within reach and prepared for easy consumption (Blanchette & Brug, 2005; Chandon & Wansink, 2002; Kratt, Kim Reynolds, & Shewchuk, 2000; Kirby, Baranowksi, Reynolds, Taylor, & Binkley, 1995; Utter, Scragg, Schaaf, & Mhurchu, 2008).

As the risk factors become more complex and socially and behaviorally intertwined, lower economic status presents another multifaceted threat for childhood obesity. In an assessment of four sets of nationally representative surveys (NHANES) ranging from 1971 to 2004 it was revealed that trends of increasing overweight had a greater impact on families living below the poverty line when compared to higher income families (Miech et al., 2006). This disparity in health has been attributed to the low cost of energy dense, nutrient poor foods in combination with human genetics and the desire for palatability foods that are high in sugar and

fat (Drewnowski, 2004). In addition, perceptions and beliefs about the cost of healthy food plays an important role in this relationship. Children in households that spent less on groceries per week consumed fewer fruits and vegetable and this was mediated by the perception of the cost of healthy food (Mushi-Brunt, Haire-Joshu, & Elliott, 2007). Reto (2003) adds that dieting, or being chronically hungry, and subsequent reactive overeating that ensues "deregulates" eating and the hormonal responses and cycling may cause stronger urges and pressures to eat.

A parent influences their child's behavioral development related to diet and physical activity through parenting style. Parenting style includes the parent's general demeanor and specific feeding styles. Baumrind defines parenting style with four categories which vary on degrees of responsiveness and demandingness (Baumrind, 1991). One of the types of parenting styles, authoritative, has been shown to be the prefered method of parenting for preventing childhood obesity. The authorative parent is both demanding and responsive being that they are assertive but not intrusive or restrictive (Baumrind). The authoritative parenting style has been linked to children consuming more fruits and vegetables (Kremers, Brug, de Vries, & Engels, 2003), exhibiting better eating habits (Bowne, 2009), and lower rates of obesity (Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006). Further influences on the social food environment come from parents' feeding styles which may foster food preferences that are inconsistent with dietary guidelines (Birch, 1999). Evaluation of feeding patterns during infancy have shown that use of presure and restriction carry forward to the use of these maladaptive control techniques in subsequent years (Blissett & Farrow, 2007; Kim & Peterson, 2008; Kimbro, Brooks-Gunn, & McLanahan, 2007; Moens, Braet, & Soetens, 2007). Kroller and Warschburger (2008) suggested that the relationship between maladaptive feeding strategies such as rewarding and pressurizing are in fact related reciprocally to the child's weight, family income and level of education, all of

which result in a cycle that reinforces continued use of these strategies (Kroller & Warschburger). Similarly children whose parents imposed either very little or a lot of restriction at home consumed more calories in comparison to those children who were exposed to a moderate level of restriction at home (Jansen, Mulkens, & Jansen, 2007). By providing excessive restrictive control over the child's eating and having limited access to highly palatable foods, the child's learning of self-regulation skills is limited (Orlet Fisher & Birch, 2002; Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002). Finally, parental role modeling influences children in food, physical activity, and media behaviors (Bauer, Nelson, Boutelle, & Neumark-Sztainer, 2008; Campbell et al., 2007; Gibson, Wardle, & Watts, 1998; Gillman et al., 2008; Leatherdale & Wong, 2008; Pugliese & Tinsley, 2007; Utter et al., 2008).

Although research evidence indicates that parenting style, feeding practices, and parental weight-status and behaviors are related to childhood obesity, parents often do not recognize that their child is overweight. Without recognition of the problem and readiness to address the issue, lifestyle behavioral change programs and health education will not improve public health as intended. In a review of studies of parents' ability to recognize obesity in their children, parental recognition ranged from 6.2% to 73%, however, in 19 of 23 studies, it was less than 50% (Parry, Gopalakrishnan, Parry, & Saxena, 2008). Parental recognition of their child's obesity differs by the age of the child with greater underestimating in younger children (Wald et al., 2007; West et al., 2008). Additionally, perceptions were more often correct for parents of girls than boys (Wald et al.), more educated parents were more likely to be concerned for their child's weight (Crawford, Timperio, Telford, & Salmon, 2006), and African American parents were twice as likely to underestimate their child's weight as whites (West et al.).

Despite the widespread problem of childhood obesity and the recognition of the numerous risk factors and consequence, attempts at clinical treatment and behavioral change interventions have only been modestly successful in creating change in the targeted behaviors and typically show short term effects (Edmunds, 2001; Estabrooks, Dzewaltowski, Glasgow, & Klesges, 2003; Glasgow, Bull, Gillette, Klesges, & Dzewaltowski, 2002; Kamath et al., 2008). However, there is strong support for the use of lifestyle interventions, even if only modest weight changes or maintenance result from these efforts (McGovern et al., 2008; Wilfey et al., 2007). Other reviews and opinions from experts in the field recommend a focus on the family as a means of intervening on childhood obesity (American Dietetics Association, 2008; Bautista-Castano, Doreste, & Serra-Majem, 2004; Kirk, Scott, & Daniels, 2005; Epstein, 2007). From these reviews it is clear that maintaining a focus on the home environment and keeping parents involved in behavior change of their children is central to the success and level of impact inteventions may provide.

A number of authors have also attempted to adapt social-ecological approaches to explain the relationship between these various home environmental factors and childhood obesity (Golan & Weizman, 2001; Rosenkranz & Dzewaltowski, 2008). Golan & Weizman's (2001) social-ecological model is of particular interest as it has been used to underpin successful childhood obesity interventions. The model focuses on how familial approaches to treat childhood obesity work through the interplay between the home environment and social-cognitive variables with the parent as the main change agent. The model outlines how the relationship between parents' nutrition and health skills and knowledge relate to parenting, modeling and changes to the environment, which ultimately influence the child's weight status (Golan & Weizman). The four areas that Golan's model emphasizes are parental knowledge of healthy lifestyle habits,

parenting skills, the physical home environment and parental role modeling of a healthy lifestyle (Golan & Weizman). In subsequent studies involving only the parents of obese children Golan and colleagues found that both the children's and parent's weight status were significantly improved and the obesogenic load at home was reduced (Golan, 2006). Further, with a follow-up of seven years, it was found that the treatment of childhood obesity with parents as the exclusive agents of change lead to sustained effects (Golan & Crow, 2004; see Appendix A).

Beyond designing interventions that are efficacious, we must also consider whether programs can be feasibly delivered on a larger scale and influence more families. Researchers and practitioners have speculated that addressing overweight status simply through clinical approaches that require parents and/or children to attend multiple sessions of long duration is not practical for delivery on a larger scale (Estabrooks et al., 2009; Glasgow et al., 2002; Klesges, Eck, Hanson, Haddock, & Klesges, 1990). In addition, although there are a number of different interventions developed and tested for overweight children, the majority of these are efficacy trials under which results emerged from ideal conditions and intensive amounts of resources (Doak et al., 2006; Estabrooks et al., 2009; Glasgow et al., 2002). It is suggested that they may not generalize to the values, structures, and beliefs of the intended audience (Yancey, Ortega, & Kumanyika, 2006). For example, the initial interventions developed based on Golan's model were delivered over a 12-month period and included 14 sessions with a clinical dietician (Golan, 2004; Golan & Crow, 2004; Golan, Kaufman, & Shahar, 2006; Golan & Crow, 2004) which may not be an appropriate model for broad reach (Doak et al.; Estabrooks et al.; Glasgow et al.).

Even when effectiveness trials or community based programs are tested, those children with the highest need are often overlooked and researchers are consequently least equipped to address the needs of these understudied segments of the population such as low-income groups

(Yancey et al.). Additionally, many treatment programs for overweight children are lost in translation because the populations treated in clinical trials do not compare to those that providers care for in their clinics or communities (Saelens & Liu, 2007). Due to the high burden of overweight and obesity for children in low-income families and the paucity of research examining home environmental strategies to reduce obesity in this population, this dissertation focused on low-income families with overweight or obese children.

A general intent of this dissertation was to understand the relationships between the home environment, lifestyle behaviors, and weight status using methods that enhance external validity. To assess the sustainability, generalizability, and internal and external validity of the proposed research program, the RE-AIM (Reach, Efficacy, Adoption, Implementation, and Maintenance) framework was used (Glasgow, Vogt, & Boles, 1999). *Reach* is defined as the absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative, intervention, or program. *Efficacy/Effectiveness* is defined as the impact of an intervention on important outcomes, including potential negative effects, quality of life, and economic outcomes. *Adoption* is defined as the absolute number, proportion, and representativeness of settings and intervention agents (people who deliver the program) who are willing to initiate a program. *Implementation* is defined as the intervention agents' fidelity to the various elements of an intervention's protocol, including consistency of delivery as intended and the time and cost of the intervention and the clients' use of the intervention strategies. Finally, *maintenance* is defined as the extent to which a program or policy becomes institutionalized or part of the routine organizational practices and policies as well as the long-term effects of a program on outcomes on the individual level (Glasgow et al.).

A growing body of literature suggests that transdisciplinary research teams that include practice partnerships are more likely to develop interventions that can be effective, efficient, and sustainable in typical community and clinical contexts (Baker, Homan, Schonhoff, & Kreuter, 1999; Estabrooks & Glasgow, 2006; Macaulay & Nutting, 2006; Potvin, Cargo, McComber, Delormier, & Macaulay, 2003). Most theoretical work on program implementation has followed a linear model that links program activities with outcomes in a sequential and non-dynamic manner (Potvin et al.). Such models do not account for the role of program principles and the social and physical context of the delivery environment in the development, implementation, testing, and interpretation of findings that are explicitly addressed within a participatory model marked by a reciprocal relationship between the research and practice-based information (Estabrooks & Glasgow, 2006; MacAuley et al., 1999).

**Rationale**

Childhood obesity and the influences from the physical and social home environment present a number of threats to the health of children, health care costs, and psychosocial adjustment of these children and adolescents. In particular health disparities seen between low-income individuals and their higher income counterparts can partially be traced to higher rates of obesity experienced by these individuals. There is a need to develop, explore, assess and disseminate practical interventions that would include lower-income individuals, be relevant and effective in this population and ultimately be designed for dissemination to speed the translation into practice. Although the correlation between parent-obesity and child-obesity is established (e.g., Danielzik et al., 2002; Hood & Ellison, 2000; Li, Law, Conte, & Power, 2009) little is known about the mechanisms of transmission of obesity from one generation to the next. Further, as indicated above, there are a number of home environmental factors that have been related to

low levels of physical activity and less healthful eating. Yet, there is no comprehensive measure currently available to assess the home environment. Thus there is also a need to establish consistency in measurement of the home environment related to physical activity and nutrition, in particular in a low-income population in order to allow for comparisons across studies, provide opportunities to assess meditational pathways, and ultimately to have more conclusive findings.

**Purpose**

Given the limitations in the current literature, the purpose of this dissertation is multi-faceted and includes two primary studies and a systematic review. First, an intervention pilot study tested the feasibility and effectiveness of a family and home environment-based childhood obesity treatment, among low-income families, that was designed for dissemination. A sequential mixed-methods research study that included quantitative and qualitative follow-up was used to allow for a richer interpretation of the findings. Concurrently, a systematic review of measures of home-environmental factors related to child physical activity, eating, and weight status was completed. The second study followed the completion of the systematic review and included the development and testing of a new home environment assessment tool. The measurement tool was designed to assess both the physical and social environmental components of the home environment that contribute to a child's physical activity and healthy eating through integrating and reviewing past measures and research findings to provide a measure with distinct domanins/subscales that can be utlized in the assessment of home environment influences individually as needed or together as a comprehensive assessment of the physical and social home environment related to nutrition and physical activity.

The dissertation used a manuscript format and three papers are presented. Manuscript 1 describes the mixed-methods study of Smart Choices. Manuscript 2 outlines the systematic review of home environmental measures. Manuscript 3 describes the measurement development and validation.

## Definition of Terms

**Body Mass Index (BMI).** A key index for relating body weight to height, it is defined as a person's weight in kilograms (kg) divided by their height in meters (m) squared.

**Childhood Overweight and Obesity.** Childhood obesity is a serious medical condition that affects children and adolescents. It occurs when a child is well above the normal weight for his or her age and height. BMI for age and gender at or above the 95th percentile is considered obese and BMI for age and gender at or above the 85th percentile is considered overweight.

**Criteria validity.** The performance of your operationalization against some criterion and includes convergent, discriminant, concurrent, and predictive validlity.

**Convergent validity.** The degree to which an operation is similar to (converges on) other operations that it theoretically should also be similar to (e.g., whether the measure correlate with a previously validated measure of the construct).

**Divergent/discriminant validity.** The degree to which the operationalization is not similar to (diverges from) other operationalizations that it theoretically should not be similar to (e.g., whether the measure does not correlate with a validated measure of a construct unrelated).

**Dual x-ray absorptiometry (DEXA).** A technique for scanning bone and measuring bone mineral density and body composition. A DXA scanner is a large machine that produces 2 X-ray beams, each with different energy levels. One beam is high energy while the other is low energy. The amount of x-rays that pass through the bone is measured for each beam. This will vary depending on the thickness of the tissue (i.e., muscle, fat, bone). Based on the difference between the 2 beams, the bone density can be measured. DXA is relatively easy to perform and the amount of radiation exposure is considered low.

**Factorial validity.** A form of construct validity that is established through factor analysis (i.e., determining the subcomponents of a larger construct, subscales on a survey)

**Health Related Quality of Life (HRQL).** Conceptualized as a patient's perceptions of the impact of disease and treatment functioning in a variety of dimensions, including, physical, mental, and social domains.

**Home Environment.** The social and physical components of the home that are related to food and physical activity of children. These components include the availability and accessiblity of food itmes and physical activity opportunities, policies to support healthy eating or physical acitivity, role modeling of healthy eating and physical activity, availability of media equipment, policies related to media, role modeling of media activities, and the kitchen environment.

**External Validity.** The validity of generalized (causal) inferences in scientific studies have external validity if the results can be generalized from the unique and idiosyncratic settings, procedures and participants to other populations and conditions.

**Interactive Voice Response Technology.** Otherwise known as automated telephone counseling this telephone system can respond with pre-recorded or dynamically generated audio to further direct users on how to proceed and provides feedback and information based on selections made by keypad inputs.

**Inter-rater reliability.** The degree of agreement between raters is important when self-report is used as part of your measurement tool.

**Internal consistency.** A measure based on the correlations between different items on the same test (or the same subscale on a larger test). It measures whether several items that propose to measure the same general construct produce similar scores (i.e., the Cronbach's Alpha of the subscales within a survey).

**Psychometrics.** A branch of psychology dealing with the theory and techniques of measurement of mental traits, capacities, knowledge, attitudes, and processes. Practicing psychometrics includes the construction of instruments and procedures for measurement and the development and refinement of theoretical approaches to measurement.

**Predictive validity.** The extent to which a score on a scale or test predicts scores on some criterion measure. We assess the operationalization's ability to predict something it should theoretically be able to predict.

**Test-retest reliability.** We estimate test-retest reliability when we administer the same test to the same sample on two different occasions. This approach assumes that there is no substantial change in the construct being measured between the two occasions and is important when self-report is used as part of your measurement tool.

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# MANUSCRIPT 1

## Smart choices for healthy families: A feasibility study for the treatment of childhood obesity in low-income families.

### Introduction

The prevalence and severity of childhood overweight has climbed dramatically in the past three decades and is recognized as a serious public health concern that requires urgent action (Ogden et al., 2006; Wang & Lobstein, 2006). Furthermore, parents may play a critical role in a child's weight status (Li, Law, Conte, & Power, 2009). The position statement on childhood obesity from the American Dietetics Association highlights the role of parents and outlines specific recommendations to address childhood obesity such as encouraging family meal time and promoting parenting strategies related to food (Nicklas & Hayes, 2008). Unfortunately, under-represented groups have not seen the benefit of programs to reduce childhood obesity (Kirk, Scott, & Daniels, 2005). Low-income children suffer from obesity disproportionately compared to their higher income counterparts (Miech et al., 2006; Singh, Kogan, & van Dyck, 2008). Perhaps this is because low-income individuals are considered a hard-to-reach population due to a lack of resources as well as low levels of health knowledge, and little use of preventive health services (Baruch, Fonagy, & Robins, 2007).

As a result, physicians have received a call to action and recommendations to address weight management for overweight and at risk children (Ariza, Laslo, Thomson, Seshadri, & Binns, 2009; Spear, et al., 2007). Recommendations for treating childhood obesity to physicians can typically be reduced to: increasing physical activity (PA) and fruit and vegetable consumption while decreasing sedentary behavior and sugar sweetened beverage consumption. Although there is some support for brief physician counseling and provision of prevention

materials at well-child visits (Dennison & Boyer, 2004), the literature does not support the conclusion that simply advising patients to be more active and eat better will induce sustained behavior change and facilitate long term weight management (Calfas, et al., 2002). The American Academy of Pediatrics released a policy statement to address the treatment and prevention of pediatric overweight and highlighted a number of strategies that demonstrated efficacy in childhood weight management (American Academy of Pediatrics, 2003). The recommendations for intensive interventions based on behavioral models were drawn from research that used intensive family-based behavior change programs that included strategies that targeted a parent and/or overweight child as primary agents of behavior change (Young, Northern, Lister, Drummond, & O'Brien, 2007).

One program that is offered in the community, EFNEP, serves a population of low-income families with health and nutrition education. EFNEP hires front-line paraprofessional lay leaders from among the population served with the intention that the life experiences of the indigenous lay leaders will enhance their rapport and credibility with the target audience (Bremner, Campbell, & Sobal, 1994, Cooperative State Research, Education, and Extension Service, 2009). A large randomized controlled field trial found that EFNEP was effective in improving nutritional outcomes for youth (Townsend, Johns, Shilts, & Farfan-Ramirex, 2006). In the state of Virginia a cost-benefit analysis revealed that there was a considerable cost savings ($10.64/$1.00) in the prevention of diet related chronic health conditions for those EFNEP participants that completed at least half of the lessons (Rajgopal, Cox, Lambur, & Lewis, 2002).

Of particular interest for younger children is a theoretical model developed by Golan and associates (Golan, 2004; 2006; Golan & Weizman, 2001) that targets the parent as the primary agent of change necessary to address childhood weight management issues. There are a number

of reasons this model is attractive. First, the model is based in sound tenets of social-ecological theory that include an emphasis on modifying the home environment, providing healthful role modeling, developing family policy related to physical activity and healthful eating, and targeting family change rather than child-only change. Second, the model stresses a health-centered, rather than the typical weight-centric, approach. Third, Golan's work demonstrated long-term effectiveness in reducing child BMI and parental cardiovascular disease risk.

It is of note, that the efficacious interventions that target families and the home environment, including those based on Golan's model, have typically involved between 10-16 sessions and the need for frequent follow-up contacts with participants which may not be possible in many settings due to the heavy use of resources (Young, Northern, Lister, Drummond, & O'Brien, 2007). There is a dearth of evidence of interventions that emphasize external validity and translation into practice. Additionally a large portion of interventions may not be feasible in community and clinical settings due to heavy use of resources such as clinical professions (e.g., Kalarchian et al., 2009; Schwartz et al., 2007). Therefore there is a need to develop and assess interventions that are feasible and can be delivered on a broad scale and efficiently. Beyond simply assessing whether an intervention can efficaciously reduce child weight status, it is also important to understand the reach of childhood obesity interventions and whether the participants compare to the larger target population (Glasgow, Vogt, & Boles, 1999; Klesges, Dzewaltowski, & Glasgow, 2008).

The primary objective of this mixed methods study was to explore the feasibility and effectiveness of a family-based intervention to treat childhood obesity that was designed for dissemination and specifically targeted low-income families. Qualitative research methods were

employed to determine feasibility (i.e., post-pilot key informant interviews) while quantitative methods were employed to determine the effectiveness of the intervention.

## Method

Smart Choices for Healthy Families was designed for dissemination using a community-clinical partnership that involved an interdisciplinary team of researchers, clinical practitioners, Virginia Cooperative Extension (VCE) faculty and lay leaders from SNAP-ED. This a priori inclusion was intended to enhance the likelihood of post research sustainability by integrating the research within an existing community resource to deliver lifestyle behavior change programs for children in a low-income population (Evashwick & Ory, 2003). Further, having the VCE lay leaders participate in the development and delivery of the program increased the probability that the program characteristics would align with the organizational mission and resources available for addressing childhood obesity in VCE. Finally, Norris and Baker (1998) reported the para-professional (i.e., lay leader) model is more effective in reaching limited-resource audiences as they represent the target population.

### Procedures

Smart Choices for Healthy Families included a brief physician referral (either by letter or in-office visit) of Medicaid eligible patients to participate in the intervention. A research nurse then contacted referred families, described the nature of the study and intervention, and set an appointment for the parent and child to complete an informed consent and assent and the baseline assessment (see Figure for flow diagram). Parents who declined participation were asked to complete a short telephone survey that included an assessment of basic demographic information. Participating families were asked to complete the intervention and assessments of study outcomes at baseline, one month, and 3 months (post program).

Post-pilot interviews were conducted with a physician partner and the two cooperative lay leaders since these three individuals were involved in the clinical-community partnership. The parent participants were also interviewed and these individuals were selected based on maximum variation sampling to purposively select a heterogeneous sample of parents (Patton, 2002). Specifically we targeted parents that had a child who experienced some weight loss as well as parents who did not, parents who attended all classes and parents who did not attend many classes. Parents were interviewed until theoretical saturation occurred (Patton). A focus group format was employed to gather qualitative feedback from the children in order to allow them to feel more comfortable sharing (Patton).

**Participants**

Participants were parent-child dyads (n=26 dyads) recruited from the Carilion Clinic Children's Hospital in Roanoke, Virginia, through physician referral. Inclusionary criteria required children to be between the ages of 8-12 with a BMI between the 90th and 99th percentile for age and gender, parents to be English speaking, have telephone access, to be a patient of one of the participating practices, and live within the geographic area. Exclusion criteria included patients with diagnosed Downs Syndrome, Prader Willi Syndrome, or being prescribed a medication that would influence appetite (e.g., Zoloft, Ritalin, Concerta, Adderall, Xopenex, Albuterol, Prednisone). The parent could be a biological parent, grandparent or other main caregiver.

The mean age of the children was 10.5 years (SD=1.2), 53.8% of the children were Black, 42.3% were white. Additionally, 96% of the participants were non-Hispanic while 4% of the participants were of Hispanic origin. The mean age of the parents was 39.5 years (SD=12.3) and included two biological grandmothers. The racial and ethnicity composition was the same as

the children, and the majority of the parents (30.8%) earned between $15,000 and $20,000 a year. Of the 26 parents that enrolled, most were unemployed (n=14), some were professional (e.g. accountant, personnel directors, PR, executive directors; n=5), while fewer worked in the service industry (e.g., firefighters, custodians, waitresses/waiters cooks; n=4), and with equipment or in manufacturing (e.g., electricians, mechanics, production line workers; n=3).

**Intervention**

The intervention was developed using a number of different content sources. However, the underlying theoretical basis of the program was a social-ecological approach that focused on providing support for parent behavior change, parenting strategies, role modeling, and home environmental changes to support healthful eating and regular physical activity (Golan & Weizman, 2001). In addition, behavioral targets included increasing physical activity and fruit and vegetable consumption while reducing sedentary behavior and the consumption of sugar sweetened beverages (American Academy of Pediatrics, 2003). Using this framework the clinic-community partnership adapted and integrated 3 programs: (1) Healthy Weights for Healthy Kids—a program for children (Burkett et al., 2007), (2) Eat Smart, Move More—a program for parents (Eat Smart Move More NC, n.d.), and (3) Family Connections—a program for parents (Estabrooks et al., 2009). The initial two programs were chosen because they had a history of delivery through VCE and were popular with low-income families. The final program was selected because it demonstrated efficacy in decreasing child BMI and was developed based upon the underlying theoretical approach that the community-clinic partnership agreed upon (Lesson topics: basic nutrition, healthy drinks, physical activity, sensible portions, positive body image, and media influences).

The resultant program, Smart Choices, was a 12-week program taught by VCE lay leaders and supported by automated telephone counseling. Specifically, small group sessions for children and sessions for parents were designed to be delivered on a bi-weekly basis. The parent sessions included explicit goal setting and feedback opportunities that were aligned with bi-weekly automated telephone sessions. Each automated telephone session included a review of the parent's previous goal, tailored feedback related to the degree of goal success, a brief lesson, and the development of a new goal to be achieved prior to the next small group session.

Smart Choices for Health Families small group sessions included a shared content area for parents and children, but child and parent sessions were conducted separately with the exception of a 10 minutes period when parent and child groups came together. During this time a shared activity that focused on enhancing enjoyment with an emphasis on the lesson content was completed. The topics covered in the Smart Choices program included basic nutrition information based on MyPyramid, activities that enhance parent and child self-efficacy to reduce sugar sweetened drink consumption and sedentary behavior and to increase physical activity and fruit and vegetable intake. Parent content also focused specifically on strategies to change the home environment to support healthful eating and physical activity, to improve parent eating and activity habits, methods to become an active role model, and new parenting skills that facilitate healthy behaviors. The IVR counseling calls supported the content delivered in the group sessions through parental monitoring, goal setting, and feedback loops. The IVR content format has been successful in decreasing BMI z-score previously in the Family Connections study (Estabrooks et al., 2009).

**Measures**

Measurements were collected at baseline, 1-month, and 3-months (completion of program). The child's body weight and height were collected to calculate the BMI for age and gender as well as body composition that was assessed by a dual x-ray absorptiometry (DEXA) scan. The child's body image and the child's and the parent's physical activity, fruit and vegetable consumption, sweetened beverage consumption, and screen time were assessed through self-report surveys. All participants received $25 reimbursement for their time at each of the measurement time points and for the interviews.

**Child Body weight and composition**. The child's body weight and height were collected through a Standard Stadiometer in order to calculate BMI for age and gender according the CDC growth charts (Kuczmarski et al., 2002). Objective measures of body composition and weight were obtained through dual DEXA scanning which is proven safe for children (Sopher, Thornton, Wang, Pierson, Heymsfield, Horlick, 2004).

**Child Health behaviors.** Physical activity, screen time, fruit and vegetable consumption, and sweetened beverage consumption were measured through a simple measure of health behaviors that has been employed in a similar population previously (Gresock, 2004). This is a 21-item questionnaire that also includes three items on parental role modeling (e.g., Do your parents eat fruits and vegetables every day?).

**Child Body Image.** The KEDS is a 14 item self report questionnaire for children aged 8 and above used as a screening tool for eating disorders in children and has shown high internal consistency (Childress, Jarrell, & Brewerton, 1993). Questions are presented with a three response format of "yes," "no," and "don't know" and includes a set of figure drawings to graphically assess weight and body dissatisfaction by selecting perceived "actual" and "desired" drawings. Individual responses are categorized into weight dissatisfaction, restricting/purging,

binge eating, and body dissatisfaction components (Childress et al., 1993). The scale has high internal consistency (α=0.73; Childress et al.).

**Child Quality of Life.** The Pediatric Quality of Life 4.0 Generic Core Scales (PedsQL) measures health-related quality of life (HRQL) in children and adolescents ages 2 to 18 and contains 23 items applicable for healthy school and community populations (Varni, Seid, & Kurtin, 2001). From the PedsQL there are summary, physical, social, and school scores. The dimensions as well as the total score show adequate reliability and validity (α=0.80-0.90; Varni et al., 2001).

**Parent Physical Activity.** The Rapid Assessment Physical Activity Scale (RAPA; (Topolski et al., 2006) includes nine yes/no items assessing the type and amount of physical activity in which adults engage with the benefit of visual representations of activity intensity. In preliminary validation studies it compares well with longer scales and a follow-up validation study has confirmed this (Topolski et al.).

**Parent Health behaviors.** The same short questionnaire that the children completed was also completed by the parents to assess screen time, fruit and vegetable consumption, and sweetened beverage consumption (Gresock, 2004). There were twelve-items which included two added items to the beverage questions in order to assess alcoholic beverages.

**Parent Quality of Life.** The CDC Healthy Day's measure was employed to measure quality of life in the parents. This is a four-item measure that has been shown to be a valid and reliable assessment of quality of life (Barger, Burke, & Limbert, 2007).

**Reach and Representativeness.** Reach of the Smart Choices intervention was determined by calculating the proportion of eligible families that participated in the study. The denominator was based upon children that were identified at each of the participating clinics with

a BMI in the study range. The representativeness of participants included a comparison between those that agreed to participate and those that declined. The variables that were compared between the two groups included the child's age, gender, race, BMI, BMI percentile, the number of people living in the home, the respondent's gender, age, ethnicity, race, education level, participation in food assistance programs, and family income.

**Qualitative Data Collection**

A mixed methods approach was selected for this study in order to expand beyond the quantitative findings to provide a richer understanding of the relationships between childhood obesity and the home environment (Cresswell, 2009). Semi-structured interviews with the parents and a focus group with the children were held in a private office at the location of the programs three months following the completion of the program. The interviews with the physician partner and the VCE lay leaders were held in a location that was convenient for the interviewee. Interviews followed a semi-structured format with a grounded theory approach which allows some flexibility in the interview format and does not set any a priori hypothesis but rather, allows themes and categories to emerge once the data is coded (Henderson, 2006; Patton, 2002). Rather than beginning by researching and developing a hypothesis, the first step is data collection, through a variety of methods and develop theory inductively (Henderson, 2006).

The physician was asked questions such as, "What strategies do you have to address childhood obesity with families currently in your practice?", and "What do you think about physician referral to community programs in order to learn health behaviors or engage in a weight-loss program?", and "How do you feel about your time commitment to recruitment?". The lay leaders were asked questions such as, "What programs do you typically deliver to address obesity?", and "If you were to develop partnerships in the community to support

reversing the childhood obesity epidemic, what would it look like and who would be involved?", and "How would you describe the partnership between Carilion and Virginia Cooperative Extension?", and questions regarding the Smart Choices for Healthy Families program. The parents were asked questions such as, "What were your expectations for the program? What were you hoping to gain from participation?, What do you think about cooking regularly for your family? And questions regarding changes they may have made as a result of the Smart Choices for Healthy Families program. During the children's focus group, questions were asked such as what their favorite activities were and if they made any changes in their diet and physical activity.

**Analysis**

Data were entered into SPSS and tested for normality with the Komolgorov-Smirnov test, a significant result indicated that the variable was not normally distributed. With normally distributed variables, paired samples t-test were performed between baseline and one-month and baseline and three-months. With variables that were not normally distributed, Wilcoxon's rank order tests were conducted.

The interviews and focus group were recorded digitally and transcribed verbatim, then coded for meaning by multiple coders. Each interview was member checked by the interviewee in order to confirm that the meaning shown in the document was indeed what they had meant. Following the grounded theory approach themes and categories in the data were coded inductively (Patton, 2002). This means themes were derived from the data without the use of a guiding theory and meaning derived from this.

## Results

**Reach**

Of the 668 potentially eligible participants drawn from the electronic medical records database, some were eliminated due to being non-English speaking (n=5), the primary physician being outside of the participating practices (n=14), the patient's BMI being outside of the desired range (n=184), and living outside of the geographic area (n=92; see the figure for flow chart). Of eligible patients that contacted for recruitment (n=264), some were not able to be reached (n=30), some declined participation (n=150), and some homes had no response (n=57). The final number of parent-child dyads that participated in the study was 26, which is a twelve percent participation rate (see the figure).

**Representativeness**

When those who accepted to participate were compared to those who declined on several demographic variables there were significantly more people living in the homes of those who declined (M = 3.95, SD = 1.31) than in the home of those who agreed to participate (M = 3.08, SD = 1.32; $p < 0.05$). Additionally, those who agreed to participate had a significantly higher household income ($M_{participants}$ = \$30,000 – \$35, 000, $M_{decliners}$ = \$20,000 – \$25,000; $p < 0.05$). Moreover, those who declined were more likely to participate in SNAP (62% decliners participated in SNAP; 35% participants participated in SNAP; $p < 0.05$). Similarly, those who declined were more likely to receive food assistance from food pantries (49% decliners received help from food pantries; 4% participated received help from food pantries; $p < 0.01$).

**Quantitative Outcomes**

Between baseline (see the table 1 for means and standard deviations on all outcome variables) and one-month there was a significant decrease in BMI z-score ($p < 0.01$), decrease in the child's consumption of sweetened beverages ($T$=-2.00, ; $p < 0.05$), decrease in negative body image ($t$=4.42, $p < 0.01$) improvement in the child's overall HRQL (t = -3.95, $p < 0.01$),

improvement in the child's physical HRQL ($t$ = -3.11, $p < 0.01$), improvement in the child's school HRQL ($t$ = -3.12, $p < 0.01$), increase in the parent's vegetable intake ($T$=-2.18, ; $p < 0.05$), and an increase in parental meal regularity ($t$=11.85, $p < 0.01$).

Between baseline and three-months there was a significant decrease in the child's BMI ($t$=2.92, $p < 0.01$), decrease in BMI z-score ($p < 0.01$), increase in the child's lean muscle mass ($t$=-4.03, $p < 0.01$) and improvement in the child's overall HRQL ($t$ = -4.23, $p < 0.01$), improvement in the child's physical HRQL ($t$ = -4.26, $p < 0.01$), improvement in the child's school HRQL ($t$ = -4.02, $p < 0.01$), decrease in parental screen time ($T$=-2.49, ; $p < 0.05$), and a significant increase in parental healthy cooking ($t$=-3.89, $p < 0.01$).

**Qualitative Results**

The participating physician qualitative responses suggested a common theme that included a lack of time and low perceptions of efficacy to address weight issues during a typical pediatric visit. In contrast the utility of having a community program for referrals was seen in a positive light. This theme is reflected in the following statement made during the semi-structured interview. "So if they are really overweight I will try and talk to the parent, but I am not very successful. (…) it also depends upon a little bit, if I have time to try and talk about exercise and activity levels sometimes I'm able to give targeted guidance along those line. But I sort of anticipate that most of the work is going to be done at the follow-up visit."

Both the lay leaders and the physicians recognize the importance and value of the partnership between VCE and the clinic because more inventive and long-term programming in healthy lifestyle education. One physician response detailed that "doing a referral sort of sends a signal to the parents that we found a problem". Similarly, one of the lay leaders reported, "Since it is the educational component that *VCE* can give, I think that's very important. And our

services are free of course so that would be a big help too, as far as supporting the clinic or any other organization that (…) may not have time for the educational component of it.“

Lay leader responses also highlighted the benefit of including children and parents in the same session. One of the lay leaders who teaches children classes on nutrition and physical activity in the school system identified a limitation of not having the parent directly involved, “I think the biggest barrier [when delivered in schools] is just going in, because they are so low-income that it’s really hard to get the message to the parent from the kid, unless it’s just a change that the kid tries to make on his own, the biggest barrier is getting that from the school to the families. I think you’ve got to make it family oriented for it to work. Versus, me, I could go in all day and do lessons for the kids, but unless they actually can take it home and get mom and dad on board, you never really know how far it goes.”

Parent responses also indicated a perception that combining the child and parent sessions on the same day in the same location was successful. “I think it was a success because the kids were involved, they came back and told the parents what we learned.”

When the parents were asked why they were interested in enrolling for the Smart Choices program they indicated that it was to benefit their child (“Anything concerning one of my kids, you know, to help them, I’m all for it.”), to be a better role model (“I thought it would be something good for the grandchildren since I am overweight, and my grandchildren were getting overweight, I thought it would be a good idea for us to go through this together”)

The enjoyment of the sessions also seemed to be a draw for the parents involved in the study. For example, one of the parents said, “Well, um, I liked em [the classes], but it was mainly her attitude towards them, she loves it here, she was always excited about coming, and she still is”. Another parent reported, “The children was excited about learning, how to eat.” This

sentiment was supported by the feedback gathered from the child focus group. Comments included, “The stuff that I was learning and how fun it was.”

The main barrier to attendance that was experienced was a lack of access to transportation. For example, one parent said, “Just, yeah, well I don’t have transportation which is one thing.” Another parent suggested, “Sending a bus to come and pick us up. That would make it so much easier to get over there since I don’t have my car.” Some of the other barriers to attendance include having a chaotic life and the interfering of the child’s other after school activities. One parent was apologetic for their lack of attendance and mentioned, “It might have been better but my life is a little random at times.” Similarly, another parent identified the child’s homework as a barrier, “With all the homework that Mary gets sometimes it’s hard to do anything else between afterschool, dinner and bedtime.”

In the classes both the participants and the lay leaders identify hands-on activities and the ability to try new recipes as something they enjoyed and benefited from. One parent mentioned, “Well Alisha did seem to enjoy the different foods that were prepared every week, so we did get a couple of healthy recipes.” One of the lay leaders mentioned, “They liked the actual fact that they could taste the recipes before trying them, they loved that. They like the handouts with the recipes, I think that was a really good thing.” Furthermore, the parents also suggested to have more hands on activities “like how we tried the recipes at the end of the class, maybe actually making the recipes would be good.”

The parents and the lay leaders reported that the there were dietary changes made, including increases in vegetable intake and decreases in sugar drink consumption. For example, “We cut back on the amount of fruit juices that we drink because we didn’t realize that it was unhealthy and less soda.” One grandparent made many changes to their families diet

"….and we had smaller plates, we don't eat off these plates (gesture to larger plate size), we eat off like saucers now. They goin crazy on me, cause I still like to eat, cause you know, I cater, cook. But the grandbabies is doin pretty good, huh. (…) We are eating a lot more vegetables, the kids like broccoli, cauliflower and carrots. Now my grandbabies like them raw, but I prefer them cooked. Also, we are using less fat in the cooking, we used to fry things and put lots of butter on em, now we are limiting the fat we use. Like I said, smaller portions with the plate size of saucers. I used to cook 15 porkchops and now I just make 6 and that's enough for everyone, sometimes Roger will have two, but most everyone just has one"

The lay leaders confirmed the dietary changes that the parents reported, "The parents would come back the next week and say they had tried such and such recipe, or this week, we cut back on sodas."

The families also reported that they increased their physical activity, in particular, the parents reporting "making time for more walks" … "instead of watching the TV."

The main recommendation from the participants was the need for more behavior change strategies. For example, "because I don't think it's as much education as it is motivation and behavior change." Another parent reported, "Umm, but as far as actually doing what I learned, I haven't actually applied what I learned like I should have." This same parent reported the desire to make changes but difficulty in doing so, "we've been talking about going in and walking in the mornings before we get up, but for some reason, we have just gotten to bed so late, and getting up so late and we are rushing and it's so much quicker just to get her a 99 cent biscuit on the way to school. Rather than having a bagel and a piece of fruit or something that's healthier. I'm sorry."

Finally, the IVR telephone call component of the program was viewed as helpful. One participant reported, "I liked 'em fine, the lady who called was nice and she called right after the classes. It was nice to be reminded and keep us on track." One of the lay leaders described the benefits of the IVR calls.

"I think that's a good idea, basically because it keep them, number one its accountability and number two it brings them, its keeps them in mind, because a lot of times when you are trying to make a change to your diet or a health situation, you need that constant reminder . So I think that going two weeks in between sessions might have been a little bit too long, so that weekly call that they got in the middle was that little "hey, I'm still here, don't forget" to kind of remind and to look forward to what's coming the following week."

## Discussion

This small pilot study provided an example of a feasible model to treat childhood obesity in a low-income population in a combined clinical-community setting. It is important to track recruitment reach and representativeness, and for Smart Choices for Healthy Families those who accepted to participate in the program were of a slightly higher income and reported less participation in food assistance program than those who declined participation. This finding aligns with previous research which documented that lower-income people are both less likely to participate in research (Yancey, Ortega, & Kumanyika, 2006), as well as lower-income parents being less likely to recognize that their child is overweight and to feel it is necessary to intervene on it (Baughcum et al., 2001).

Despite this being a small pilot study there were positive outcomes, both qualitatively and quantitatively. There was a mean decrease in the children's BMI z-score while their lean muscle mass increased. This shows positive changes in body composition, however, the overall percent body fat did not decrease significantly. Beyond simply having a small sample size and difficulty in behavior change, perhaps these results are partially due to the age group that participated in the study, 8-12 years old, which is an age of naturally occurring metabolic changes along with increasing behavioral risk factors for obesity (Jasik & Lustig, 2008).

Several behavioral risks for obesity decreased in both the children and the parents. The children showed a decrease in sweetened beverage consumption while parents showed an increase in vegetable intake, meal regularity and healthy cooking as well as a decrease in screen

time. This parallels the parent's initial reason for signing up for the program, to help their children and to become better role models in terms of nutrition and physical activity, and shows the resulting behavior changes from that motivation. This is supported in other interviews with mothers of obese children, where they revealed that they did understand that their child's weight was a family rather than individual problem and intended to initiate a range of strategies (Jackson, Mannix, Faga, & McDonald, 2005).

Once the families started attending the classes, the children's enjoyment of the activities was the drawing factor to return, especially due to the hands-on activities. The parents reported both positive dietary changes and physical activity changes from the program. While some of these reported changes were reflected in the quantitative measure, not all changes were. Perhaps the measure was not sensitive enough to change since a short and simple assessment of nutrition and physical activity behavior changes was selected, or perhaps this reflects that the changes the parents reported in the interviews have not been established fully yet, and they are in the process of adopting this new behavior change. In dietary behavior change there has been shown to be a large discrepancy between self-perceived diet and actual diet (Kristal, Glanz, Curry, & Patterson, 1999). Therefore, perhaps these parents were making positive changes to their family's diet, but that this behavior change was still in progress and they were still learning the necessary skills to perform the behavior change to the fullest (Kristal et al.). With that said, individuals also reported that integrating more behavior change strategies would be helpful. Creating a balance between feasibility and dose strength of the behavior change is an area that requires more research, perhaps following a stepped-care approach as suggested previously (Patrick et al., 2006).

The effectiveness of Healthy Weight for Healthy Kids relies on the authority that the physicians have with their patients and the experience and level of rapport that the lay leaders were able to develop with the participants. The assistants' ability to address the cultural sensitivity of the program is largely because they serve as change agents that are representative of the target population. As Rogers (2003) describes, representativeness (homophily) is the degree to which pairs of individuals who interact are similar and homophily between the change agent and audience is predictive of adoption. The use of lay leaders is recommended and what they lack in technical expertise they make up for in social expertness and the development of close personal relationships with a base of trust (Rogers).

Children showed improved body image and HRQL. These results are important to acknowledge since obese children experience decreasing levels of self-esteem and are more likely to experience depression and engage in high-risk behaviors such as smoking or consuming alcohol (Strauss, 2000). Furthermore, interventions addressing childhood obesity need to be health-centered (Golan & Weizman, 2001) and cautious in monitoring body image and other potentially negative outcomes from childhood obesity intervention so as to "first do no harm" (O'Dea, 2005).

The finding from the qualitative follow-up supported the research-practice partnership between VCE, the clinic, and researchers. The physician and the VCE lay leaders both acknowledged the value in having lifestyle behaviors related to childhood obesity taught to families outside of the clinic due to limited time and resources in a medical setting. Further, the VCE lay leaders acknowledged the value of the novel approach of having both parent and child involved in group sessions rather than relying solely on the children to make the change. FNP's organizational structure includes an adult and child group that may decrease the ability to

influence the family unit. Future implications include a recommendation for Health Care Organizations developing partnerships with community-based programs such as VCE.

The final piece of feedback from the participants was that they enjoyed the IVR telephone counseling calls and found them helpful. This is aligned with the completion of the calls, of those that attended the previous class 79% completed the following IVR call. These data support the use of IVR technology in a low-income population as a method to extend the point of contact. Future programs treating childhood obesity in a low-income population could benefit from the inclusion of automated telephone counseling.

The next step to advance the findings presented in this paper is to test the model of physician referral to a community-based program that involves implementation of a modified cooperative extension program to address childhood obesity in a randomized control trial. The control group would receive what is typically delivered in the cooperative extension program which is nutrition and physical activity classes separately for only the children and perhaps a stepped care approach for those families that require a more intensive intervention.

Figure

Flow of Participants

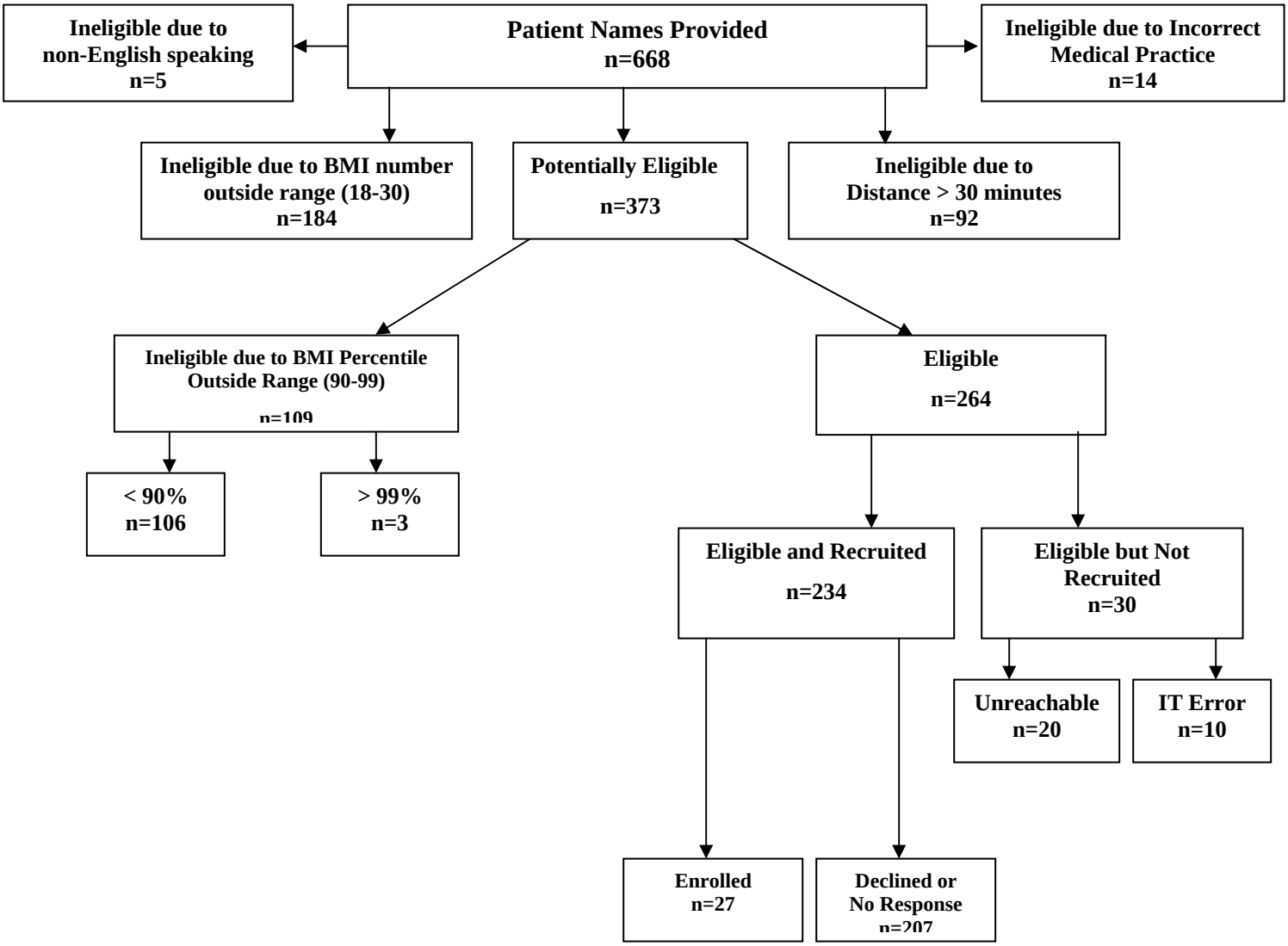
Patient Names Provided
n=668
Ineligible due to non-English speaking
n=5
Ineligible due to Incorrect Medical Practice
n=14
Ineligible due to BMI number outside range (18-30)
n=184
Potentially Eligible
n=373
Ineligible due to Distance > 30 minutes
n=92
Ineligible due to BMI Percentile Outside Range (90-99)
n=109
Eligible
n=264
< 90%
n=106
> 99%
n=3
Eligible and Recruited
n=234
Eligible but Not Recruited
n=30
Unreachable
n=20
IT Error
n=10
Enrolled
n=27
Declined or No Response
n=207

Table 1. Findings at 1- and 3- Months.

| Variable | Baseline | 1-Month | 3-Months |
|---|---|---|---|
| BMI Z-Score | 94.5 (3.5) | 93.9 (4.2)** | 93.6 (4.4)** |
| Child Percent body fat | 38.2 (6.3) | 37.9 (6.9) | 38.0 (7.2) |
| Child Lean muscle mass | 68.9 (10.1) | 68.3 (11.2) | 69.1 (10.4)** |
| Child Weight | 116.1 (18.8) | 114.3 (18.5) | 116.1 (17.7) |
| Child Fruit Servings | 1.3 (0.5) | 1.4 (0.8) | 1.6 (0.6) |
| Child Vegetable Servings | 1.4 (1.0) | 1.3 (0.7) | 1.3 (0.8) |
| Child Soda Consumption | 0.8 (0.7) | 0.8 (1.2)* | 1.1 (1.2) |
| Outside Play Time | 0.8 (0.7) | 0.9 (0.7) | 1 (0.8) |
| Child Screen Time | 1.0 (0.4) | 0.8 (0.4) | 0.9 (0.3) |
| Child Body Dissatisfaction | 2.3 (1.4) | 1.8 (1.1)** | 1.8 (1.3) |
| HRQL- total | 86.2 (6.8) | 90.1 (6.6)** | 90.7 (6.4)** |
| HRQL- physical | 89.7 (5.3) | 93.0 (6.1)** | 95.1 (4.4)** |
| HRQL- emotional | 84.2 (9.9) | 88.3 (12.7) | 86.0 (11.0) |
| HRQL- social | 88.5 (11.6) | 90.2 (11.2) | 91.1 (11.4) |
| HRQL- school | 83.0 (12.0) | 86.9 (11.5)** | 88.1 (10.4)** |
| Parent BMI | 42.8 (11.5) | 34.9 (13.8) | 31.0 (11.1) |
| Parent Quality of Life | 2.1 (1.1) | 2.1 (0.5) | 1.9 (0.9) |
| Parent Report CHAOS | 1.6 (0.5) | 1.7 (0.7) | 1.7 (0.6) |
| Parent Fruit Consumption | 1.2 (0.5) | 1.5 (0.9) | 1.7 (0.8) |
| Parent Vegetable Consumption | 1.4 (0.6) | 1.8 (0.8)* | 1.9 (0.7) |
| Parent Meal Regularity | 0.8 (0.6) | 0.7 (0.6)** | 0.6 (0.3) |
| RAPA – cardio | 1 (1.2) | 1.1 (1.1) | 1.8 (1.1) |
| RAPA – strength | 0.6 (1.1) | 0.6 (1.0) | 1.1 (0.9) |
| Parent Sweetened Beverage Consumption | 1.8 (1.5) | 1.5 (1.1) | 1.5 (1.0) |
| Parent Screen Time | 1.9 (0.7) | 1.4 (0.6) | 1 (0.5)* |
| Parent Healthy Cooking | 3.6 (0.6) | 3.7 (0.6) | 3.9 (0.5)** |

Note. Means are presented with Standard Deviations in brackets.
*p<0.05, **p<0.01

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## MANUSCRIPT 2

## Measures of the home environment related to childhood obesity: A Systematic review.

### Introduction

The prevalence and severity of childhood overweight has increased significantly in the past three decades and action is needed to combat this public health concern (Ogden et al., 2006; Wang & Lobstein, 2006). Negative outcomes from being overweight during childhood include being at a higher risk for a number of chronic and acute conditions (Daniels, 2006) as well as negative social and psychological outcomes (Lee, 2009). The source for the majority of childhood obesity cases can be attributed to lifestyle behaviors that lead to energy imbalance (Dehghan, Akhtar-Danesh, & Merchant, 2005) Increased energy imbalance has been linked to changes in the food and physical activity environments (Spiegelman & Flier, 2001). For example, a shift in the availability of food and changes in the composition of our diet includes a lack of fruit and vegetable consumption, and increasing amounts of juices, sweetened beverages, condiments, snacks, cheese, and meals eaten at restaurants, in particular, fast food (Helms, 2007; Nicklas, Baranowski, Cullen, & Berenson, 2001). The other side of the energy balance equation is the decreased need for physical activity (Spiegelman & Flier, 2001), obese or overweight children engaging in significantly less moderate and vigorous physical activity, more sedentary screen time, and lower participation rates in physical education at school than their normal weight counterparts (Datar & Sturm, 2004; O'Brien, Nader, & Houts, 2007; Trost, Kerr, Ward, & Pate, 2001).

The home environment has also been documented as one that can either facilitate or inhibit healthful eating and physical activity (Golan & Weizman, 2001; Rosenkranz & Dzewaltowski, 2008) and parents are considered to play a key role in the development of a

households social and physical environment. From a social environment perspective, parents serve as role models for both physical activity (Pugliese & Tinsley, 2007) and diet behaviors (Hood & Ellison, 2000; Orlet Fisher, Mitchell, Wright, & Birch, 2002). Parents also influence child eating and activity behavior based upon the way that they parent. For example, an authoritative parenting style (i.e., both demanding and responsive without being intrusive or restrictive; (Baumrind, 1991). has been linked to children consuming more fruits and vegetables (Kremers, Brug, de Vries, & Engels, 2003), exhibiting better eating habits (Bowne, 2009), and exhibiting lower rates of obesity (Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006). Further influences on the social food environment come from parents' feeding styles which may foster food preferences that are either consistent or inconsistent with dietary guidelines (Birch, 1999). Evaluation of feeding patterns during infancy have shown that use of pressure and restriction carry forward to the use of these maladaptive conrol techniques in subsequent years (Blissett & Farrow, 2007; Kim & Peterson, 2008; Kimbro, Brooks-Gunn, & McLanahan, 2007; Moens, Braet, & Soetens, 2007). Kroller and Warschburger (2008) suggested that the relationship between maladaptive feeding strategies such as rewarding and pressurizing are in fact related reciprocally to the child's weight, family income and level of education, all of which result in a cycle that reinforces continued use of these strategies (Kroller & Warschburger). Finally, parental role modeling influences children in food, physical activity, and media behavior choices (Bauer, Nelson, Boutelle, & Neumark-Sztainer, 2008; Campbell et al., 2007; Gibson, Wardle, & Watts, 1998; Gillman et al., 2008; Leatherdale & Wong, 2008; Pugliese & Tinsley, 2007; Utter et al., 2008).

From a physical environment perspective, children consume more unhealthy foods if they are available in the home (Campbell et al., 2007; Haerens, Craehnest, Deforche, Maes, Cardon,

& De Bourdeaudhuij, 2007; Kristjansdottir et al., 2006) and participate in more physical activity, when the equipment is available (Fees, Stewart Trost, Bopp, & Dzewaltowski; Spurrier, Anthea Magarey, Golley, Curnow, & Sawyer, 2008; Stucky-Ropp, 1993; Timperio et al., 2008). In addition to the availability of healthful foods in the home (presence of food items), those that are more accessible (within reach and prepared for easy consumption) are also more likely to be consumed (Blanchette & Brug, 2005; Chandon & Wansink, 2002; Kratt, Kim Reynolds, & Shewchuk, 2000; Kirby, Baranowksi, Reynolds, Taylor, & Binkley, 1995; Utter, Scragg, Schaaf, & Mhurchu, 2008). Similarly, when more screen opportunities are available (e.g., computer, television, handheld games), children are more likely to engage in these sedentary activities (Dennison, Erb, & Jenkins, 2000; Saelins et al., 2002; Salmon, Timperio, Telford, Alison Carver, & Crawford, 2005; Zutphen, Bell, Kremer, & Swinburn, 2007).

There have also been a number of reviews of literature on interventions that target family and home environment factors to improve eating, activity, and weight status in children (Berry et al., 2004; McLean, Griffin, Toney, & Hardeman, 2003; Moore & O'Donohue, 2005; Nowicka & Flodmark, 2008; Ventura & Birch, 2008; Young, Fors, Fasha, & Hayes, 2007). In each case there has been a consistent call for assessing all relevant home environment variables with validated measures. To develop an accurate assessment of the influence of the home environment as it relates to childhood obesity it is important to have strong conceptual models and validated measures (Hand, 1996). Several groups of researchers have worked independently over the past 20 years developing measures of parental influence on childhood obesity and various components of the home environment that are pertinent to specific programs of research. As a result there is a wide variety of measures available. The disadvantage of having multiple measures of the home environment is that there is no standard by which results can be compared.

Based upon the proliferation of measures of different components of the home environment there is a need to provide clarity on what is available and the degree to which measurement tools can validly and reliably provide a comprehensive assessment of the home environment. Therefore, the purpose of this systematic review is to examine the measurement tools of the home environment as it relates to childhood obesity.

## Method

The guidelines for conducting a systematic review by Glenny, O'Meara, Melville, Sheldon, and Wilson (1997) were followed and include describing inclusion criteria based on the relevance of the manuscript, the outcomes, the design, and the search strategy. To frame the review the home environment will be defined by a modified conceptual model described by Gattshall and colleagues (2008; see Appendix B).

### Relevance

Relevant studies were considered if the focus was reporting on a validated measure of the home environment related to child eating and physical activity behaviors and childhood obesity or its sub-components as outlined above.

### Outcomes

Studies were also included if they are a description of the validation of a measure of one or more of the following components: feeding style, physical activity physical environment (availability/accessibility), food physical environment (availability/accessibility), food social environment (parental role modeling – health eating, parental policies – health eating), physical activity social environment (parental role modeling – physical activity, parental policies – physical activity).

### Design

Inclusion of measurement validation studies reported on at least one of the following psychometric properties: test-retest reliability, inter-rater reliability, internal consistency, criteria validity (sensitivity, specificity), convergent validity, divergent validity, predictive validity, or factorial validity. Additionally, the measure could be a survey instrument completed by the parent or child either in paper-pencil format or by a telephone or in-person interview or completed by the researcher through direct observation.

**Search Strategy**

The following databases were searched: MEDLINE, PYSCLIT, CINAHL, ERIC, and PsychINFO. Additionally, citations of the articles resulting from the searches were scanned for inclusion. Once potentially eligible manuscripts were identified, they were screened for inclusion and several were eliminated at this point.

**Inclusion criteria and data extraction**

Manuscripts published between the dates of January 1998 and May 2010 were searched with the following key terms: measurement, survey, childhood obesity, home environment, parenting style, feeding practices, feeding style, food availability (fruits and vegetables, fats and sweets), food accessibility (fruits and vegetables, fats and sweets), physical activity availability (sports equipment, exercise equipment), physical activity accessibility (sports equipment, exercise equipment), parental role modeling of healthy eating or physical activity, parental policies to support healthy eating or physical activity (see Table 2 for details on search terms used).

**Exclusion criteria**

No attempt was made to search for unpublished literature and other manuscripts were eliminated if they were a review, utilized a qualitative methodology, included a measure that was

not specific to children, not publishing the measure the authors were reporting on, or were not published in English.

## Results

Overall the combined search strategies identified 49 manuscripts of measurement validation of parental and home environment influences on childhood obesity or diet and physical activity. After reviewing the abstracts of these studies in more detail 11 were eliminated, two more manuscripts were added from screening reference lists of the existing papers and another three were eliminated upon reading study details and findings exclusionary criteria. A total of 37 manuscripts were included in the final review (see table 2 for search results). Of the 37 papers reviewed, 59% discussed some aspect of parenting specific to food, feeding style and food socialization. Thirty-two percent of the manuscripts measured food availability and accessibility, 11% measured physical activity availability, 5% measured media availability, 8% focus on parenting related to physical activity and 11% focus on parenting related to screen time.

The main reason for excluding articles was a lack of psychometric properties reported such as inter-rater reliability or internal consistency (see table 3 for a summary of the psychometric properties reported).

### Food availability and accessibility in the home

Several researchers have developed measures of the availability and accessibility of both healthy food items and less healthy food items in the home with a greater emphasis on fruits and vegetables. While no gold standard exists for examining availability and accessibility of foods in the home, many trials have used in-home inventories. This procedure involves a researcher checking off food items or food groups that they observe in the home. Rosno and colleagues

categorized foods observed into red, yellow, and green based on nutritional value (red foods are to be eaten sparingly, yellow foods in moderate amounts, and green foods without restriction; Rosno, Steele, Johnston, & Aylward, 2008). Similar inventories have been conducted through the researcher's observation (e.g., Spurrier et al., 2008).

However, in many studies it is not feasible to have an in-home inventory of every participant and a fruit and vegetable availability and accessibility checklist is has been utilized. Hearn, and colleagues (1998) created a checklist of 10 fruits and 10 vegetables most commonly consumed by children and three items assessing accessibility (fruit and vegetables out in the open, cut up and ready to eat, fruits and vegetables within reach for children). Low internal consistencies were obtained when fruit and vegetable availability and accessibility were computed separately, and the Cronbach's alpha increased to 0.69 when the two scales were collapsed. However, collapsing scales together does not allow for an accurate assessment of the underlying construct since more than one variable is included in the scale (e.g., Hand, 1996). The general guideline for adequate internal consistency is a Cronbach's alpha over 0.70 (Nunnally, 1978).

Other researchers have taken the checklist Hearn applied and added several fruit and vegetable items. For example, Marsh, Cullen, and Baranowski (2003) asked participants about the availability of 13 types of fruits and 18 types of vegetables in the home over the previous seven days. In this validation study Marsh and colleagues evaluated the validity of the measure by also conducting in-home inventories. The authors were able to support the measure with substantial sensitivity and specificity, meaning that the parent-reported availability and accessibility agreed with the observations collected by the researcher. Higher false positive rates appeared with highly perishable items which tend to be consumed at a faster rate (Marsh et al.).

Subsequent use of the fruits and vegetable availability and accessibility inventory in parents have shown similar alpha scores to the scale administered by Hearn and colleagues ($\alpha = 0.70$; Cullen et al., 2000; $\alpha = 0.77$, Cullen et al., 2004).

Cullen and colleagues (2003) found that the scale showed improved internal consistency when children reported ($\alpha = 0.83$ for availability and 0.92 for accessibility). The authors suggested that children may have more internally consistent perceptions of their home environment or perhaps adults show greater response bias (Cullen et al., 2003). Additionally, Cullen and Thompson (2008) reported a Cronbach's alpha of 0.85 for fruit and 0.82 for vegetables when fourth to sixth-grade African American students reported on availability.

Fulkerson and colleagues (2008) modified the availability and accessibility scale even further to include a more comprehensive list of food items more reflective of diets in the U.S. beyond that of just fruits and vegetables. The resulting Home Food Inventory (HFI) contained 190 items which respondents would indicate if an item was present (yes/no) and whether it was canned, dried, fresh or frozen as appropriate (Fulkerson et al.). Criterion validity was assessed through validation using an in-home inventory (Fulkerson et al.). Agreement between the researcher and the participant was substantial, supporting the validity of the HFI (Fulkerson et al.). Furthermore, the food groups indicated through the inventory were positively correlated to consumption of those foods on the 24-hour food recall (Fulkerson et al.).

Rather than focus on fruit and vegetable consumption, Campbell and associates (2007) choose to focus on the availability of unhealthy foods. They administered a survey of the home food availability through ten items and a factor analysis revealed three factors – 'unhealthy foods', 'healthy foods', and 'general food availability'. The Cronbach's alphas were low for the latter two so they were not included in the study. The availability of unhealthy food was a robust

predictor of obesity and consumption of calorie dense, nutrient poor snacks in the place of less calorie dense options like fruits and vegetables (Campbell, Crawford, Salmon, Garnett, & Baur, 2007). Availability has also been assessed by simply asking whether parents purchase fruit and snack foods on their child's request and if they liked to keep fruit or snack foods in the house in a place that catches the eye (van Assema, Glanz, Martens, & Johannes Brug, 2007). Percentage test-retest agreement was reported as 71% to 82% for the dichotomous items on availability. The results suggested that parents are more likely to report greater availability of fruits than their children and that self-reported intake was correlated more with the children's report of availability, except in the case of breakfast intake, this was correlated more with parent's report of availability. This highlights the difference in child and parent reporting as previously mentioned. Similarly, availability can be assessed by asking children if their parents would purchase the fruit that they requested and if there is usually fruit available in their home (De Bourdeaudhuij et al., 2005). The measure used in intervention trials across Europe assessed a number of psychosocial variables related to diet in addition to family rules – demands and allowances (results from this domain are reported below), availability at home, and availability away from home. The three items assessing the availability within the home had low-to-adequate internal consistency (Cronbach's alpha 0.55-0.76) while the ICC's indicated adequate test-rest reliability (ICC 0.48-0.65).

**Physical activity availability and accessibility**

Several studies assess the home environment in terms of the availability and accessibility to physical activity. Home physical activity environment was assessed through a measure with 17-items that asked whether the child had certain items at home (Hume, Ball, & Salmon, 2006). Test-retest reliability for the home physical environment and physical activity opportunities scale

showed moderate reliability with the exception of having a covered area outdoors and having active toys (Hume et al., 2006). The measure Hume and colleagues employed was taken from a large study which assessed the family environment as a potentially potent source of influence on children's physical activity and sedentary behaviors. The authors found that children with seven or more physical activity equipment items in the home were between two to four times more likely to be in the highest physical activity category and children with a large yard were more active than those with a smaller yard size (Salmon, Telford, & Crawford, 2004).

In a more extensive measurement of the physical activity environment Sirard and colleagues (2008) established the test-retest reliability and validity (compared responses of participants to researcher's observations) of the Physical Activity and Media Inventory (PAMI). In the PAMI participants record whether they have specific equipment in categories (sports equipment, fitness equipment, transportation equipment, water sports equipment, and outdoor/yard equipment and media equipment) and each item is multiplied by the score of accessibility ('put away and difficult to get to' to 'in plain view and easy to get to'). From this measure researchers can rank the overall quality of the home environment score by a ratio of activity-to-media equipment (Sirard et al.). The authors recommend that the PAMI can be used in conjunction with other home assessment tools (e.g., home food availability) to identify obesiogenic home environments.

**Media equipment availability**

Sedentary activities which, in today's technology and media driven world, is often determined by the opportunities the child has to engage in screen time (Wartella & Jennings, 2000). Salmon and colleagues (2005) simply had parents complete an inventory of items in their home that may encourage or support children's screen-based behaviors or low level activity: pay

TV, free-to-air TV, video/DVD player, electronic games, computer, Internet access, and TV sets in the child's bedroom. The percent agreement between tests (test-retest) was high (91% - 99%). Findings showed that having pay TV and electronic games at home predicted increased sedentary behavior (Salmon et al., 2005).

Rosenberg and colleagues (2010) developed a measure of media and physical activity equipment in the home based on previous measures and established the test-retest reliability. There were 21 electronic items and 14 physical activity items with acceptable test-retest reliability (ICC 0.54 - 0.92). Parent and adolescent reports had high agreement, but the test-retest reliability was higher for the child reported availability. Predictive validity showed that electronic equipment in adolescents' bedrooms was positively related to sedentary behavior and activity equipment in the home was inversely associated with television time in adolescents and children, and positively correlated with adolescents' physical activity.

Timperio and colleauges (2008) examined associations between family physical activity and sedentary environment (including reinforcement, rules and restrictions, role modeling, and availability) related to BMI. Test-retest reliability for the Likert scaled items was acceptable (ICC=0.81-0.90) and for checklist items, percent agreement was high for physical activity items (≥91%) and sedentary items (≥83%; Timperio et al.).

Similar to the assessment of fruit and vegetable availability some authors take a simple approach with telephone interviews inquiring how many TV's the family has in their home and whether the child has a TV in their bedroom (van Zutphen et al., 2007). Psychometric properties of this telephone interview were not presented, but results revealed that families with only one TV in the household and no TV in the child's bedroom watched less TV, which ultimately was

related to lower weight status in children supporting predictive validity of this short measure (van Zutphen et al.).

**Parental role modeling and policies for healthy eating and physical activity**

Beyond the physical environment in the home, parents are also responsible for providing the social environment that can either encourage or discourage healthy choices (Golan & Weizman, 1998). Young and colleagues (2004) assessed parental influence on children's dietary behaviors through parental encouragement in a 6-item scale with acceptable internal consistency ($\alpha = 0.87$; Sallis et al., 1987). Since Sallis and colleagues published their Heart Healthy Eating Habits Scale prior to the cut-off of 1998 we will only report on Young's use of this scale. Young and colleagues modified this scale based on a factorial analysis and face validity to ensure that all four types of social support were included (material, informational, and emotional). The results of Young and colleagues revealed that parental modeling and support were significant predictors of consumption in middle school students in the U.S. Similarly, Evans and collegaues (2006) asked parents about social support for fruits and vegetables. There was a Cronbach's alpha of 0.83 for instrumental support and an alpha of 0.71 for emotional social support.

Another way researchers can measure parental influence on children's health behaviors is through rules and policies that they implement. Van Assema and colleagues (2007) assessed parents food rules for fruit, snacks, and breakfast with a few items for each type of food (e.g., do you have a rule for when snacks can be eaten). Test-retest reliability was low-to-adequate for the rules and policy scales (69-88% agreement).

Campbell and colleagues (2007) assessed meal and eating formality and parenting consistency for feeding and television viewing which can both be considered parental policies for healthy eating in the Gattshall model. The internal consistencies were low to sufficient for

these two scale ($\alpha = 0.68$ for meal formality, $\alpha = 0.80$ for parenting consistency). The findings revealed that older children may be less influenced by parental role modeling compared to younger children in previous studies where modeling was supported as a strong predictor of consumption (Campbell et al.). Perhaps the mother's eating behaviors influence older children's consumption through availability of these foods in the home rather than the learning that may occur in younger children through parental role modeling.

Pearson and colleagues (2009) asked parents about the frequency with which they modeled physical activity or healthy eating or provided transportation or financial support to their child for physical activity and dietary behaviors. Although the items were provided in an additional file it does not appear that the psychometric properties of these questions were reported (Pearson et al., 2009). The authors demonstrated that parental modeling is a consistent correlate of positive health behaviors in boys and girls and not necessarily within the same behavior domain. This presents a challenge for interpreting construct validity, but further research with this measure is necessary.

Some studies focus more on physical activity and screen time behavior. Hume and colleagues (2006) asked children over the last month how often were their parents, grandparents, siblings or friends were active with them as well as if somebody at home encouraged them to be active over the past month. This scale showed adequate test-retest reliability and acceptable consistency ($\alpha = 0.73$). Salmon and colleagues (2005) asked parents about rules and restriction they implement with their children regarding screen time (e.g., how often they restricted their child's screen-based behavior), this scale showed adequate test-retest reliability. Parental role modeling was assessed through the estimated total time the parent spent watching TV, playing electronic games, and using the computer during their leisure time and how often they do these

activities as a family (Salmon et al.). These items showed adequate test-retest reliability as well. Families with more rules about TV watching had children with lower levels of TV watching (Salmon et al.). Additionally, parents who used the computer a lot and had a strong preference for the internet and computer and families that used the computer together had children who spent more time in screen-based activities (Salmon et al.).

Cullen and associates (2001) measured parental modeling through child reported 12-items (e.g., My parents eat vegetables at supper when I am with them) which showed sufficient internal consistency with a Cronbach's alpha of 0.89. In this measurement study they also assessed parent encouragement to eat fruits and vegetables and this had an internal consistency of $\alpha = 0.88$. Cullen and Thompson (2008) also employed these two measures and supported the internal consistency and found that after receiving an internet-based intervention targeting African American parents and children, daughters reported significant increases in parent modeling of fruit consumption and marginally significant increase in parent modeling of vegetable consumption.

In a more wide-ranging attempt to assess parenting strategies specific to both eating and activity, Larios and colleagues (2009) developed and tested the Parenting Strategies for Eating and Activity Scale (PEAS) in a sample of Latino women. The measure was designed to be available in both English and Spanish and the factor analysis supported a five factor solution: limit setting, discipline, concern, monitoring, and control (Larios et al., 2009). Internal consistencies for this scale were sufficient with Cronbach's alphas ranging from 0.81- 0.82. Finally, the construct validity was established for the PEAS with the subscales having positive correlations with those of the appropriate subscale of the Child Feeding Questionnaire (CFQ). In a final phase of this study Larios and colleagues found that women who reported using more

strategies to reduce fat in her family's diet were more likely to use control strategies such as limit setting and discipline. Along the same lines Vereecken and colleagues (2004) developed a measure that assessed permissive and restrictive rules for eating, pressure for eating, using food for a reward, encouragement and discouragement for eating, catering on children's demand and avoiding negative modeling behavior. The internal consistencies for these scales were sufficient with Cronbach's alphas ranging from 0.71 – 0.94. Analysis of all these factors revealed that mothers' consumption was an independent predictor for all four outcome variables, verbal praise was a significant predictor for children's vegetable consumption, permissiveness for regular consumption of soft drinks and sweets and using food as a reward for regular sweet consumption (Vereecken et al.). Differences in children's food consumption by mother's education level were completely explained by mother's consumption and other food parenting practices (Vereecken et al.).

**Multiple components of the home environment**

In efforts to expand the understanding of the home environment other authors have developed measures that assess multiple components of the home environment. Upon examining the Physical and Nutritional Home Environment Inventory (Spurrier et al., 2008), the following components of the home environment were included: parental role modeling for physical activity and policies for screen time and diet, the remaining items assessed the dietary and physical activity behaviors of the child. Although testing the psychometric properties of this measure of the home environment was beyond the scope of the manuscript the authors did report on the relationship between the measured constructs and outcomes that should be theoretically related (predictive validity). For example, fewer rules about TV viewing and presence of playstation

were associated with more indoor sedentary time, the size of the participant's back yard and the amount of outdoor play equipment were associated with more outdoor play time (Spurrier et al.).

Project-EAT was a large study to investigate the factors influencing eating habits of adolescents and the measure was 221-items assessing a range of socio-environmental, personal, and behavioral factors hypothesized to be associated with dietary intake among adolescents (Neumark-Sztainer, Wall, Perry, & Story, 2003). To assess availability children were asked if vegetables were served with dinner. The internal consistency was moderate despite a large sample size with the Cronbach's alpha = 0.63. Home availability was a strong predictor of consumption, however, in homes where preference for fruits and vegetables was low the availability did not matter, on the other side, in homes where preference was high, availability was an important predictor. Meal patterns are important to consider since this is when parental role modeling may take place and learned behaviors are initiated. The subscales had low internal consistency ($\alpha = 78$ for family meal patterns and $\alpha = 0.43$ for social support for healthy eating). Although Project-EAT emphasized nutrition, there were items asking how much the participants mother and father encouraged them to be physically active and how much she cared about staying fit and exercising (Bauer et al., 2008). These items showed adequate test-retest correlations between 0.66 and 0.69 (Bauer et al.). This study showed the importance of encouragement to be active by adolescents' same sex parent with the exception of older males (Bauer et al.).

Dave and associates (2010) developed and tested the Home Nutrition Questionnaire for a low-income mainly Hispanic population. These six factors included child's preferences for FV, parental practices that promote FV, parental role modeling, perceived cost of FV, perceived benefits of fast food and eating while watching television. In addition the authors assess

availability and accessibility to fruits and vegetables based on previous measures. The internal consistency of the scales was adequate-to-high (Cronbach's alpha 0.69-0.87). Through regression modeling the authors found that parental modeling and policies lead to increased availability and accessibility to fruits and vegetables. In addition, a perceived benefit of fast food lead to decreased availability and accessibility to fruits and vegetables in the home.

Bryant and her colleagues (2008) assessed multiple components of the home environment in their Healthy Home Survey (HHS) including food, media, and physical activity availability and accessibility, parental role modeling and policies for eating and physical activity over a telephone interview and had an in-home inventory to validate the responses. The test-retest was almost perfect for food availability in terms of percentage of items that were in agreement. Kappa scores show response prevalence and possible bias in responses which was evident in several constructs. Validity (in-home assessments) estimates were lowest for sweet snacks and fresh vegetables and highest for frozen fruit and frozen vegetables. Test-retest reliability for food variety was high for most items except fresh fruit. Food environment (accessibility) showed good reliability and poor validity. Eating practices show adequate reliability except for questions regarding child only being allowed to eat at set meal items, polices for second helpings, and whether a parent considers themselves to be healthy. Physical activity and media environment show adequate reliability and validity except for the presences of bike or riding toys, rating of having adequate play space inside, yard measurement, and computer in the child's bedroom. The results of the HHS suggest that measurement of variety and quantity of foods may be a better indicator of quality foods in the home rather than presence or absence alone.

Finally, Gattshall and colleagues (2008) developed and tested the HES which assesses a breadth of home environment variables including the availability and accessibility of food (both

fruits and vegetables and fat and sweets), the availability and accessibility of physical activity, parental role modeling of healthy eating, physical activity, and parental policies for eating and physical activity (Gattshall et al.). The internal consistencies were low-acceptable for these scales with Cronbach's alphas ranging from 0.66 – 0.84, except for the accessibility of fat and sweets scale which had a low alpha (0.59). Test-retest reliability was modest to high with Pearson correlations between the two tests being 0.49 – 0.99. Inter-rater reliability was modest to high with Pearson correlations between 0.22- 0.70 indicating some differences between parents report of the home environment, in particular for the physical activity availability, parental policies for physical activity and healthy eating, fruit and vegetable accessibility, and fat and sweets accessibility. In terms of validity, the subscales showed strong predictive validity with physical activity of both the child and parent being significantly correlated with the appropriate subscale. Similarly, various dietary outcomes were correlated with scores on the appropriate subscale. Despite some low inter-rater reliability scores the benefit of the HES is that the subscales are appropriately divided so that one subscale is only assessing one construct and the psychometric properties and outcomes associated with these are not blurred between multiple constructs on the same scale as in some of the previous measures.

**Screeners or short measures of the home environment**

Ihmels, Welk, Eisenmann, and Nusser (2009) developed and tested the Family Nutrition and Physical Activity (FNPA) screen tool to screen for a familial environment and behaviors that may predispose a child to become overweight. This is a 21-item survey resulted in a single factor which assessed parental role modeling of nutrition and physical activity, television availability and dietary/nutrition/sleep behaviors. Two items regarding restriction and reward use were removed from the data set due to participant's misinterpretation of restriction as a positive

strategy. This measure combines home environment variables with child behaviors as do the following two measures.

Wilson and colleagues (2007) developed and tested the Child Nutrition Questionnaire which assesses fruit and vegetable availability and accessibility and parental policies for healthy eating in 14-items. They found adequate test-retest reliability in 10 of the 12 scales and low-to-acceptable internal consistencies with Cronbach's alphas ranging from 0.50 – 0.80.

Golan and Weizman (1998) created the Family Eating and Activity Habits Questionnaire (FEAHQ) and included the availability of unhealthy foods as an indicator of stimulus exposure in addition to child eating behaviors. The eight items assessing availability had adequate internal consistency with a Cronbach's alpha of 0.78 and the test-retest was acceptable.

**Feeding style**

Feeding style has received a lot of attention in research, largely separate from the home environment, but is relevant to the social food environment as it is closely related to parental policies for healthy eating. Feeding style is defined as the strategies and parenting specific to the child's eating and is particularly important for younger children. Birch and colleagues developed and tested the Child Feeding Questionnaire (CFQ) and multiple authors have used this measure over the past 20 years. In a sample of almost 400 parents Birch and colleagues (2001) established a seven factor model which focused on two broad categories: parental perceptions and concerns regarding child-feeding practices and parental use of child-feeding practices. The seven factors included in this model were: perceived responsibility for the child's weight, perceived parent weight, perceived child weight, concern about child weight, pressure to eat, restriction, and monitoring and all subscales have high internal consistency (Cronbach's alphas ≥0.71; Birch et al.).

Other authors utilize certain subscales from the CFQ based upon their research questions. Campbell and colleagues (2007) utilized some subscales from the CFQ but modified them to be from the perspective of the child and conducted a factor analysis to reveal the unique factor structure due to the change from parents reporting to children reporting. Children reported on their perception of their parent's concern about their weight and perceptions of their feeding style (monitoring, food as a reward, and pressure). The internal consistencies of these factors were low-adequate with Cronbach's alphas ranging from 0.60 – 0.82. Robinson, Kiernan, Matheson, and Haydel (2001) assessed the level of control over their child's intake and had low internal consistency ($\alpha = 0.61$) and found that contrary to their hypothesis greater levels of parental control was negatively associated with body weight of third grade children (Robinson et al.). The authors conclude that previous findings of control being related to greater body weight of the child do not apply to younger children (ages 8-9) of diverse ethnic and socio-demographic backgrounds (Robinson et al.).

Arredondo and colleagues (2006) adapted the CFQ based upon focus groups with Latina mother's and yielded a five factor measure which assessed diet and activity under each of the parenting style dimensions: monitoring, discipline, control, limit setting, and reinforcement. Internal consistencies of these subscales were adequate with Cronbach's alphas ranging from 0.72 – 0.87. The findings of this study revealed that parental use of positive reinforcement and monitoring was associated with children's healthy eating and exercise. Also, parents' use of appropriate disciplining styles was associated with healthier eating while parental use of control styles was associated with unhealthy eating. Daughters of parents who used control styles ate worse than boys and older employed and more acculturated parents used less controlling styles.

Wardle and colleagues (2002) created the Parental Feeding Style Questionnaire (PFSQ) and found four subscales: emotional feeding, instrumental feeding, prompting or encouraging child to eat, and control over eating. Internal consistency for the subscales were low-sufficient with Cronbach's alphas ranging from 0.65 – 0.85 and adequate test-retest reliability with Pearson correlations between 0.67 – 0.83 and all significantly correlated between time one and time two. The results showed that obese mothers were no more likely than normal-weight mothers to offer food to deal with emotional distress, to use food as a form of reward, or to encourage the child to eat more than he or she wanted to.

Hughes and associates (2005) wanted to expand the concept of child feeding to include dimensions of Maccoby and Martin's (1983) typology of general parenting: parental demandingness and responsiveness regarding their child's eating. The Caregiver's Feeding Styles Questionnaire (CFSQ) was developed and two factors emerged: parent centered and child centered strategies (Hughes et al.). Test-retest reliability was acceptable with values 0.85 and 0.82 and convergent validity was supported by the subscales being correlated with the appropriate subscales on a parenting measure (assessed the four dimensions: authoritative etc) and the CFQ (Hughes et al.). The findings of this study revealed that authoritative parents tended to be more nurturing than authoritarian and uninvolved parents. Authoritarian parents were more inconsistent relative to uninvolved parents and were more likely to let child transgression go. Authoritarian parents were more likely to put pressure on their children to eat than parents low on demandingness, indulgent parents were less likely to use restriction than parents that were high on demandingness, and authoritative parents were more likely to monitor than parents that were low on responsiveness. Children with indulgent parents had higher BMI's compared to authoritarian parents (Hughes et al.).

Similar to Hughes and colleagues, Ogden and colleagues (2006) wanted to expand the concept of child feeding to reflect overt and covert control over child's eating. Overt control is defined as controlling child's food intake in a way that they can detect while covert control cannot be detected by the child (Ogden et al.). This new measure was significantly related to control dimensions of the CFQ in order to support construct validity and the two new scales had adequate internal consistencies (overt control Cronbach's alpha = 0.78, covert control Cronbach's alpha = 0.83).

Kroller and Warschburger (2009) tested parental feeding strategies through translated items from both the CFQ and the CFSQ and found support for the following scales: restriction, monitoring, pressure, rewarding, child's control, and modeling. The internal consistencies were adequate with Cronbach's alphas ranging from 0.75 – 0.93 and test-retest reliability was moderate with Pearson correlations ranging from 0.41 – 0.78 (Kroller & Warshburger). They found that pressure to eat was a significant predictor of intake of problematic foods while rewarding feeding significantly decreased consumption of fruits and vegetables while allowing the child to control his/her own food choices increased the fruit and vegetable intake of the child (Kroller & Warshburger).

Joyce and Zimmer-Gembeck (2009) developed the Parent Feeding Dimensions Questionnaire to assess multiple parental feeding-specific dimensions including: supportiveness (includes warmth and autonomy), structure, coerciveness (includes rejection and coercion) and chaos. The internal consistency of these subscales were adequate with Cronbach's alphas ranging from 0.72 – 0.92 and content and construct validity were assessed in an unpublished manuscript (Joyce & Zimmer-Gembeck). The findings of this study showed that parents who are more restrictive have children who engage in more disinhibited eating and restrictions are directly

related to the child's weight (Joyce & Zimmer-Gembeck). Additionally, parents who display more coerciveness and chaos in their parenting style related to food had children who displayed more disinhibited eating and hence, parents restricted more (Joyce & Zimmer-Gembeck).

## Discussion

Many reviews of childhood obesity interventions have been conducted, as well as several reviews focusing on interventions in the home or parental involvement (e.g., Berry et al., 2004; Nowicka & Flodmark, 2008). These reviews conclude that behavioral interventions including the family are effective however the mechanism of change is unclear (e.g.,Young et al., 2007). The current review assessed measures of the home environment in a broad sweep of the literature in order to gain a better understanding of the relationship between the home environment and childhood obesity and appropriate measures of these complex constructs according the conceptual model proposed by Gattshall and colleagues (2008). Many researchers chose to design new measures for their studies due to a lack of validated measures in the area of the home environment and often the items employed were brief and there was a lack of transparency in the psychometric properties. In order for research in the area of the home environment and childhood obesity to move forward a greater emphasis on appropriate measurement is necessary (Goran, 1998).

Also, the current measures of the home environment do not necessarily translate to specific sub-populations. The existing efforts to validate home environment measures did not seek out specific population that experience obesity at disproportionate rates, such as low-income families or racial-ethnic minorities. Future measurement efforts may want to focus on measuring the home environment of these harder-to-reach families in order to garner a better understanding of the factors that influence these important health behaviors.

Despite limitations, several authors have put great efforts forward in terms of designing and testing aspects of the home environment. For example, Bryant and colleagues (2008) and Gattshall and colleagues (2008) have both put forth two comprehensive measures of the home environment assessing both social and physical environments that influence childhood obesity. Further research that expands these measures is warranted.

It is known that availability and accessibility of fruits and vegetables leads to greater consumption (e.g., Cullen et al., 2003; Cullen & Thompson, 2008; Hearn et al., 1998; Young et al., 2004). Additionally, some researchers have indicated that there is greater internal consistency when children report rather than parents on home availability and accessibility (e.g., Cullen et al., 2003; Cullen & Thompson, 2008), which is an issue that requires more attention to determine if parents are in fact biased in their responses when compared to children. Additionally, less attention has been placed on the availability of unhealthy foods in the home and is considered separate from fruits and vegetables. Perhaps if more researchers assessed both healthy and unhealthy foods available and accessible a better understanding of food choices and related health behaviors in the home could be attained. Comprehensive food inventories such as the HFI (Fulkerson et al., 2008) may increase research and participant burden, therefore, an inventive measure which assesses different food groups but may not be exhaustive needs to be validated.

Although less attention has been paid to the availability and accessibility to physical activity opportunities it is an important predictor to engaging in physical activity and weight status of children (e.g., Salmon, Telford, & Crawford, 2004). More research is needed in this area to further describe the relationship between certain populations and their access to physical activity equipment. In concert with physical activity, the more opportunities a child has to be sedentary with screen-based behaviors, the more time is spent in these activities (e.g., Salmon et

al., 2005) and also are more likely to have an increased weight status (e.g., Timperio et al., 2008).

Although food and activity availability is important, parental encouragement and policies need to further support the child in making healthy food choices and increasing physical activity. Various aspects of the parental social environment that promote activity and healthy eating have been identified (e.g., Bauer et al., 2008; Pearson et al., 2009). Perhaps including measurement of aspects of the social home environment such as parenting specific to food and physical activity can help researchers identify mediators of change and ultimately get closer to recognizing which components of interventions are effective and through which mechanisms. Additionally, role modeling has been suggested to be less important for older children as they begin to be more autonomous in their choices (Story, Neumark-Sztainer, & French, 2002).

Although closely related to parental policies and role modeling of healthy eating and physical activity, child feeding is a unique construct which has been studied extensively. The Child Feeding Questionnaire (Birch et al., 2001) has been employed, manipulated and tested by a number of researchers and the factors involving parental perceptions and concerns regarding child-feeding practices and parental use of child-feeding practices have all shown various relationships with child weight outcomes. Therefore, researchers should consider child feeding in their assessment of the social home environment related to nutrition.

The different measures assessing similar constructs of the home environment currently hinder a comparative analysis across studies. Many of the current measures of the home food and physical activity environment focus on one or two constructs (e.g., fruit and vegetable availability and accessibility), more comprehensive measures are necessary to capture influences in the home on food and physical activity behaviors of children and how these develop. This

calls for a more concerted effort to gain a better understanding of family influences on childhood obesity. Future research should aim to identify the intervention components from family-based interventions that are effective in treating childhood obesity through the use of appropriate theories and models to guide research designs and measurement tools that are valid and reliable.

Table 2. Terms used to extract manuscript.

| **Key Terms** | | | | | | | | | | | **Yield Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Measur* (TI) | Or | Survey (TI) | and | home environment (TI) | or | home food environment (TI) | or | home physical activity environment (TI) | and | childhood o* | 12 |
| | | | | food availab* or access*(TX) | or | Fruit and vegetable availab* or accessibility (TX) | or | Fat and sweets availab* or access* (TX) | | | 6 |
| | | | | physical activity availab* or access* (TX) | or | Sport equipment availab* or access* (TX) | or | Exercise equipment availab* or access* (TX) | | | 0 |
| | | | | parent* (TX) | and | healthy eating (TX) | and | childhood obesity (AB) | | | 5 |
| | | | | parent* (TX) | and | physical activity (TX) | and | childhood obesity (TX) | | | 2 |
| | | | | encourage* | And | Parent* | and | healthy eating | or | physical activity | 7 |
| | | | | eating practices (TX) | or | food skills (TX) | or | feeding style (TX) | | | 16 |
| | | | | home media environment | | | | | | | 1 |
| SUB-TOTAL | | | | | | | | | | | 49 |
| Eliminated after screening | | | | | | | | | | | 11 |
| Identified through reference lists searched | | | | | | | | | | | 2 |
| Eliminated due to not meeting criteria upon detailed examination | | | | | | | | | | | 3 |
| TOTAL | | | | | | | | | | | 37 |

Table 3. Psychometric properties assessed by measures of the home environment.

| Reference | Measure | Dimensions | Participants | Low-income | Culture/Ethnicity | Inter-rater Reliability | Test-retest Reliability | Internal consistency | Criteria validity | Convergent validity | Predictive validity | Factorial Validity | Content Validity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hearn et al., (1998) | *FJV availability and accessibility* | Fruit and vegetable availability and accessibility | Parents of elementary school children (N= | No | No information | - | - | α = 0.69 | - | - | Pearson correlation to intake r= 0.11-0.54 | - | - |
| Cullen et al. (2000) | *Food socialization* | Fruit and vegetable availability and accessibility, Parental policies for healthy eating | Parents of grade six children, interviewed (N=109) | No | 61% African American, 67% Hispanic American, 54% Euro-American | - | Pearson r = 0.39-0.92 | α = 0.06-0.84 | - | - | - | 9% -55% of variability | - |
| Marsh, Cullen, and Baranowski (2003) | | Fruit and vegetable availability | Parents of fourth to sixth grade children interviewed; mean age of parents = 42.1 (N=48) | No | 48% white, 33% Mexican American, 8% Black, 11% Asian/other | - | - | - | Sensitivity & specificity = 34.5-42.0% (75.9% agreement; false positive = 19.4-20.6%; false negative 3.6-4.1% | - | - | - | - |
| Cullen et al. (2003) | *FJV availability and accessibility* | Fruit and vegetable availability and accessibility | Fourth-sixth grade children (N=225) and their parents (N=88); mean age of parents = 40 (6.6) | No | Children with non-participating parents (26% African American, 31% European American, 31% Hispanic, 12% Asian); Children with participating parents (22% African American, 32% European American, 33% Hispanic, 13% Asian) | - | - | α = 0.30-0.85 | - | - | For children with high FJV preferences, FJV availability predicted consumption; both availability and accessibility were significantly related to consumption for children with low FJV preferences. | - | |
| Cullen, | *FJV availability* | Fruit and | Fourth-sixth grade | No | 25% African | - | Pearson r= | α = 0.19- | - | - | - | Account for | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baranowski, Rittenberry, Cosart, Herbert, de Moor, (2001) | *and accessibility, norms, parental control, parent-child food control* | vegetable availability and accessibility, feeding style/ practice, Parental role modeling and policies of healthy eating | students (N=230) | | American, 29% European American, 37% Mexican American, 9% Asian | | 0.30-0.73 | 0.88 | | | | 11 & 4% variability | |
| Wilson, Magarey, & Mastersson (2008) | *The child nutrition questionnaire* | Fruit and vegetable availability and accessibility, parental policies for health eating | Children ages 10-12 (N=141) | No | No information | - | ICC = 0.47 to 0.66 | α = 0.50 - 0.80 | - | - | Pearson r = 0.36-0.48 | - | |
| Bryant, Ward, Hales, Vaughn, Tabak, Stevens (2008) | *Healthy Home Survey* | ALL dimensions | Parents of children ages 3-8 years (N=85) | 10.5% <$19,00 | 72.9% white and 23.5% black | - | % agreement = 84.4 – 95.6 | - | % agreement = 80.5-96.3% | - | - | - | |
| Sirard, Nelson, Pereira, Lytle (2008) | *Physical Activity and Media Inventory (PAMI)* | Physical activity availability and accessibility (& media) | Parent-child dyads with children 10-18 years (N=31) | No | 52% white, 19% African American, 6% Mexican American, 6% Native American, 6% Asian | - | ICC = 0.87 to 0.99; Kappa=0.42-1.0 | - | Pearson r=0.67 - 0.98 | - | - | - | |
| Rosenburg et al. (2010) | *Physical Activity and Media Equipment* | Physical activity and Media equipment availability | Adolescents (n = 189; mean age = 14.6), parents of adolescents (n = 171; mean age = 45.0), and parents of younger children (n = 116; parents mean age = 39.6; children's mean age = 8.3) | No | No information | - | *between parent and child agreement ICC =0.49-0.93 | - | - | - | Availability of equipment predicted media behavior ΔR2=0.00-0.15 | - | - |
| Hume, Ball, & Salmon (2006) | *physical and social aspects of the PA environment* | Parental role modeling and policies for physical activity, physical activity availability | Grade five and six children mean age= 11.1 ± 0.7 years(N=39) | No | No information | - | (ICC = 0.72-0.88 | α = 0.43-0.77 | - | - | - | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Campbell, Crawford, Ball (2006) | *Family Food Environment* | Parental role modeling and policies for healthy eating, fruit and vegetable availability | Parent-child dyads, mean age of children 6.1 (N=560) | Yes range of social-economic status | No information | - | - | α = 0.64-0.90 | - | - | Regression accounted for 2.8-11.7% of the variance in outcome variables | Support for a nine factor model | |
| Birch, Fisher, Grimm-Thomas, Markey, Sawyer, Johnson (2001) | *Child Feeding Questionnaire (CFQ)* | Parental policies for healthy eating | Sample one: parents of 5-9 year old girls (N=394); sample two: parents of 8-11 year old children (N=148); sample three: parents of 7-11 year old children (N=126) | Sample one: 29% <$35,000 | Sample two: 85% non-Hispanic white, 9% African American, 4% Hispanic; Sample three: 90% Hispanic, 6% non-Hispanic white | - | - | α = 0.70-0.92 | - | - | - | Support for a seven factor model | - |
| Kroller & Warschburger (2008) | *Combined items from CFQ & CFSQ* | Parental policies for healthy eating | Mothers of 3-6 year olds (N=219) | 33.5% below poverty level | 94.5% German nationality | - | Pearson r = 0.41-0.78 | α = 0.730.93 | - | - | Feeding strategies accounted for 22.2% of eating habits | - | - |
| Gattshall, Shoup, Marshall, Crane, & Estabrooks (2008) | *Home Environment Survey* | ALL dimensions | Parents (mean age =40) of children ages 8-12 years (mean age=10.5) | No | 61.3% white, 6.1% black, 3.3% Asian, 3.8% American Indian, 23.6% Latino | Pearson r = -0.08-1.00 | Pearson r = 0.43 -0.99 | α = 0.59-0.84 | - | - | Pearson correlations with outcome variables r = 0.14-0.36 | - | - |
| Dave et al., (2010) | *Home Nutrition Questionnaire* | Parental role modeling and policies related to nutrient, fruit and vegetable availability and accessibility | Parents of children in first – fifth grade (N=184) | Yes | Mostly Hispanic | - | - | α = 0.69 – 0.87 | - | - | - | Support for a six factor solution | - |
| Hughes et al., 2005 | *Caregiver's feeding styles questionnaire* | Child feeding | Parents of children ages 3-5 years old (N=231) | Yes | 43% African American, 56% Hispanic | - | Pearson r= 0.82-0.85 | α = 0.58 – 0.86 | - | CFQ, F(9,518)= 3.17, p<0.001, Parenting Dimensions Inventory, F(27,602) =2.26, p<0.001 | - | Support for a two factor model supported | |

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| Spurrier et al (2008) | Physical and Nutritional Home Environment Inventory | Physical activity and media availability, role modeling of physical activity, parental policy regarding physical activity, media, and diet | Parents of preschool children (N=280) | No | No information | - | - | - | - | - | Significant ANOVAs between inventory subscales and screen time, physical activity, and diet behaviors | - | |
| Salmon et al (2005) | Several questionnaires | Availability of media equipment, parental role modeling and policies regarding screen time | Parents of children 10-12 years old, mean age = 11.5 +/- 0.6 years (N=927) | 30% Low SES | No information | - | ICC = 0.60-0.83 | α = 0.61 | - | - | Significant t-tests between subscales and TV viewing and physical activity levels | - | |
| Robinson et al (2001) | *Parental control over child's food intake* | Parental control over child's food intake | Parents of children (mostly mothers), mean age of child = 8.4 +/-0.4 (N=957) | Yes | 44.8% white, 20.7% Asian, 3.8% African American, 19.3% Hispanic, 9.7% multi-ethnic, 0.7% Native American, 1.3% Pacific Islander | - | - | α = 0.61 – 0.64 | - | - | - | - | |
| Larios et al (2009) | *Parenting strategies for eating and activity scale (PEAS)* | Policies for diet, physical activity and media; feeding style | Phase two: mothers of children kindergarten – second grade (N=91); phase three: mothers of children in elementary school (N=714) | Not reported | Latina mothers | - | - | α= 0.81-0.83 | - | Significant correlations with corresponding CFQ subscale | Significant correlations with behavioral strategies related to PEAS subscales | Five factor structure supported with 7-24.5% variance accounted for | |
| Joyce & Zimmer-Gembeck (2009) | Parent Feeding Dimensions Questionnaire (PFDQ) | Feeding style | Caregivers to children 4-8 years old, mean age = 5.7 +/-0.9 (N=247) | No | 94% white | - | - | α= 0.60-0.83 | - | - | *predicted BMI z-score with PFDQ subscales, related health behaviors not tested | - | |
| Fulkerson et al (2008) | Home Food Inventory (HFI) | Food availability | Sample one (criterion validity) N=51 adults; | | Sample one = 68% white, 14% black, 6% | - | - | - | Sensitivity and specificity for food groups ranged | - | Significant correlations with consumption of | | |

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| | | | Sample two (construct validity) parent of a child 10-17 years (N=349) | | American Indian, 2% Asian, 4% Hispanic; sample two = 99% white | | | | 0.70-0.95 | | food groups, Pearson r= 0.13-0.37 | | |
| Campbell et al. (2007) | Novel items | Unhealthy food availability, policies for healthy eating (meal and eating formality, parenting consistency); | Parents of adolescence, mean age= 13.0 +/- 0.2 (N=347) | No | No information | - | - | α= 0.44-0.82 | - | - | Regression models significantly predicted sweetened beverage consumption and sweet snack consumption accounting for 9-22% of the variance | - | |
| Golan & Weizman, 1998 | Family Eating and Activity Habits Questionnaire (FEAHQ) | Role modeling of eating behaviors and physical activity, availability of unhealthy foods (stimulus) | Mother of children 6-11 (N=60) | No | No information | Pearson r= 0.81 to 0.94 | Pearson r= 0.78 to 0.90 | α= 0.78-0.88 | - | - | Correlation between child's weight loss and change in FEQHQ score, Pearson r = 0.36-0.73 | - | Expert panel supported items |
| Neumark-Sztainer et al (2003) | 221 item Project EAT questionnaire | Parental policies and role modeling of healthy eating, availability of fruits and vegetables | Children and adolescents at middle and high schools, mean age=14.9 +/- 1.7 (N=3957) | | 48.5% Caucasian, 9.0% African American, 19.2% Asian American, 5.8% Hispanic, 3.5% Native American, and 3.9% mixed/ other | - | - | α=0.43-0.81 | - | - | Pearson correlations with outcome variables r=-0.09-0.33 | Support for a 13-factor solution | - |
| Ogden et al (2006) | Control questionnaire | Overt and covert control over child's eating | Study one: parents of children between 4-11 years (N=297) Study two: parents of children (N=61) | No | Study one: 80% white | - | - | α=0.63-0.83 | - | Significant correlation with CFQ subscales, Pearson r= 0.26-0.53 | - | Support for overt and covert control factors (accounting | - |

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| | | | | | | | | | | | | for 22-28% variance) | |
| Ihmels et al. (2009) | Family Nutrition and Physical Activity (FNPA) | Policies for TV, parental role modeling for TV, diet, and physical activity | Parents of first grade children (N=438) | 34% <$20,000 | 68.0% Caucasian, 11.6% African American, 11.5% Hispanic, and 4.8% Asian, (4.1% were classified as "Other) | - | - | α=0.72 | - | - | Significant Pearson correlations with outcome variables, r=-0.2-0.66 | Support for a five factor solution accounting for 5-17% variance | - |
| Rosno et al. (2008) | Food inventory | Food availability | Parents of overweight children ages 6-18, mean age=11.6 +/- 2.5 (N=63) | No | 83%, European American, 6% African American, 4% Native American, 8% "other" | 95% agreement between researchers | - | - | - | - | - | - | - |
| De Bourdeaudhui et al. (2005) | social, personal, and environmental correlated to children's vegetable consumption | Parental role modeling and policies for nutrition, food availability | Children ages 10-11 (N=326) | No | 76% in Norway, 99% in Spain, 100% in Portugal, 82% in Denmark and 99% in Belgium | - | ICC = 0.42-0.88 | α=0.13-0.93 | - | - | Significant Spearman correlations in appropriate directions, r= -0.20- 0.54 | - | - |
| van Zutphen et al. (2007) | Correlates to TV viewing | Policies regarding TV, TV availability | Parents of children ages 4-12 (N=1926) | Yes | No information | - | - | - | - | - | Mann–Whitney, Kruskal–Wallis, and ANOVA's supported differences in TV viewing based on variables measures ($p<0.05$) | - | - |
| Pearson et al. (2009) | Family environment | Parental role modeling and policies for physical activity and eating | Parent-child dyads of children ages 10-12 (N=775) | No | No information | - | - | - | - | - | Pearson Chi-Square test revealed differences in diet and PA behaviors based on variables measured (OR=0.4-2.6) | - | - |
| Vereecken et al. | Parenting | Food frequency, | Parents of pre- | No | No information | - | - | α=0.71- | - | - | Spearman | 1 | - |

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| (2004) | practice related to food | Parental policies and role modeling regarding eating | school children in Belgium, mean age= 4.7 +/- 1.0 (N=346) | | | | | 0.94 | | | correlations between intake and variables r=-0.16-0.59 | | |
| Evans et al. (2006) | Several questionnaires | Fruit and vegetable availability and accessibility, parental policies for healthy eating (reported from both child and parent) | Parents of children in 4-5th grade (N=31) | 27% Low SES | 50% African American | - | - | α=0.67-0.94 | - | - | - | - | - |
| Young et al. (2004) | Several questionnaires | Fruit and vegetable availability, policies for healthy eating, parental modeling (all child reported) | Students ages 12-16 (N=366) | | 82% Caucasian, 6% African American, 4% Multi-racial, 3% Asian, 3% Hispanic, 3% American Indian | - | - | α=0.65-0.85 | - | - | Regression supported variables predicting fruit and vegetable consumption accounting for 39% of the variance | - | - |
| van Assemma et al. (2007) | Family food rules an environment | Parental policies for healthy eating, fruit and vegetable availability and accessibility , sweet and fats availability and accessibility | Parent-child dyads with children ages 12-14 years, mean child age =12.7, mean parent age = 41.9 (N=502) | No | No information | - | - | - | - | - | - | - | - |
| Wardle et al. (2002) | Parental Feeding Style Questionnaire | Feeding style | Families with same-sex twins, mean age = 4 (N=214) | No | No information | - | Pearson correlations r = 0.76-0.83 | α=0.69-0.92 | - | - | * compared subscale results to weight status of the family, not related diet behaviors | - | - |
| Total | 37 | | | | | 6 (16%) | 13 (35%) | 26 (70%) | 4 (11%) | 3 (8%) | 20 (54%) | 13 (35%) | 1 (3%) |

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# MANUSCRIPT 3

## Refining a measurement of the home environment as it relates to childhood obesity

## Introduction

Lifestyle behaviors that lead to energy imbalance are important causes of childhood obesity (Dehghan, Akhtar-Danesh, & Merchant, 2005). These modifiable behavioral risk factors include the consumption of sweetened beverages, fruit and vegetable consumption, screen time, and physical activity (American Academy of Pediatrics, 2003). Parents control the social and physical environment such as the availability and accessibility of foods and physical activities, parental role modeling of healthy behaviors, parental policies regarding eating, physical activity, and screen time. Unfortunately, these home environment factors (both social and physical) are often counterproductive to promoting healthy eating and maintaining a physically active lifestyle (Birch, 1999).

Numerous measures of various aspects of the home environment have been developed. However, these measures often assess only one or two components of the home environment such as the physical nutrition, physical activity, and media environments. These measures can be conceptualized as availability and accessibility to foods, physical activity opportunities, and media activities. In terms of availability and accessibility to foods some investigators focus solely on fruits and vegetables (e.g., Weber Cullen et al., 2003; De Bourdeaudhuij et al., 2005; Evans et al., 2006; Marsh, Cullen, & Baranowski, 2003; van Assema, Glanz, Martens, & Johannes Brug, 2007), while others focus on all food groups (Fulkerson et al., 2008; Rosno, Steele, Johnston, & Aylward, 2008). Despite being within a single domain, the availability and accessbility of foods, there is great variation in method that makes comparison across studies difficult. Measuring physical activity constructs in the home has typically been a separate endeavor than measurement of nutrition variables. As in the assessment of the physical nutrition

enviroment, several authors assess the physical activity physical environment through researcher assessed in-home inventories (e.g., Salmon, Telford, & Crawford, 2004; Spurrier, Magarey, Golley, Curnow, & M. Sawyer, 2008), or according to the child's perception of the home and neighbourhood physical activity environments (Hume, Ball, & Salmon, 2006), or by inventory checklists completed by the parent (e.g., Sirard, Nelson, Pereira, & Lytle, 2008). On the other side of the physical activity equation is the time a child spends in sedentary activities is again, often explored in separate measures (Salmon, Timperio, Telford, Carver, & Crawford, 2005; Zutphen, Bell, Kremer, & Swinburn, 2007).

Beyond the physical environment in the home, parents are also responsible for providing the social environment that can either encourage or discourage healthy choices (Golan & Weizman, 1998). Support for physical activity and healthy eating can be conceptualized as providing transportation or financial support to their child for physical activity and dietary behaviors (Hoefer, McKenzie, Sallis, Marshall, & Conway, 2001; Pearson, Timperio, Salmon, Crawford, & Biddle, 2009). As components of a larger survey assessing several constructs related to children's nutrition related behavior some authors include a few items assessing parental strategies focusing on policies or rules (De Bourdeaudhuij et al., 2005; Kristjansdottir et al., 2006; Neumark-Sztainer, Wall, Perry, & Story, 2003; Tak, te Velde, & Johannes Brug, 2008). Others give role modeling and policies related to diet more emphasis (Campbell et al., 2007; Larios, Ayala, Arredondo, Baquero, & Elder, 2009; van Assema et al., 2007).

Policies and rules are particularly important in the area of screen time given that the relationship between screen time and increased weight status has been well established (e.g., Wiecha, Sobol, Peterson, & Gortmaker). Measures of parent's social influence on screen time

often focus on the rules and restrictions around television watching and video game playing (e.g., Salmon et al., 2005).

Two measures that assess multiple components of the home environment include the Healthy Home Survey (HHS; Bryant et al., 2008) and the Home Environment Survey (HES; Gattshall, Shoup, Marshall, Crane, & Estabrooks, 2008). The HHS includes assessment of food, media, and physical activity availability and accessibility, parental role modeling and policies for eating and physical activity through a telephone interview. The HHS had good test-retest reliability for food availability, however validity estimates were lower for sweet snacks and fresh vegetables compared to frozen fruit and frozen vegetables. The results of the HHS suggest that measurement of variety and quantity of foods may be a better indicator of quality foods in the home rather than presence or absence alone. The HES assesses a breadth of home environment variables including the availability and accessibility of food (both fruits and vegetables and fat and sweets), the availability and accessibility of physical activity, parental role modeling of healthy eating, physical activity, and parental policies for eating and physical activity through a questionnaire completed by the parent (Gattshall et al.). The internal consistencies were low-to-acceptable for the sub-scales with Cronbach's alphas ranging from 0.59 – 0.84. Test-retest reliability was modest to high with Pearson correlations between the two tests being 0.49 – 0.99. Inter-rater reliability was modest to high with Pearson correlations between 0.22- 0.70 indicating some differences between two caregiver's report of the home environment. Despite some low inter-rater reliability scores the benefit of the HES includes asssessing a full range of social and environmental influences of the home environment and child nutrition and weight status and having one subscale for each construct and the psychometric properties and outcomes associated with these constructs are not blurred.

Finally, the construct of child feeding has been well established as an important contributor to both child eating behaviors and weight status of the child (Crouch, O'Dea, & Battisi, 2007; Orlet Fisher, Mitchell, Wright, & Birch, 2002). The psychometric properties of the Child Feeding Questionnaire are well established and the scale is a good addition to the other dimensions of the home food environment (CFQ; Birch et al., 2001).

Growing portion sizes in the United States over the past 30 years (e.g., (Rolls, 2003; Young & Nestle, 2002) have changed the environmental cues which surround the consumption of larger portions. Larger plate, cup, and utensil size lead to greater portions served and consumed (e.g., Wansink & Cheney, 2005), which ultimately leads to higher weight status (e.g., Young & Nestle). It has been suggested that serving plates influence portion control through visual cues (e.g., how full is your plate) and suggesting larger normative portion sizes (Wansink, van Ittersum, & Painter, 2006).

Beyond the size of serving plates and utensils there are appliances in the home that allow a family to cook more healthfully. For example, having a refrigerator allows a family to store perishable food items that may be more healthful than pre-packaged items or fast food. School space architecture in the scope of obesity prevention has been considered (Gorman, Lackney, Rollings, & Huang, 2007). However, kitchen and home design is a new concept in the public health field that certainly needs to be considered when assessing the physical home environment related to nutrition.

Therefore, it is the purpose of this study to modify a measurement tool to assess both the physical and social environmental components of the home environment that contribute to a child's physical activity and healthy eating through integrating and reviewing past measures and research findings. The aim is to provide a measure with distinct domains/subscales that can be

utlized in the assessment of home environment influences individually as needed or together as a comprehensive assessment of the physical and social home environment related to nutrition and physical activity in particular in low-income families. Gattshall and colleagues (2008) developed and tested the reliability and validity of a comprehensive measure, the Home Environment Survey (HES), but were not satisfied with the resulting psychometric properties. The subscales in the original HES included: 1) Physical Activity Availability, 2) Physical Activity Accessibility, 3) Fruit/Vegetable Availability, 4) Fruit/Vegetable Accessibility, 5) Fat/Sweet Availability, 6) Fat/Sweet Accessibility, 7) Parental Role Modeling of Physical Activity, 8) Parental Role Modeling of Healthy Eating, 9) Parental Policies to Support Physical Activity, and 10) Parental Policies to support Healthy Eating. The Comprehensive Home Environment Survey (CHES) will be the base for the current study and modifications will be made to this instrument based on other research. Additions to the home enviornment constructs will include parental feeding style (CFQ), media availability, and a kitchen utensil and appliance inventories. Appendix B is the representation of the primary factors to operationalize the home environment based on Golan's model of the home environment and the extant literature in this area. Some items were added to the CHES, such as handheld video games to the list of items assessing media availablity and hiking boots to the list of items for physical activity.

## Method

### Procedures

**Phase I: Item Generation.** During the first step in the refinement of the CHES a list of unrestricted items was developed. These items followed the structure (see figure in Appendix B) of the original HES and were expanded from a thorough review of background literature and other home environment measures.

**Phase II: Panel of Experts.** A panel of four experts in the field of measurement of childhood obesity and the home environment were approached to help review items for the CHES. In order to enhance the specificity and transparency on the characteristics and qualifications of the experts their qualifications are listed (see Appendix C). The expert panel members were asked to provide ratings of content relevance on a 5-point Likert Scale: 1 (Poor Match), 2 (Fair Match), 3 (Good Match), 4 (Very Good Match), and 5 (Excellent Match) as well as provide further suggestions for what should be added to the survey. Modifications were made to the scale based on the suggestions and ratings from the panel of experts. Some of the items that were excluded included how often the family would shop for groceries because this wasn't deemed relevant to determining obesity. Also, lawn tools such as mower and rakes were deleted off the list of physical activity items. Another item that was deleted included how many channels the family received on their television. Granola was left off of the list of items for fats and sweets since this food can be healthy. Other items were left off because they were redundant, such as, hiding snacks and foods (this is redundant with simply limiting access to junk foods).

**Phase III: Readability and Understandability.** Readability and understandability was assessed in the target population. Ten parents from varying racial, economic, and education levels read over the questionnaire and commented on items that are difficult to understand. Follow-up verbal information was gathered in order to clarify the responses and make the necessary changes to improve readability and understandability. The final survey read at a grade 5 level (Please see Appendix B for the survey).

**Phase IV: Psychometric Properties.** 150 parents completed the CHES and accompanying validating surveys. Families were approached in a clinic setting and offered a $10 gift card for a local grocery store as an incentive. Forty-eight parent-child dyads were selected at

random to have two parents complete the CHES in order to establish inter-rater reliability. Similarly, 43 parent-child dyads were selected to complete the HES a second time two weeks following the initial completion to establish test-retest reliability.

Concurrent validity was assessed for subscales of the CHES to determine if the measure does in fact indicate the behavior of interest (Cronbach & Meehl, 1955). For example, fruit and vegetable availability should be predictive of child intake.

**Participants**

Particpants included parents of children ages 5-17 recruited through a pediatric clinic that primarily served Medicaid eligible families. Participants included all children of any BMI category in order to develop a broadly applicable instrument. Please see Table 4 for the distribution of the age, gender, and BMI groups.There was a total of 150 parent-child dyads recruited to complete the CHES and corresponding instruments that were employed to establish predictive validity. In the case of inter-rater reliability, 43 parent-child dyads were selected at random to have a second parent in the home also complete the CHES. In the case of test-retest reliability, 48 parent-child dyads were selected at random to have the same parent complete the CHES a second time, two weeks following the first completion.

One-hundred and fifty parent participants completed the survey and the mean age was 35.7 years old (SD = 9.1), 48% were Black, 44% were white, and 5% were mixed. Very few participants identified as a Hispanic or Latino (6%). The mean BMI of the parents was 31.5 (SD = 8.3) and 92% were female. The majority of the respondents reporting being the child's mother (85%), the father (7%), the grandmother (2%) or legal guardian (5%). The mean number of children under the age of 18 in the home was 2.5 (1.3).

The majority of households reporting being below the poverty line with 38% making less than $10,000 a year, 20% earning between $10,000 and $19,000 income, and 33% made $20,000 and $50,000 a year. The majority of families resided in a single family home (55%) and apartments (28%) (please see table 5 for demographic characteristics of the parents and the home).

There were also 150 child participants, with a mean age of 9.99 years old (SD = 3.4), similar to their parents, 49% were Black, 34.9% were White, and 12.1% were mixed and 5.4% were Hispanic. The mean BMI of the children was 21 (SD = 6.2) and the mean percentile for age and gender was 66.3 (SD = 32.7). Children above the age of 9 years completed the child self-reported survey, 89 children completed the survey (please see table 6 for demographic characteristics of the child).

**Measures**

**Nutrition and physical activity home environment.** The Family Nutrition and Physical Activity Screening Tool (FNPA; Ihmels, Welk, Eisenmann, & Nusser, 2009) is a 21-item screener which indicates the overall family environment that may predispose a child to obesity. The FNPA was validated in a large population and evaluated whether the CHES is related to the family environmental and behavioral factors that may predispose a child to childhood obesity. The internal consistency for the FNPA was acceptable ($\alpha$=0.70).

**Dietary intake - child.** Children completed a short food frequency questionnaire (Buzzard et al., 2001) which is 31-items and allows the researcher to calculate a fiber, fruit and vegetable, and fat score for each respondent which has adequate test-retest reliability (r=0.24-0.59). Assessing dietary intake of the children will be important for assessing whether home environment variables related to food are predictors of intake (see Appendix C). Children also

completed a modified Beverage intake questionnaire which has adequate test-retest reliability (r=0.35-0.76; 13-items; Hedrick, Comber, Estabrooks, Savla, Davy, In review)

**Physical activity – child.** Children completed the Physical Activity Questionnaire for Children (PAQ-C) as a general measure of physical activity because it has relatively strong correlation coefficients with other physical activity measures compared to other recall measures (Kowalski, Crocker, & Kowalski, 1997). The PAQ-C is a self-administered, 10-item, 7-day recall questionnaire that measures general moderate to vigorous physical activity levels during the school year and has adequate internal consistency (α=0.80-0.83) and test-re-test reliability (r=0.75-0.82; see Appendix D).

**Screen time – child.** Children completed a simple screen time measure that includes four items and simply asks the number of hours that a child watches television or movies, plays video games, and spends on the computer on a typical weekday. An additional question regarding time spent playing active video games (e.g., Wii Fit) was asked to differentiate between sedentary video games and active ones (see Appendix E).

**Dietary intake – parents.** Parents completed three short screeners to assess dietary intake: The National Cancer Institute Fruit and Vegetable screener (Thompson et al., 2000), the Dietary Fat Screener (Block et al., 2000), and a beverage intake questionnaire (Hedrick et al., under review). The Fruit and Vegetable screener is seven items and has shown predictive validity with regressions to full length diet surveys (see Appendix F), the Dietary Fat Screener is 17-items and has shown predictive validity with full length diet surveys (r=0.41-0.72; see Appendix G), and the beverage consumption questionnaire 21-items which has adequate test-retest reliability (r=0.35-0.76; see Appendix H). Together these short screeners will provide a valid assessment of the parent's intake of important food groups.

**Physical activity – parents.** Parents completed Godin's Leisure Time Questionnaire (Godin & Shephard, 1985) which is 4-items and is a quick measure that assesses weekly light, moderate, and strenuous physical activity (see Appendix I).

**Screen time - parents.** Parents completed the same questionnaire that the children completed for screen time. This will be 6-items that will assess hours spent watching television, movies, on the computer, or playing video games during the week and on the weekend.

**Psychometric Properties**

In order to determine the internal consistency of the CHES, Cronbach's alphas were computed for each of the subscales on all completed CHES scales and an alpha of 0.6-0.7 indicates acceptable reliability, and 0.8 or higher indicates good reliability (Nunnaly, 1978). In order to measure the agreement between dual-parent raters bivariate correlations (Pearson Correlations *r*) between the ratings were used. In order to determine if the FNPA score was significantly related to the overall score on the CHES and to assess the predictive validity, Pearson Correlations (*r*) were calculated.

## Results

**Item trimming, internal consistency, and reliability**

The final survey had 181 items (please see table 7 for the number of items included in each subscale). Standardized averages were calculated for each subscale to account for different scales on items that were averaged. There were 18 scales that were included in the total CHES score, all of which were on a scale of 0-1 with higher scores indicating a healthier home. The mean score was 10.31 (1.5). See Appendix B for the survey that was administered with the items that were retained in each scale bolded (items that were not included in the subscale calculation are grayed). The subscales had adequate to excellent Cronbach's Alpha ranging from 0.67 –

0.92. Media role modeling items (how often did you watch TV, play video games, or on the computer) did not have a strong Cronbach's Alpha, therefore, screen time that the parents reported was included as a media role modeling item.

The Pearson Correlations for the scales between initial completion of the CHES and a second completion one-to-two weeks later showed good correlation with values ranging from 0.73-0.97 showing good test-retest reliability (see Table 7 for all Pearson Correlations). The Pearson Correlations for the scales between raters (a spouse to the participant who initially completed the survey or second caregiver to the child) had good correlations with values ranging from 0.42-0.92 showing good inter-rater reliability (see Table 7 for all Pearson Correlations). All test-retest and inter-rater reliability correlations were significant at the 0.01 level.

**Relationship among variables**

Children of parents with higher BMI's were more likely to also display higher BMI percentiles ($p<0.01$, $r=0.32$) and these children had higher amounts of screen time ($p<0.01$, $r=0.48$), less physical activity at recess and lunch ($p<0.05$, $r=-0.27$; $p<0.01$, $r=-0.33$ respectively). Additionally, parents that participated in less physical activity had higher BMI's ($p<0.01$, $r=-0.24$). The screen time of parents and children were related ($p<0.01$, $r=0.37$) as was the parental physical activity level and children's physical activity level during recess ($p<0.05$, $r=0.27$), lunch ($p<0.01$, $r=.29$), evenings ($p<0.05$, $r=0.25$), weekends ($p<0.01$, $r=0.30$) and increased activity level during the weekend ($p<0.01$, $r=0.30$).

The greater the parent's BMI, the higher the score was for the child's fat intake ($p<0.05$, $r=0.23$). Similarly for parents, higher fat intake was related to higher calories intake from beverages ($p<0.01$, $r=0.40$). The higher the fat intake reported by the parents greater amount of fat intake that was reported by the children ($p<0.01$, $r=0.27$), greater amount of calories the child

took in from beverages ($p<0.01$, $r=0.40$). Parents and children calories from beverages were also significantly correlated ($p<0.01$, $r=0.52$).

**Validity**

The total score of the CHES was related to the parents BMI, higher scores were more likely in parents with lower BMI's ($p<0.01$, $r=-0.24$) and children with lower BMI percentiles ($p<0.05$, $r=-0.21$). The total score was positive correlated with the FNPA score ($p<0.01$, $r=0.37$) and was higher in those parents that consumed more vegetables ($p<0.01$, $r=0.25$). Parents who scored higher on the CHES were also more likely to have higher incomes ($p<0.01$, $r=0.31$).

The children of parents that role modeled less physical activity had higher BMI percentiles ($p<0.05$, $r=-0.20$) and these parents also tended to have higher BMI's ($p<0.01$, $r=-0.30$). In families with more opportunities for physical activity (Physical Activity Availability) children engaged in more types of activities ($p<0.01$, $r=0.32$), were more active in PE class ($p<0.01$, $r=0.27$), recess ($p<0.05$, $r=0.24$), and during the evenings ($p<0.01$, $r=0.33$), and weekends ($p<0.05$, $r=0.24$) and parents were more active ($p<0.01$, $r=0.22$). Children with less access to physical activity equipment (Physical Activity Accessibility) engaged in more screen time behaviors ($p<0.01$, $r=-0.31$), parents in homes with greater access to physical activity equipment were also of lower BMI status ($p<0.05$, $r=-0.20$). Parents with policies that encourage more physical activity are more active themselves ($p<0.05$, $r=0.19$) have children who have a higher general level of activity ($p<0.01$, $r=0.30$) are more active during PE ($p<0.05$, $r=0.21$), recess ($p<0.01$, $r=0.32$), lunch ($p<0.01$, $r=0.41$) and afterschool $p<0.05$, $r=0.24$). Similarly, parents who role model more physical activity, have children who are more active during PE ($p<0.05$, $r=0.24$), recess ($p<0.01$, $r=0.32$), lunch ($p<0.01$, $r=0.36$), evenings ($p<0.05$, $r=0.22$) and weekends ($p<0.05$, $r=0.25$) and a higher overall level of physical activity ($p<0.01$, $r=0.34$).

The more opportunities in the home for screen time behaviors (Media Availability), the higher the child's BMI percentile was ($p<0.05$, $r=0.17$) and the more screen time that the child ($p<0.01$, $r=0.30$) and parent will engage in ($p<0.05$, $r=0.21$). Interestingly, greater media availability is related to greater physical activity in children at recess ($p<0.05$, $r=0.25$), and the more types of activities the child engaged in ($p<0.01$, $r=0.27$). The more policies related to monitoring media the more likely the parent will be physically active ($p<0.05$, $r=0.20$) as well as the child during PE ($p<0.05$, $r=.25$), recess ($p<0.01$, $r=0.32$), and lunch ($p<0.05$, $r=0.26$). The more policies related to monitoring media the less screen time the child reported ($p<0.01$, $r=-0.26$) and the parent reported ($p<0.05$, $r=-0.19$). The more modeling of screen time behaviors the parent reported to exhibit, the greater amount of screen time the child reported ($p<0.01$, $r=0.37$). The more policies for screen time behaviors the parents reported, their intake of vegetables was higher ($p<0.01$), $r=0.27$). Also, the more the parents modeled media behavior (screen time) the less active the child was in PE ($p<0.05$, $r=-0.22$), at recess ($p<0.01$, $r=-0.27$), at lunch ($p<0.01$, $r=-0.27$).

Children with a higher BMI percentile were more likely to have parents that have concerns for their weight ($p<0.01$, $r=0.51$) and parents that restrict their diet ($p<0.01$, $r=0.34$). These parents that were more likely to restrict their child's diet and have concerns for their weight were also of higher BMI ($p<0.01$, $r=0.29$) and restrict their child's diet ($p<0.01$, $r=0.27$). Children of parents with greater concern for their weight participated in less physical activity during lunch ($p<0.05$, $r=-0.25$), and evenings ($p<0.05$, $r=-0.22$). Parents who had higher fat intake were more likely to pressure their child to eat ($p<0.01$, $r=0.23$). Parents who used more restriction and pressure had children less likely to consume vegetables ($p<0.01$, $r=-0.28$, $p<0.05$, $r=-0.20$ respectively). Parents who used restriction in their feeding style were also more likely to

have concerns for their child's weight ($p<0.01$, $r=0.67$). Parents were more likely to report being on a diet if they were of higher BMI ($p<0.01$, $r=0.24$). Parents who reported being on a diet were more likely to have lower fat intake ($p<0.05$, $r=-0.20$) and calories from beverages ($p<0.05$, $r=-0.18$) themselves.

Parents who modeled good dietary habits reported lower fat intake ($p<0.001$, $r=-0.41$). Parents who reported more policies to support healthy eating were more likely to have higher vegetable intake ($p<0.05$, $r=0.21$), lower fat intake ($p<0.01$, $r=-0.28$), and sugar sweetened beverage ($p<0.05$, $r=-0.20$). Children of parents with more policies to support healthy eating consumed fewer sugar sweetened beverages ($p<0.01$, $r=0.28$). Parents with older children were less likely to role model healthy eating habits ($p<0.01$, $r=-0.23$) and implement policies regarding food ($p<0.01$, $r=-0.24$). Parents of lower BMI were more likely to reported modeling good dietary habits ($p<0.01$, $r=-0.25$). Parents who reported modeling good dietary habits also reported less fat consumption ($p<0.01$, $r=-0.40$), and fewer calories from beverages ($p<0.05$, $r=-0.19$). Children of parents who reported modeling good dietary behavior reported greater vegetable consumption ($p<0.05$, $r=0.20$) and fewer sugar sweetened beverages ($p<0.01$, $r=-0.29$). Those parents who reported modeling good dietary habits also reported having more policies to support healthy eating ($p<0.01$, $r=0.36$). Families wither younger children were more likely to eat dinner together ($p<0.01$, $r=-0.22$).

Child who ate more often in front of the TV were less likely to have family meal time ($p<0.01$, $r=-0.42$), the parents were more likely to have screen time ($p<0.01$, $r=0.26$), and have greater fat intake ($p<0.01$, $r=0.30$). Children who ate more in front of the TV engaged in more screen time ($p<0.05$, $r=0.21$). Families with more family meal time (more nights per week with family dinners at a table) had parents who ate more vegetables ($p<0.05$, $r=0.19$) and less fat

($p<0.01$, $r=-0.23$), and fewer sugar sweetened beverages ($p<0.05$, $r=-0.16$). Child in families with more meal time had less screen time ($p<0.05$, $r=-0.19$).

Parents who reported more fat and sweets items in their home (Fat and Sweets Availability) were more likely to have a child of higher BMI percentile ($p<0.01$, $r=0.23$). Availability of fats and sweets items in the home was related to higher caloric intake from beverages for the children ($p<0.01$, $r=0.35$), and greater consumption of sugar sweetened beverages ($p<0.01$, $r=0.28$). Availability of fats and sweets items in the home was related to higher fat intake ($p<0.01$, $r=0.27$), and caloric intake from beverages ($p<0.01$, $r=0.26$) and consumption of sugar sweetened beverages ($p<0.01$, $r=0.39$) for the parents. Greater availability of fruits, vegetables and juices in the home was related to greater intake of fruits and vegetables by the parents ($p<0.01$, $r=0.37$), and lower BMI ($p<0.05$, $r=-0.17$). In families with more fruit and vegetable accessibility the children reported greater fat and fiber intake ($p<0.05$, $r=0.21$; $p<0.05$, $r=0.22$ respectively). (Note, fat and sweets availability and accessibility is reverse scored)

## Discussion

The modification of the original HES resulted in a tool with several subscales that assess both the physical and social environmental components of the home environment that contribute to a child's physical activity and healthy eating in low-income families. The measure has distinct domains/subscales that can be utilized in the assessment of home environment influences individually as needed or together as a comprehensive assessment of the physical and social home environment related to nutrition and physical activity. The instrument was found to be feasible and the majority of scales demonstrated substantial agreement for inter-rater and test-retest reliability.

Compared to previous measures of the home environment, the CHES displays adequate internal and external validity for school age children. Accurate assessment of home environment variables related to nutrition and physical activity behaviors in low-income families is an important missing assessment tool that may help us understand health disparities in a new light. Many researchers have assessed components of the home environment separately, either physical activity or nutrition environments (e.g., Cullen et al., 2000; Hume et al., 2006). Few authors have developed comprehensive measures of the physical and social environment for a specific population.

Although the majority of the scales had moderate to high reliability, a somewhat lower Cronbach's alpha was noted for media availability. Perhaps because this is a new area that is developing quickly (i.e., new technologies in media being developed) so further work may be needed to include relevant items for media availability and test the internal consistency. Overall, the CHES showed construct validity by relating to a previous measure of the home environment. The overall score of the CHES was related to the score on the FNPA which is a screener of the home environment for factors that may predispose a child to childhood obesity. In addition, the subscales of the CHES showed predictive validity by having significant correlations to theoretically related constructs. In most cases, physical activity and media constructs of the CHES (availability, accessibility, policies and modeling) were related to physical activity and screen time behaviors as well as weight. However, nutrition related variables did not show many significant correlations to child intake of vegetables, fiber, and fat that was indicated by the FFQ. Perhaps the FFQ was not suitable for children as reporting intake has been problematic for many authors (Rockett, Berkey, & Colditz, 2003). However, the measurement of beverage intake was much more precise and showed correlations to many of the CHES subscales.

Future use of the CHES should focus on further assessing the validity of the items that were retained after our assessment. These items should be assessed again in a low-income population, with the addition of criterion validity through in-home assessments. Due to lack of personnel to go into low-income neighborhoods in-home assessments were not possible in the current testing of the CHES. Future testing could also include higher income families to be able to compare findings and see differences between populations.

Table 4. Participant Demographics: BMI Percentile, Age, Gender Categories.

| | BMI 5th-85th% Boys | BMI 5th – 85th% Girls | BMI 85th – 95th% Boys | BMI 85th – 95th% Girls | BMI >95th% Boys | BMI >95th% Girls | Total |
|---|---|---|---|---|---|---|---|
| 5-8 years | 18 | 17 | 7 | 4 | 5 | 4 | 55 |
| 9-12 years | 21 | 10 | 6 | 3 | 11 | 8 | 58 |
| 13-17 years | 7 | 11 | 3 | 3 | 1 | 11 | 36 |
| Total | 46 | 38 | 16 | 10 | 17 | 23 | 150 |

Table 5. Parent Participant Demographics

| Variable | N | Mean or Percentage |
|---|---|---|
| Parent age | 150 | 36 (9.4) |
| Parent Participant Female (%) | 138 | 92% |
| Relationship to child | | |
| Mother | 127 | 85% |
| Father | 10 | 7% |
| Grandmother | 3 | 2% |
| Grandfather | 2 | 1% |
| Legal Guardian | 8 | 5% |
| Parent Race | | |
| Black | 71 | 48% |
| White | 65 | 44% |
| Mixed Race | 7 | 5% |
| Asian | 2 | 1% |
| American Indian | 2 | 1% |
| Other | 3 | 2% |
| Parent Ethnicity | | |
| Hispanic or Latino | 9 | 6% |
| Not Hispanic or Latino | 139 | 93% |
| Not sure | 2 | 1% |
| Household Income | | |
| $10,000 | 57 | 38% |
| $10,000 - $19,000 | 30 | 20% |
| $20,000 - $50,000 | 50 | 33% |
| $50,000 - $100,000 | 10 | 6% |
| > $100,000 | 3 | 2% |
| Occupation Status | | |
| Full-time work outside the home | 68 | 45% |
| Part-time work outside the home | 23 | 15% |
| Stay at home mom/dad | 55 | 36% |
| Work for wages from home | 4 | 3% |
| Home type | | |
| Apartment | 42 | 28% |
| Multi-family house | 15 | 10% |
| Single family house | 83 | 55% |
| Mobile home | 5 | 4% |
| Condominium | 3 | 2% |
| Shelter | 2 | 1% |

Table 6. Child demographics

| Variable | Mean (SD) or Percentage (N) |
|---|---|
| Child age | 9.99 (3.4) |
| Female (%) | 48.6% (73) |
| BMI Mean | 21 (6.2) |
| BMI Percentile for age and gender | |
| Normal Weight | 56% (84) |
| Overweight | 16% (24) |
| Obese | 28% (42) |
| Race | |
| Black | 49% (73) |
| White | 34.9% (52) |
| American Indian | 1.3% (2) |
| Asian | 0.7% (1) |
| Mixed Race | 12.1% (19) |
| Other | 2.0% (3) |
| Ethnicity | |
| Hispanic or Latino | 5.4% (8) |
| Not Hispanic or Latino | 91.9% (139) |
| Not sure | 2.0% (3) |

Table 7. Psychometric Properties of Comprehensive Home Environment Survey

| Scale (#items) | Internal Consistency (Cronbach's Alpha) | Test-Retest Reliability (Pearson Correlation) | Inter-Rater Reliability (Pearson Correlation) |
|---|---|---|---|
| Grow fruits and vegetables (1) | - | 0.82** | 0.84** |
| Physical Activity Availability (34) | 0.77 | 0.91*** | 0.84*** |
| Physical Activity Accessibility (2) | 0.76 | 0.59** | 0.61** |
| Physical Activity Role Modeling (6) | 0.80 | 0.81** | 0.42** |
| Gym attendance (1) | - | 0.92** | 0.79** |
| Parental Policies to Support Physical Activity (7) | 0.81 | 0.93** | 0.68** |
| Media Availability (7) | 0.67 | 0.96** | 0.91** |
| Media Role Modeling – Screen time (1) | - | 0.81** | 0.46** |
| Parental Policies to Monitor Media (7) | 0.74 | 0.95** | 0.70** |
| Eating in front of the TV (1) | - | 0.78** | 0.90** |
| Fruit, Juice, and Vegetable Availability (47) | 0.89 | 0.73** | 0.81** |
| Fat and Sweets Availability (16) | 0.81 | 0.90** | 0.91** |
| Fruit and Vegetable Accessibility (1) | - - | 0.93** | 0.55** |
| Fat and Sweets Accessibility (2) | 0.92 | 0.90** | 0.84** |
| Family Meal Time (1) | - | 0.90** | 0.78** |
| Role Model Diet (13) | 0.83 | 0.89** | 0.59** |
| Parental Policies to Support Healthy Eating (27) | 0.85 | 0.87** | 0.73** |
| Kitchen Environment (7) | 0.79 | 0.97** | 0.90** |
| Total Score (181) | - | 0.92** | 0.70** |

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## CH 6: GENERAL CONCLUSIONS

Childhood obesity has reached increasing levels to the point where one in three children is considered obese or overweight. These children are at higher risk for health conditions that were previously only diagnosed in adults such as Type II diabetes and non-alcoholic fatty liver disease. Children from low-income families are at an even greater risk for obesity due to complex changes in the environment such as a lack of resources for physical activity and the low cost of energy dense nutrition poor foods.

Parents influence their child's weight status through both the social and physical components of the home food and physical activity environment.

Many reviews on both childhood obesity interventions and those specifically focusing on the family have been conducted. The review conducted as part of this dissertation focused on measurement of home environment variables that influence children's eating and physical activity behaviors. This review highlighted the lack of continuity in measurement of the home environment in that most authors focus on one or two aspects of the home environment (e.g., fruit and vegetable availability and accessibility) and that many of the subscales in these measures show less than desirable psychometric properties, in particular low internal consistencies. Finally, none of the measures reviewed focus on a specific population, such as low-income families despite these individuals experiencing obesity at disproportionate rates.

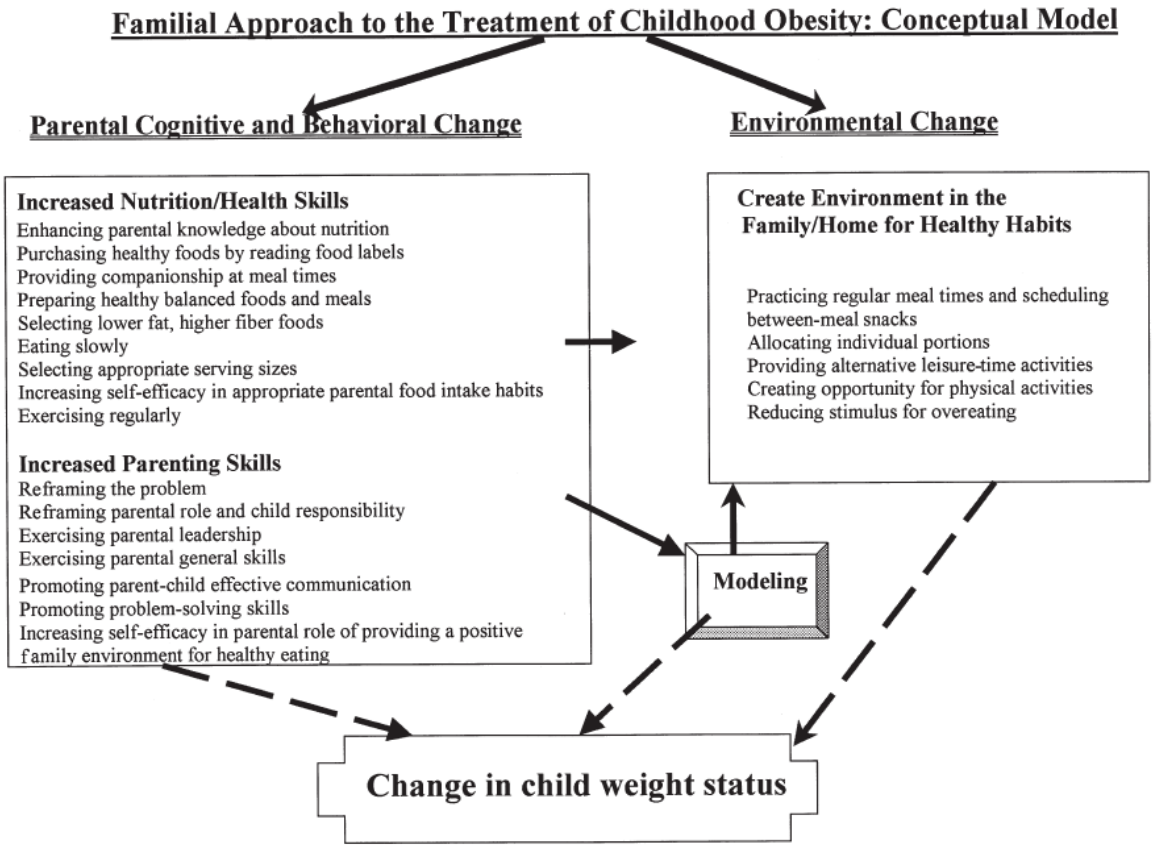
Subsequently, the Home Environment Survey (HES) was modified to include a wide range of factors so that all components of the home environment are assessed by a single scale, and all these scales together comprise factors that contribute to the health of the home. The resulting comprehensive nature of the HES includes 19 scales with a total of 181 items after item trimming. The HES was tested in a low-income population of parents of children 5-17 years old with BMI's of healthy, overweight, and obese ranges. The majority of these subscales show excellent internal consistency, test-retest reliability, and inter-rater reliability. The total score of the HES was significantly correlated to a previously validated

screener of the home environment as well as the child's BMI percentile and the parent's BMI. Each of the subscales of the HES showed significant correlations to behaviors and outcomes that they should be theoretically related to (e.g., availability of physical activity opportunities was significantly correlated to the level of physical activity in the children and the parents). Future studies with the HES should utilize the items that the current study included in the scales (some items were not included in the calculations of the Cronbach's Alphas and the subscale scores if they reduced the internal consistency). The HES should be further assessed in a low-income population and relationships between weight, health behaviors and scale constructs compared.

In addition to measurement of the home environment of low-income families, a pilot study of an intervention utilizing a clinical-community partnership was conducted. Smart Choices for Healthy Families was a bi-weekly group class taught be VCE lay leaders with automated telephone counseling on weeks between the group sessions. In the classes and the automated telephone calls the parents focused on similar topics as the children but focused more on parental strategies such as changes to the home environment and the importance of parental role modeling and communication. Participants were recruited through physician referral and included children ages 8-12 with a BMI between the $90^{th}$ and $99^{th}$ percentile for age and gender. At the conclusion of the program, there were positive changes in the children's BMI, body composition, and health behaviors of the parents and children. Qualitative follow-up with the physicians and the lay leaders suggested that the partnership was valuable.

# Appendix A

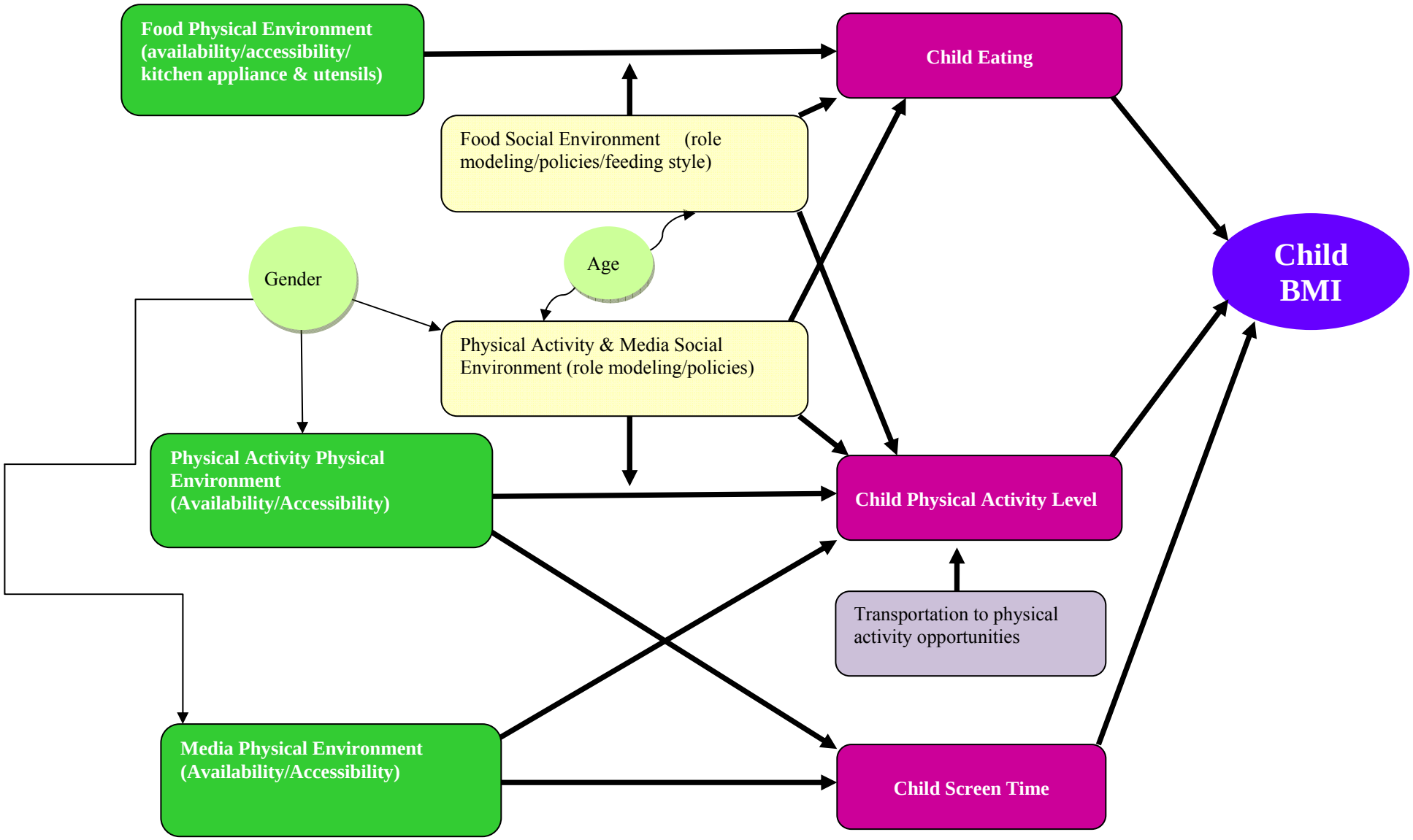
## Golan & Weizman's Model of Childhood Obesity


Familial Approach to the Treatment of Childhood Obesity: Conceptual Model
Parental Cognitive and Behavioral Change
Environmental Change
Increased Nutrition/Health Skills
Enhancing parental knowledge about nutrition
Purchasing healthy foods by reading food labels
Providing companionship at meal times
Preparing healthy balanced foods and meals
Selecting lower fat, higher fiber foods
Eating slowly
Selecting appropriate serving sizes
Increasing self-efficacy in appropriate parental food intake habits
Exercising regularly
Increased Parenting Skills
Reframing the problem
Reframing parental role and child responsibility
Exercising parental leadership
Exercising parental general skills
Promoting parent-child effective communication
Promoting problem-solving skills
Increasing self-efficacy in parental role of providing a positive family environment for healthy eating
Create Environment in the Family/Home for Healthy Habits
Practicing regular meal times and scheduling between-meal snacks
Allocating individual portions
Providing alternative leisure-time activities
Creating opportunity for physical activities
Reducing stimulus for overeating
Modeling
Change in child weight status

# Appendix B

## Conceptual Model of the Home Environment

(modified from Gattshall et al., 2009)


Food Physical Environment (availability/accessibility/ kitchen appliance & utensils)
Child Eating
Food Social Environment (role modeling/policies/feeding style)
Age
Gender
Child BMI
Physical Activity & Media Social Environment (role modeling/policies)
Physical Activity Physical Environment (Availability/Accessibility)
Child Physical Activity Level
Transportation to physical activity opportunities
Media Physical Environment (Availability/Accessibility)
Child Screen Time

# Appendix C

## Panel of Experts Characteristics

| Name | Qualifications | Characteristics |
|---|---|---|
| James Sallis | PhD | - publication and work in the area of measurement development and evaluation<br>- publication and work in the area of childhood obesity and the home environment |
| Mary Story | PhD, R.D. | - research interest and publications in the area of family and community interventions for healthy eating obesity prevention in children |
| David Dzewaltowski | PhD | - publication and work in the area of environmental and psychosocial influences on physical activity<br>- Prevention of obesity through out-of-school programs<br>- Community development and public health behavior theory |
| Claudio Nigg | PhD | - publication and work in the area of health behavior change theories, school based physical activity and nutrition programs |

# Appendix D

## Home Environment Survey


Please answer the following items as best you can.

Your personal responses will be confidential and we will not be shared with anyone. All of your answers are very important for this research study. However, remember that you do not have to answer any questions that you do not want to.

This survey will take you about 30 minutes to finish.

If you are unsure about what a question means please ask Courtney.

**Contact information:**

Courtney Robert, PhD Candidate
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1 Riverside Circle SW, Suite 104
Roanoke, VA, 24016
Ph: (540) 857-6661
Email: crobert@vt.edu
Fax: (540) 857-6658

**Office Use Only**

Location: _____

Date: _____

ID: _____

PART A: Caregiver and home information. Please answer the following demographic and home information questions to the best of your knowledge. Demographics are characteristics that describe you.

1. What is your age: _____

2. How would you describe *your* race? (please circle your response)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Black or African American | White | American Indian/Alaskan Native | Asian | Mixed Race | Native Hawaiian or Other Pacific Islander | Not sure | Other: _____ |

3. How would you describe *your* ethnicity? (please circle your response)

Hispanic or Latino Not Hispanic or Latino Not Sure

4. What is your height: _____

5. What is your weight: _____

6. How many children (under 18 years of age) live in your home? _____

Instructions: Please answer the questions in reference to the child that is with you at the time you enrolled in the study. If you have more than one child with you at the time, you can answer the questions in regards to the ***child with the birthday that falls first in the calendar year.***

7. What is your relationship with this child _____

8. How would you describe the race of *the child*? *(please circle your response)*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Black or African American | White | American Indian/Alaskan Native | Asian | Mixed Race | Native Hawaiian or Other Pacific Islander | Not sure | Other: _____ |

9. How would you describe the ethnicity of *the child*? *(please circle your response)*

Hispanic or Latino Not Hispanic or Latino Not Sure

10. What is your family's annual household income? *(please circle your response)*

Less than 10,000 $10,000 - $19,000 $20,000 - $50,000 $50,000 - $100,000 Greater than $100,000

11. Which of the following best describes your occupation *(please circle your response)*

| Full time working outside the home | P/T working outside the home | Working from home for a salary | Stay at home mom/dad |
|---|---|---|---|

12. What percent of the time does your child live with you? *(please circle your response)*

| Less than 25% | Between 25% and 50% | Between 50% and 75% | More than 75% but less than 100% | 100% |
|---|---|---|---|---|

13. Do you have a dog? *(please circle your response)*

Yes No

14. Think about who prepares the food in your home, which of the following best indicates your role?
*(please circle your response)*

| Food preparation is primarily my responsibility | I prepare food sometimes but it is not primarily my responsibility | I share food preparation equally with another family member | I rarely prepare food in our house |
|---|---|---|---|

15. Think about who plans family activities in your home, which of the following best reflects your role?
*(please circle your response)*

| Activity planning is primarily my responsibility | I plan family activities but it is not primarily my responsibility | I share family activity planning equally with another family member | I rarely plan family activities |
|---|---|---|---|

16. Think about the foods your child eats, which of the following best describes you?
*(please circle your response)*

| I am the one who has the most knowledge about what my child eats | I have some knowledge about what my child eats but *I am not* the one who knows the most | I share equally in my knowledge of what my child eats with another family member | I do not usually know what my child eats |
|---|---|---|---|

17. Think about the activities your child participates in, which of the following best describes you?
*(please circle your response)*

| I am the one who has the most knowledge about my child's activities | I have some knowledge about my child's activities but *I am not* the one who knows the most | I share equally in my knowledge of my child's activities with another family member | I do not usually know about most of my child's activities |
|---|---|---|---|

18. What best describes your home? *(please circle your response)*

Apartment | Condominium | Multi-family house | Single Family House | Mobile Home | Shelter

19. How many staircases do you have in your home? *(please circle your response)*

0 | 1 | 2 | 3

20. How often does your family eat fruits and vegetables that you have grown?
*(please circle your response)*

Not at all | Rarely | Some of the time | Most of the time | All of the time

21. What is the average time that you spend preparing the evening meal?
*(please circle your response)*

0-15 minutes | 16-30 minutes | 31-45 minutes | 46-60 minutes | >60 minutes

22. Where do you typically shop for your groceries? *(circle all that apply)*

Corner Store | Farmers Market | Grocery Store (e.g., Kroger) | Other: _____

23. Which of these statements best describes the food eaten in your household in the last 12 months?
*(please circle your response)*

| Often we don't have enough to eat | Sometimes we don't have enough to eat | We have enough to eat but not always the kinds of food we want | We always have enough to eat and the kinds of food we want |
|---|---|---|---|

24. How often during the last 12 months have you been hungry because your family couldn't afford more food?
*(please circle your response)*

Almost every month | Some months, but not every month | Only 1-2 months | I have not been hungry for this reason

PART B: Think about the things that are currently in your home and circle your response for each question.

1. Please indicate if you have the following areas in or around your home. If you have an area but it is not suitable for your child to play/exercise in please mark "No"

| | | |
|---|---|---|
| Inside playroom/area | Yes | No |
| Workout/exercise room | Yes | No |
| Sandbox | Yes | No |
| Outside Play area/yard | Yes | No |

2. What is the approximate size of your yard? *(please circle your response)*

We do not have a yard Small Medium Large

3. Which of the following things does your child have? *(please circle your response)*

| | | | | |
|---|---|---|---|---|
| Jungle-gym/swing set | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Size-appropriate bicycle | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Rollerblades/skates | Yes | No | | |
| | *If yes, are they in working condition?* | | Yes | No |
| Skateboard/scooter | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Jump rope | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Basketball hoop | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Baseball equipment (At least one of the following: ball, bat or mitt) | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Tennis/racquetball racket | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Hockey Equipment (at least a hockey stick) | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Ball of any kind (Volleyball, soccer, football, fitness ball, foam balls etc.) | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Pedometer (step counter) | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Winter Sports Equipment (at least one of the following: sled, skis, snowboard, ice skates) | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Home aerobic equipment (e.g., treadmill, cycle) | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Yoga/exercise mat | Yes | No | | |
| | *If yes, is it in working condition?* | | Yes | No |
| Hiking shoes | Yes | No | | |
| | *If yes, are they in working condition?* | | Yes | No |

| | | | | | |
|---|---|---|---|---|---|
| Running shoes (athletic or "tennis" shoes) | Yes | No | | | |
| | *If yes, are they in working condition?* | | | Yes | No |
| Sandbox | Yes | No | | | |
| | *If yes, is it in working condition?* | | | Yes | No |
| Trampoline | Yes | No | | | |
| | *If yes, is it in working condition?* | | | Yes | No |
| Yard Game (e.g., croquet, horseshoes etc.) | Yes | No | | | |
| | *If yes, is it in working condition?* | | | Yes | No |
| Pool (in ground or above) | Yes | No | | | |
| | *If yes, is it in working condition?* | | | Yes | No |
| Weight lifting equipment, toning devices (e.g., free weights) | Yes | No | | | |
| | *If yes, is it in working condition?* | | | Yes | No |
| An active video game like Wii Fit? | Yes | No | | | |
| | *If yes, is it in working condition?* | | | Yes | No |
| Hula Hoop | Yes | No | | | |
| | *If yes, is it in working condition?* | | | Yes | No |
| Swimming gear – bathing suits, goggles etc | Yes | No | | | |
| | *If yes, is it in working condition?* | | | Yes | No |
| | Yes | No | | | |
| Other equipment<br>Please list: _____<br>_____ | *If yes, is it in working condition?* | | | Yes | No |

Considering the things that you said you have in the question above…

| | All | Most | Some | Very few | None |
|---|---|---|---|---|---|
| 4. How much of it is stored in an area that your child uses regularly? | 1 | 2 | 3 | 4 | 5 |
| 5. How much of it is stored someplace where your child would need help getting out before he/she can use them. | 1 | 2 | 3 | 4 | 5 |
| 6. How much of it is stored out of sight when he/she is not using them. | 1 | 2 | 3 | 4 | 5 |

PART C: In the past 30 days, think about the types of things you did in your leisure time and you parenting related to physical activity. Please check the appropriate box for each question

1. How often did your child see you… *(please circle your responses below)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Doing something that was physically active (e.g., walking, biking, playing sports)? | 0 | 1 | 2 | 3 | 4 |
| Doing moderately active housework or yard-work? | 0 | 1 | 2 | 3 | 4 |
| Use physical activity for relaxation or stress relief? | 0 | 1 | 2 | 3 | 4 |

2. How often… *(please circle your responses below)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Did your child hear you talk about participating in a sport or being physical active? | 0 | 1 | 2 | 3 | 4 |
| Did your child hear you say that you were too tired to do something active? | 0 | 1 | 2 | 3 | 4 |
| Were you physically active with your child or did you play sports with him/her? | 0 | 1 | 2 | 3 | 4 |
| Did you verbally encourage your child to be physically active or play sports? | 0 | 1 | 2 | 3 | 4 |
| Did you transport your child to a place where he/she can be physically active or play sports? | 0 | 1 | 2 | 3 | 4 |
| Did you send your child outside to play when the weather was nice? | 0 | 1 | 2 | 3 | 4 |
| Did you give your child options to new physical activities to try? | 0 | 1 | 2 | 3 | 4 |
| Did you praise your child when they were physically active? | 0 | 1 | 2 | 3 | 4 |
| Did you watch your child practice or perform a dance routine? | 0 | 1 | 2 | 3 | 4 |
| Did you watch your child practice for sports? | 0 | 1 | 2 | 3 | 4 |
| Did you watch your child play sports? | 0 | 1 | 2 | 3 | 4 |

3. How often, in an average week, do you attend a gym, YMCA, or community center to exercise?
*(please circle your response)*

Not at all  1 time  2 times  3 times  4 times  5 times  More than 5 times

PART D: Think about the media equipment that is currently in your home and circle your response for each question

1. How many TVs do you have in your home? _____ (If none, skip to question 7)

2. Do you have a digital TV recorder (e.g., TiVo, Replay TV, Sonic Blue) *(please circle your response)*

Yes No Don't know

3. What best describes your television service for the primary television in the home? *(please circle your response)*

No TV in the home | No cable | Basic cable | Cable + premium channels | Satellite/Dish

4. Do you have exercise equipment (such as stationary bikes, treadmills) in your main TV viewing area? *(please circle your response)*

Yes No

5. Does your main TV viewing area have adequate space for your child to play or exercise while watching TV/Videos? *(please circle your response)*

Yes No

6. Does your child have a TV in his/her bedroom? *(please circle your response)*

Yes No

7. Does your child have a video game station or computer? *(please circle your response)*

Yes No Don't know

8. Do you have a desktop or laptop computer in your home? *(please circle your response)*

Yes No Don't know

9. Does your child have a PSP, Nintendo DS, iTouch or any other handheld video game? *(please circle your response)*

Yes No Don't know

10. Do you have video games on your phone? *(please circle your response)*

Yes No Don't know

11. Approximately how many video games and computer games are in your home? (Include items that are owned, rented and borrowed)

*(please circle your response)*

0 1-10 11-20 21-30 31-40 41-50 >50

12. How often is your television left on, whether or not it is being watched? *(please circle your response)*

Never Rarely Sometimes Frequently Always

13. How often does your child see you… *(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| On the computer? | 0 | 1 | 2 | 3 | 4 |
| Watching TV/movies? | 0 | 1 | 2 | 3 | 4 |
| Playing video games | 0 | 1 | 2 | 3 | 4 |

PART F: Based on the last 30 days, thinking about your parenting regarding time spent watching television, playing video games, and on the computer, please circle your answers.

1. Do you have any firm limits or agreements with your child about how much he/she can watch TV or Videos?
   O No (If no, go to Question 2) O Yes (If yes, go to Question 1a)

   1a. How much time are they allowed to watch Television or Videos per day? _____
   1b. How often are these limits enforced? *(please circle your response)*

   Never Rarely Sometimes Frequently Always

2. Do you have any firm limits or agreements with your child about how much time he/she is allowed to play on the computer or use it to communicate with friends?
   O No (If no, go to Question 3) O Yes (If yes, go to Question 2a)

   2a. How much time is allowed to play or talk with friends on the computer per day? _____
   2b. How often are these limits enforced? *(please circle your response)*

   Never Rarely Sometimes Frequently Always

3. Do you have any firm limits, or agreements, about how much time your child can play video games?
O No (If no, go to question 4) O Yes (If yes, go to Question 3a)

3a. How much time are they allowed to play video games per day? _____
3b. How often are these limits enforced? *(please circle your response)*

Never Rarely Sometimes Frequently Always

4. How often do you discipline your child for playing video games or watching TV without permission? *(please circle your response)*

Never Rarely Sometimes Frequently Always

5. How often does your child eat in front of the TV? *(please circle your response)*

Never | 1 time or less per week | 2-3 times per week | 4-5 times per week | Everyday

6. Do you have the following TV rules…. *(please circle your response)*

| | | |
|---|---|---|
| No TV/DVD before homework | Yes | No |
| No computer before homework | Yes | No |
| No internet without permission | Yes | No |

PART G: Thinking of the past 30 days, please answer the following questions about the types of foods you had in your house. Please circle the appropriate number for each food item.

1. How often did you have the following fruits (fresh, canned, or frozen) in your house?
(*please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Apples | 0 | 1 | 2 | 3 | 4 |
| Oranges | 0 | 1 | 2 | 3 | 4 |
| Bananas | 0 | 1 | 2 | 3 | 4 |
| Grapes | 0 | 1 | 2 | 3 | 4 |
| Pears | 0 | 1 | 2 | 3 | 4 |
| Strawberries | 0 | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Blueberries/ blackberries | 0 | 1 | 2 | 3 | 4 |
| Kiwi | 0 | 1 | 2 | 3 | 4 |
| Cantaloupe/Melon | 0 | 1 | 2 | 3 | 4 |
| Pineapple | 0 | 1 | 2 | 3 | 4 |
| Peaches/ nectarines | 0 | 1 | 2 | 3 | 4 |
| Plum | 0 | 1 | 2 | 3 | 4 |
| Applesauce | 0 | 1 | 2 | 3 | 4 |
| Fruit Salad | 0 | 1 | 2 | 3 | 4 |
| Watermelon | 0 | 1 | 2 | 3 | 4 |
| Mango | 0 | 1 | 2 | 3 | 4 |
| Other:_____ | 0 | 1 | 2 | 3 | 4 |

2. How often did you have the following vegetables (fresh, canned, or frozen) in your house?
*(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Asparagus | 0 | 1 | 2 | 3 | 4 |
| Beans (baked, lentils, kidney, etc.) | 0 | 1 | 2 | 3 | 4 |
| Beets | 0 | 1 | 2 | 3 | 4 |
| Bell Pepper (red, green, or yellow) | 0 | 1 | 2 | 3 | 4 |
| Broccoli | 0 | 1 | 2 | 3 | 4 |
| Brussel Sprouts | 0 | 1 | 2 | 3 | 4 |
| Cabbage | 0 | 1 | 2 | 3 | 4 |
| Carrots | 0 | 1 | 2 | 3 | 4 |
| Cauliflower | 0 | 1 | 2 | 3 | 4 |
| Celery | 0 | 1 | 2 | 3 | 4 |
| Corn | 0 | 1 | 2 | 3 | 4 |
| Cucumber | 0 | 1 | 2 | 3 | 4 |
| Green Beans | 0 | 1 | 2 | 3 | 4 |
| Greens (mustard, collard, kale, spinach, swiss chard etc.) | 0 | 1 | 2 | 3 | 4 |
| Lettuce | 0 | 1 | 2 | 3 | 4 |
| Mixed vegetables | 0 | 1 | 2 | 3 | 4 |
| Mushroom | 0 | 1 | 2 | 3 | 4 |
| Onion (green, red, white, yellow) | 0 | 1 | 2 | 3 | 4 |
| Peas | 0 | 1 | 2 | 3 | 4 |
| Potatoes | 0 | 1 | 2 | 3 | 4 |
| Squash (acorn, zucchini etc.) | 0 | 1 | 2 | 3 | 4 |
| Sweet Potatoes/ Yams | 0 | 1 | 2 | 3 | 4 |
| Tomatoes | 0 | 1 | 2 | 3 | 4 |
| Other:_____ | 0 | 1 | 2 | 3 | 4 |

3. Would you say the amount of fresh fruit and vegetables you currently have in your home is…
*(please circle your response)*

more than usual  less than usual  about the same

4. How often did you have the following juices in your house (fresh, frozen, bottled, or canned)?
*(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Apple juice | 0 | 1 | 2 | 3 | 4 |
| Grape juice | 0 | 1 | 2 | 3 | 4 |
| Orange juice | 0 | 1 | 2 | 3 | 4 |
| Fruit juice blend | 0 | 1 | 2 | 3 | 4 |
| Vegetable juice (e.g., V8, tomato juice) | 0 | 1 | 2 | 3 | 4 |
| Other: Specify _____ | 0 | 1 | 2 | 3 | 4 |

5. How often did you have the following snack items in your house? *(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Chips | 0 | 1 | 2 | 3 | 4 |
| Popcorn | 0 | 1 | 2 | 3 | 4 |
| Nuts | 0 | 1 | 2 | 3 | 4 |
| Crackers | 0 | 1 | 2 | 3 | 4 |
| Pretzels | 0 | 1 | 2 | 3 | 4 |
| Sunflower Seeds | 0 | 1 | 2 | 3 | 4 |
| Other: Specify _____ | 0 | 1 | 2 | 3 | 4 |

6. How often did you keep the following drinks (boxed, canned, powdered) in your house?
*(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Sugared Drinks (Sports drinks, Kool-aid®, boxed or bottled fruit flavored drinks, sweetened teas) | 0 | 1 | 2 | 3 | 4 |
| Non-diet Soft Drinks (ie. Soda, Carbonated beverages) | 0 | 1 | 2 | 3 | 4 |
| Other: Specify _____ | 0 | 1 | 2 | 3 | 4 |

7. How often did you have the following sweets/dessert foods in your house? *(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Candy | 0 | 1 | 2 | 3 | 4 |
| Cookies | 0 | 1 | 2 | 3 | 4 |
| Cakes/Snack cakes | 0 | 1 | 2 | 3 | 4 |
| Ice Cream, Sherbet, Frozen Yogurt or Sugared Popsicles | 0 | 1 | 2 | 3 | 4 |
| Chocolate/Chocolate bars | 0 | 1 | 2 | 3 | 4 |
| Other: Specify _____ | 0 | 1 | 2 | 3 | 4 |

PART H. Based on the past 30 days, thinking about where you like to store food, please circle the appropriate response for each statement

*(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| 1. Fruits and vegetables in a place where they could be seen and easily reached. | 0 | 1 | 2 | 3 | 4 |
| 2. Can the child get a soda without the help or permission of an adult | 0 | 1 | 2 | 3 | 4 |
| 3. Can the child get snack foods without the help or permission of an adult | 0 | 1 | 2 | 3 | 4 |

PART I: Based on the past 30 days, thinking about your food and meal behaviors, please circle the appropriate response for each statement

1. How often did you... *(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Eat healthy meals or snacks while your child was around? ("healthy" defined as fruits, vegetables, low-fat foods, lean meats, whole grains etc.) | 0 | 1 | 2 | 3 | 4 |
| Eat meals in the living room or TV room? | 0 | 1 | 2 | 3 | 4 |
| Take a second helping during meals? | 0 | 1 | 2 | 3 | 4 |
| Eat unhealthy snacks around your children? | 0 | 1 | 2 | 3 | 4 |
| Drink sugared drinks or non-diet soda around your children? | 0 | 1 | 2 | 3 | 4 |
| Avoid going to cafes or restaurants with your children which sell unhealthy foods? | 0 | 1 | 2 | 3 | 4 |
| Avoid buying sweets and chips or salty snacks (change to fatty snacks?) and bringing them into the house | 0 | 1 | 2 | 3 | 4 |
| Not buy foods that you would like because you do not want your children to have them? | 0 | 1 | 2 | 3 | 4 |

2. How often did your child see you…. *(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Eat while standing? | 0 | 1 | 2 | 3 | 4 |
| Eat straight from the pot/pan/bowl? | 0 | 1 | 2 | 3 | 4 |
| Eat while watching television, reading, or working? | 0 | 1 | 2 | 3 | 4 |
| Eat when you were bored? | 0 | 1 | 2 | 3 | 4 |
| Eat when you were angry or in a bad or sad mood? | 0 | 1 | 2 | 3 | 4 |
| Eat late in the evening or at night? | 0 | 1 | 2 | 3 | 4 |
| Eat while driving | 0 | 1 | 2 | 3 | 4 |

3. Are you or anyone else in the home following a weight loss diet? *(please circle your response)*

Yes No Don't know

4. How many days of the week do your family sit at a table and eat dinner together?
This includes when it is just you and your child(ren). *(please circle your response)*

One day or less 2 days 3 days 4 days 5 days 6 days 7 days

5. How often do you take your child with you grocery shopping? *(please circle your response)*

Never Rarely Sometimes Frequently Always

PART J: Based on the last 30 days, thinking about your parenting regarding food, please circle your answers.

1. How often did you... *(please circle your response)*

| | Never | Rarely | Sometimes | Frequently | Always |
|---|---|---|---|---|---|
| Use food as a reward for your child? | 0 | 1 | 2 | 3 | 4 |
| Use food as a punishment for your child? | 0 | 1 | 2 | 3 | 4 |
| Prepare meals with your child? | 0 | 1 | 2 | 3 | 4 |
| Plan meals/menus with your child? | 0 | 1 | 2 | 3 | 4 |
| Offer healthy snacks when your child was hungry? | 0 | 1 | 2 | 3 | 4 |
| Eat breakfast with your child? | 0 | 1 | 2 | 3 | 4 |
| Eat dinner with your child? | 0 | 1 | 2 | 3 | 4 |
| Have regularly scheduled meals and snacks with your family? | 0 | 1 | 2 | 3 | 4 |
| Allow your child eat snacks or sweets without permission? | 0 | 1 | 2 | 3 | 4 |
| Allow your child to take soft drinks whenever he/she wants | 0 | 1 | 2 | 3 | 4 |
| Give my child soft drinks or snacks if (s)he asks | 0 | 1 | 2 | 3 | 4 |
| Give your child something else if they did not like what was prepared | 0 | 1 | 2 | 3 | 4 |

2. Do you have the following food rules in your home.... *(please circle your response)*

| | | |
|---|---|---|
| How many servings of fruit and vegetables your child should eat | Yes | No |
| How many snacks is your child allowed to eat | Yes | No |
| When to snack | Yes | No |
| Which snacks to eat | Yes | No |
| No second helpings at meals | Yes | No |
| Limited portion sizes at meals | Yes | No |
| No dessert except fruit | Yes | No |
| No sweet snacks | Yes | No |
| No fried snacks at home (such as potato chips) | Yes | No |
| | | |
| | | |

3. When it is mealtime and your child is not hungry what would you usually do?

*(please circle your response)*

| Suggest the child sit down at the table but not eat | Suggest the child eat later | Suggest the child sit down at the table but eat less | Convince the child to eat a full meal with the family | It never happens, the child is always hungry |
|---|---|---|---|---|

4. Do you buy food upon your child's request? *(please circle your response)*
   a. Fruits and vegetables:

   Not at all Rarely Sometimes Quite A Bit Very Much

   b. Snacks or sugary cereal:

   Not at all Rarely Sometimes Quite A Bit Very Much

Part K. Please complete the following questions thinking about your opinion of your child's weight and your parenting regarding food.

1. How concerned are you…. *(please circle your response)*

| | Unconcerned | A little concerned | Concerned | Fairly Concerned | Very Concerned |
|---|---|---|---|---|---|
| About your child eating too much when you are not around him/her? | 0 | 1 | 2 | 3 | 4 |
| About your child having to diet to maintain a desirable weight? | 0 | 1 | 2 | 3 | 4 |
| Are you about your child becoming over weight? | 0 | 1 | 2 | 3 | 4 |

2. How much do you agree/disagree? *(please circle your response)*

| | Disagree | Slightly Disagree | Neutral | Slightly Agree | Agree |
|---|---|---|---|---|---|
| I have to be sure that my child does not eat too many sweets (candy, ice cream, cake, or pastries) | 0 | 1 | 2 | 3 | 4 |
| I have to be sure that my child does not eat too much | 0 | 1 | 2 | 3 | 4 |
| I have to be sure that my child does not eat too much of his/her favorite foods | 0 | 1 | 2 | 3 | 4 |
| I intentionally keep some foods out of my child's reach | 0 | 1 | 2 | 3 | 4 |
| If I did not guide or regulate my child's eating, (s)he would eat too many junk foods | 0 | 1 | 2 | 3 | 4 |
| If I did not guide or regulate my child's eating, she would eat too many of his/her favorite foods | 0 | 1 | 2 | 3 | 4 |

3. How much do you agree/disagree? *(please circle your response)*

| | Disagree | Slightly Disagree | Neutral | Slightly Agree | Agree |
|---|---|---|---|---|---|
| My child should always eat all of the food on his/her plate | 0 | 1 | 2 | 3 | 4 |
| I have to be especially careful to make sure my child eats enough | 0 | 1 | 2 | 3 | 4 |
| If my child says "I am not hungry", I try to get him/her to eat anyway | 0 | 1 | 2 | 3 | 4 |
| If I did not guide or regulate my child's eating, (s)he would eat much less than she should | 0 | 1 | 2 | 3 | 4 |

PART L: Based on your kitchen in the past 30 days, please circle your answers.

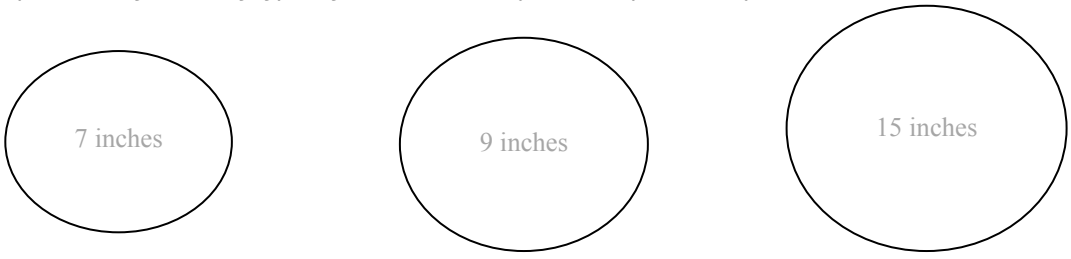
1. In your kitchen do you have... *(please circle your response)*

| | | |
|---|---|---|
| adequate counter space to prepare food? | Yes | No |
| adequate refrigerator and freezer space? | Yes | No |
| adequate cupboard storage space? | Yes | No |
| a microwave? | Yes | No |
| a toaster? | Yes | No |
| a steamer? | Yes | No |
| a stove Top? | Yes | No |
| an oven? | Yes | No |

2. How much do you use cooking equipment for food preparation (such as oven, microwave, food processor, electric mixer)? *(please circle your response)*

Not at all Rarely Sometimes Quite A Bit Very Much

3. What size plate does your family typically use for meals? (See examples below)




Small Medium Large

4. How confident are you that you have accurately reported your child's home environment on this survey?

| Not at all | A little | Moderately | Quite Completely |
|---|---|---|---|

Appendix E

Family Nutrition and Physical Activity (FNPA) screening tool

(Ihmels, Welk, Eisenmann, & Nusser, 2009)

Instructions: For each category, circle the description that best fits your child or your family. It is important to indicate the most common or typical pattern and not what you would like to happen.

| **In a typical week…** | | | | |
|---|---|---|---|---|
| 1. Does your family eat dinner while watching television? | Yes | | No | |
| 2. Do you use food as a reward for good behavior? | Yes | | No | |
| 3. Do you restrict how much your child eats potato chips, cookies, and candy? | Yes | | No | |
| 4. Do you have a routine or schedule for bedtime for your child? | Yes | | No | |
| 5. How many hours of sleep does your child usually get each night? | <8 | 8-9 | 9-10 | >10 |
| 6. How many hours of television does your child watch? | <7 | 7-14 | >14 | |
| 7. How many hours does your child spend on the computer or video games? | <7 | 7-14 | >14 | |
| 8. Does your child have a television in his or her bedroom? | Yes | | No | |
| 9. Do you monitor the amount of television your child watches? | Yes | | No | |
| 10. How often does your child eat breakfast? | Almost never | Sometimes | Often | Almost always |
| 11. How often does your family eat at least one meal together each day? | Almost never | Sometimes | Often | Almost always |
| 12. How often does your family eat fast food during the week? | Almost never | Sometimes | Often | Almost always |
| 13. How often does your family eat fruits and/or vegetables with your main meal? | Almost never | Sometimes | Often | Almost always |
| 14. How often do you use prepackaged foods (like frozen pizza) for your main meal? | Almost never | Sometimes | Often | Almost always |
| 15. How often does your family freshly prepare food (like chicken, pasta) for your main meal? | Almost never | Sometimes | Often | Almost always |
| 16. How often does your family drink soda pop or Kool-Aid at snacks and meals? | Almost never | Sometimes | Often | Almost always |
| 17. How often does your family drink 100% fruit juice or low fat milk at snacks and meals? | Almost never | Sometimes | Often | Almost always |
| 18. How often do you participate in at least 30 minutes of physical activity per day? | Almost never | Sometimes | Often | Almost always |
| 19. How often does your family play games outside, ride bikes, or walk together? | Almost never | Sometimes | Often | Almost always |
| 20. How often does your child participate in physical activity during their free time? | Almost never | Sometimes | Often | Almost always |

21. In the past year how many organized sports with a coach or leader (e.g. soccer) or in organized group activities involving physical activity (e.g. swim lessons) has your child participated in?

0-1 1-2 3-4 5+

Appendix F

Goals for Health Food Frequency Questionnaire (FFQ)

Buzzard et al., 2001

**Instructions:** Please answer these questions as honestly as possible. Remember, all of your answers are PRIVATE

1. How often do you eat white bread or rolls? (include bread for sandwiches and toast)
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

2. How often do you eat whole wheat bread, rye bread, or other brown bread or rolls?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

3. How often do you eat cold or hot cereal or grits?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

4. How often do you eat pizza?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

5. How often do you drink milk or add milk to your cereal?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

6. How often do you eat cheese? (include cheese in sandwiches and cheeseburgers)
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

7. How often do you drink fruit or vegetable juice?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

8. How often do you eat fruit *(include all kinds - - fresh, canned, cooked, or dried fruits)*
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

9. How often do you eat beans like baked beans, red beans, or black-eyed peas? *(include beans in chili, bean soup, and beans and rice)*
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

10. How often do you eat green salads like lettuce or spinach salad?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

11. How often do you eat French fries, fried potatoes, or hash browns?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

12. How often do you eat baked, boiled, or mashed potatoes?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

13. How often do you eat vegetables? (Include all kinds - - fresh, canned, and cooked)
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

14. How often do you eat fried chicken or chicken nuggets?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

15. How often do you eat fried fish (include fish sticks and fried shrimp)
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

16. How often do you eat hot dogs?
   - ☐ Never
   - ☐ Less than once a WEEK
   - ☐ 1-3 times a WEEK
   - ☐ 4-6 times a WEEK
   - ☐ Once a DAY
   - ☐ 2 times a DAY
   - ☐ 3 or more times a DAY

17. How often do you eat bologna or salami?
    - ☐ Never
    - ☐ Less than once a WEEK
    - ☐ 1-3 times a WEEK
    - ☐ 4-6 times a WEEK
    - ☐ Once a DAY
    - ☐ 2 times a DAY
    - ☐ 3 or more times a DAY

18. How often do you eat mayonnaise on your sandwiches?
    - ☐ Never
    - ☐ Less than once a WEEK
    - ☐ 1-3 times a WEEK
    - ☐ 4-6 times a WEEK
    - ☐ Once a DAY
    - ☐ 2 times a DAY
    - ☐ 3 or more times a DAY

19. How often do you eat bacon or sausage? (Include spam, scrapple and chit'lins)
    - ☐ Never
    - ☐ Less than once a WEEK
    - ☐ 1-3 times a WEEK
    - ☐ 4-6 times a WEEK
    - ☐ Once a DAY
    - ☐ 2 times a DAY
    - ☐ 3 or more times a DAY

20. How often do you eat hamburgers, cheeseburgers, meatloaf, or meatballs?
    - ☐ Never
    - ☐ Less than once a WEEK
    - ☐ 1-3 times a WEEK
    - ☐ 4-6 times a WEEK
    - ☐ Once a DAY
    - ☐ 2 times a DAY
    - ☐ 3 or more times a DAY

21. How often do you eat chips? (Include foods like potato chips, corn chips, tortilla chips, and cheetos)
    - ☐ Never
    - ☐ Less than once a WEEK
    - ☐ 1-3 times a WEEK
    - ☐ 4-6 times a WEEK
    - ☐ Once a DAY
    - ☐ 2 times a DAY
    - ☐ 3 or more times a DAY

22. How often do you eat donuts, sweet rolls or muffins?
    - ☐ Never
    - ☐ Less than once a WEEK
    - ☐ 1-3 times a WEEK
    - ☐ 4-6 times a WEEK
    - ☐ Once a DAY
    - ☐ 2 times a DAY
    - ☐ 3 or more times a DAY

23. How often do you eat cake, cookies, brownies, or pie?
    - ☐ Never
    - ☐ Less than once a WEEK
    - ☐ 1-3 times a WEEK
    - ☐ 4-6 times a WEEK
    - ☐ Once a DAY
    - ☐ 2 times a DAY
    - ☐ 3 or more times a DAY

24. How often do you eat ice cream or milkshakes?
    - ☐ Never
    - ☐ Less than once a WEEK
    - ☐ 1-3 times a WEEK
    - ☐ 4-6 times a WEEK
    - ☐ Once a DAY
    - ☐ 2 times a DAY
    - ☐ 3 or more times a DAY

25. How often do you eat candy bars?
    - ☐ Never
    - ☐ Less than once a WEEK
    - ☐ 1-3 times a WEEK
    - ☐ 4-6 times a WEEK
    - ☐ Once a DAY
    - ☐ 2 times a DAY
    - ☐ 3 or more times a DAY

26. How often do you add butter or margarine to your bread or rolls?
    - ☐ Never
    - ☐ Not very often
    - ☐ Sometimes
    - ☐ Almost always
    - ☐ Don't eat bread or rolls

27. Please list the names of one or two cereals you eat most often:
    1. _____
    2. _____
    3.

28. What kind of milk do you usually drink?
    - ☐ Whole milk
    - ☐ Low-fat milk (1 or 2% fat)
    - ☐ Skim (non-fat) milk
    - ☐ Don't know
    - ☐ Don't drink milk

29. What type of juice do you usually drink?
    - ☐ 100% real fruit or vegetable juice
    - ☐ Flavored fruit drinks (such as Hi-C, Kool-Aid, or punch)
    - ☐ Don't know
    - ☐ Don't drink juice

30. How often do you add butter, margarine, sour cream or gravy to your potatoes?
    - ☐ Never
    - ☐ Not very often
    - ☐ Sometimes
    - ☐ Almost always
    - ☐ Don't eat potatoes

31. How often do you add butter or margarine to your vegetables?
    - ☐ Never
    - ☐ Not very often
    - ☐ Sometimes
    - ☐ Almost always
    - ☐ Don't eat vegetables

Appendix G

Physical Activity Questionnaire – Children (PAQ-C)

Kowalski, Crocker, & Faulkner (1997)

**Instructions:** We are trying to find out about your level of physical activity from ***the last 7 days*** (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

**Remember:**

- There are no right and wrong answers — this is not a test.
- Please answer all the questions as honestly and accurately as you can — this is very important.

1. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? (Mark only one circle per row.)

| | No | 1-2 | 3-4 | 5-6 | 7 times or more |
|---|---|---|---|---|---|
| Skipping | | | | | |
| Rowing/canoeing | | | | | |
| Tag | | | | | |
| Walking for exercise | | | | | |
| Bicycling | | | | | |
| Jogging or running | | | | | |
| Aerobics | | | | | |
| Swimming | | | | | |
| Baseball, softball | | | | | |
| Dance | | | | | |
| Football | | | | | |
| Badminton | | | | | |
| Skateboarding | | | | | |
| Soccer | | | | | |
| Street hockey | | | | | |
| Volleyball | | | | | |
| Floor hockey | | | | | |
| Basketball | | | | | |
| Ice skating | | | | | |
| Cross-country skiing | | | | | |
| Ice hockey/ringette | | | | | |
| Other: _____ | | | | | |

2. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only.)

| I don't do PE | Hardly Ever | Sometimes | Quite often | Always |
|---|---|---|---|---|

3. In the last 7 days, what did you do most of the time at recess? (Check one only.)

| | | | | |
|---|---|---|---|---|
| Sat down (talking, reading, doing schoolwork)…… | Stood around or walked around | Ran or played a little bit | Ran around and played quite a bit | Ran and played hard most of the time |

4. In the last 7 days, what did you normally do *at lunch* (besides eating lunch)? (Check one only.)

| | | | | |
|---|---|---|---|---|
| Sat down (talking, reading, doing schoolwork)…… | Stood around or walked around | Ran or played a little bit | Ran around and played quite a bit | Ran and played hard most of the time |

5. In the last 7 days, on how many days *right after school*, did you do sports, dance, or play games in which you were very active? (Check one only.)

| | | | | |
|---|---|---|---|---|
| None | 1 time last week | 2 or 3 times last week | 4 times last week | 5 times last week |

6. In the last 7 days, on how many *evenings* did you do sports, dance, or play games in which you were very active? (Check one only.)

| | | | | |
|---|---|---|---|---|
| None | 1 time last week | 2 or 3 times last week | 4 or 5 times last week | 6 or 7 times last week |

7. *On the last weekend*, how many times did you do sports, dance, or play games in which you were very active? (Check one only.)

| | | | | |
|---|---|---|---|---|
| None | 1 time | 2 or 3 times | 4 or 5 times | 6 or more times |

8. Which *one* of the following describes you best for the last 7 days? Read *all five* statements before deciding on the *one* answer that describes you.

| | | | | |
|---|---|---|---|---|
| All or most of my free time was spent doing things that involve little<br><br>physical effort | I sometimes (1 — 2 times last week) did physical things in my free time<br><br>(e.g. played sports, went running, swimming, bike riding, did aerobics) | I often (3 — 4 times last week) did physical things in my free time | I quite often (5 — 6 times last week) did physical things in my free time | I very often (7 or more times last week) did physical things in my free time |

Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

| Day | None | Little Bit | Medium | Often | Very often |
|---|---|---|---|---|---|
| Monday | | | | | |
| Tuesday | | | | | |
| Wednesday | | | | | |
| Thursday | | | | | |
| Friday | | | | | |
| Saturday | | | | | |
| Sunday | | | | | |

9. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

| Yes | No |
|---|---|
| | |

If yes, what prevented you: _____

Appendix H

Screen time measure

Gortmaker et al. (1999)

a) In your free time on an average weekday (Monday-Friday), how many hours do you spend **watching TV & videos?**

| 0 | ½ hour | 1 hour | 2 hours | 3 hours | 4+ hours |
|---|---|---|---|---|---|
| | | | | | |

b) In your free time on an average weekday (Monday-Friday), how many hours do you spend **playing video games?**

| 0 | ½ hour | 1 hour | 2 hours | 3 hours | 4+ hours |
|---|---|---|---|---|---|
| | | | | | |

c) In your free time on an average weekday (Monday-Friday), how many hours do you spend **playing or doing homework on the computer?**

| 0 | ½ hour | 1 hour | 2 hours | 3 hours | 4+ hours |
|---|---|---|---|---|---|
| | | | | | |

Appendix I

Fruit and Vegetable Screener

Thompson et al., 2000

**Instructions:** Think about your eating habits over the past year or so. About how often do you eat each of the following foods? Remember breakfast, lunch, dinner, snacks and eating out. Mark one bubble for each food.

| Fruits and Vegetables | [0] Less than 1/WEEK | [1] Once a WEEK | [2] 2-3 times a WEEK | [3] 4-6 times a WEEK | [4] Once a DAY | [5] 2+ a DAY |
|---|---|---|---|---|---|---|
| Fruit juice, like orange, apple, grape, fresh, frozen or canned. (Not sodas or other drinks) | | | | | | |
| How often do you eat any fruit, fresh or canned (not counting juice?) | | | | | | |
| Vegetable juice, like tomato juice, V-8, carrot | | | | | | |
| Green salad | | | | | | |
| Potatoes, any kind, including baked, mashed or french fried | | | | | | |
| Vegetable soup, or stew with vegetables | | | | | | |
| Any other vegetables, including string beans, peas, corn, broccoli or any other kind | | | | | | |

Appendix J

Dietary Fat Screener

Block et al. (2000)

**Instructions:** Think about your eating habits over the past year or so. About how often do you eat each of the following foods? Remember breakfast, lunch, dinner, snacks and eating out. Mark one bubble for each food.

| Meat and Snacks | [0] Less than 1/MONTH | [1] 2-3 times a MONTH | [2] 1-2 times a WEEK | [3] 3-4 times a WEEK | [4] 5+ times a WEEK |
|---|---|---|---|---|---|
| Hamburgers, ground beef, meat burritos, tacos | | | | | |
| Beef or pork, such as steaks, roasts, ribs, or in Sandwiches | | | | | |
| Fried chicken | | | | | |
| Hot dogs, or Polish or Italian sausage | | | | | |
| Cold cuts, lunch meats, ham (not low-fat) | | | | | |
| Bacon or breakfast sausage | | | | | |
| Salad dressings (not low-fat) | | | | | |
| Margarine, butter or mayo on bread or Potatoes | | | | | |
| Margarine, butter or oil in cooking | | | | | |
| Eggs (not Egg Beaters or just egg whites) | | | | | |
| Pizza | | | | | |
| Cheese, cheese spread (not low-fat) | | | | | |
| Whole milk | | | | | |
| French fries, fried potatoes | | | | | |
| Corn chips, potato chips, popcorn, crackers | | | | | |
| Doughnuts, pastries, cake, cookies (not lowfat) | | | | | |
| Ice cream (not sherbet or non-fat) | | | | | |

Appendix K

Beverage Questionnaire

Hedrick, Comber, Estabrooks, Savla, Davy, In review

**Instructions:** In the past month, please indicate your response for each beverage type by marking an "X" in the bubble for "how often" and "how much each time"
**1)** Indicate how often you drank the following beverages, for example, you drank 5 glasses of water per week, therefore mark 4-6 times per week

**2)** Indicate the approximate amount of beverage you drank each time, for example, you

drank 1 cup of water 2 times per day, therefore mark 1 cup under "how much each time"

| | HOW OFTEN (MARK ONE) | | | | | | | HOW MUCH EACH TIME (MARK ONE) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type of Beverage | Never or less than 1 time per week (go to next beverage) | 1 time per week | 2-3 times per week | 4-6 times per week | 1 time per day | 2+ times per day | 3+ times per day | Less than 6 fl oz (3/4 cup) | 8 fl oz (1 cup) | 12 fl oz (1 1/2 cups) | 16 fl oz (2 cups) | More than 20 fl oz (2 1/2 cups) |
| Water | O | O | O | O | O | O | O | O | O | O | O | O |
| 100% Fruit Juice | O | O | O | O | O | O | O | O | O | O | O | O |
| Sweetened Juice Beverage/Drink (fruit ades, lemonade, punch, Sunny Delight) | O | O | O | O | O | O | O | O | O | O | O | O |
| 100% Vegetable Juice (V8, etc.) | O | O | O | O | O | O | O | O | O | O | O | O |
| Whole Milk | O | O | O | O | O | O | O | O | O | O | O | O |
| Reduced Fat Milk (2%) | O | O | O | O | O | O | O | O | O | O | O | O |
| Low Fat/Fat Free Milk (Skim, 1%, Buttermilk, Soymilk) | O | O | O | O | O | O | O | O | O | O | O | O |
| Soft Drinks, Regular | O | O | O | O | O | O | O | O | O | O | O | O |
| Diet Soft Drinks/Artificially Sweetened Drinks (Crystal Light) | O | O | O | O | O | O | O | O | O | O | O | O |
| Sweetened Tea | O | O | O | O | O | O | O | O | O | O | O | O |
| Coffee, with cream and/or sugar (includes non-dairy creamer) | O | O | O | O | O | O | O | O | O | O | O | O |
| Tea or Coffee, black, with/ without artifical sweetener (no cream or sugar) | O | O | O | O | O | O | O | O | O | O | O | O |
| Non-alcoholic or Light Beer | O | O | O | O | O | O | O | O | O | O | O | O |
| Beer, Ales, Wine Coolers | O | O | O | O | O | O | O | O | O | O | O | O |
| Hard Liquor (shots, rum, tequila, etc.) | O | O | O | O | O | O | O | O | O | O | O | O |
| Mixed Alcoholic Drinks (daiquiris, margaritas, etc.) | O | O | O | O | O | O | O | O | O | O | O | O |
| Wine (red or white) | O | O | O | O | O | O | O | O | O | O | O | O |
| Meal Replacement Shakes/Protein Drinks (Slimfast, shakes, etc.) | O | O | O | O | O | O | O | O | O | O | O | O |
| Energy Drinks (Red Bull, Rockstar, Full Throttle, etc.) | O | O | O | O | O | O | O | O | O | O | O | O |
| Other (list): | O | O | O | O | O | O | O | O | O | O | O | O |
| Other (list): | O | O | O | O | O | O | O | O | O | O | O | O |

Appendix L

Godin's Leisure Time Questionnaire

Godin, & Shephard (1985)

**Instructions:** In this excerpt from the Godin Leisure-Time Exercise Questionnaire, the individual is asked to complete a self-explanatory, brief four-item query of usual leisure-time exercise habits.

1. During a typical **7-Day period** (a week), how many times on the average do you do the following kinds of exercise for **more than 15 minutes** during your free time (write on each line the appropriate number)

Times Per Week

**i. STRENUOUS EXERCISE**
**(HEART BEATS RAPIDLY)**

(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling) _____

**ii. MODERATE EXERCISE**

**(NOT EXHAUSTING)**

(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing) _____

**iii. MILD EXERCISE**

**(MINIMAL EFFORT)**

(e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking) _____

2. During a typical **7-Day period** (a week), in your leisure time, how often do you engage in any regular activity **long enough to work up a sweat** (heart beats rapidly)?

| Often | Sometimes | Never/Rarely |
|---|---|---|