

## ABSTRACT

### Food For Thought: A Social Cognitive Approach to Assessing Children's Food Environments

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The objective of this study was to describe the process of developing and piloting a Social Cognitive Theory (SCT)-based assessment tool to capture the interaction between environmental and social determinants of child fruit and vegetable (F/V) intake. A three-stage process facilitated development of the 64-item *Food For Thought* questionnaire: (1) initial item selection and improvement; (2) expert panel review for improvement and establishing content and face validity, comprehensiveness, and cultural equivalence; and (3) refinement from a pilot test and focus group. Instrument modifications determined from these processes were described in detail. Children ages 8-12 (n=42) of ethnically diverse and low-income households were administered the computer-based questionnaire during after-school programming at local community centers. Scale response means and bivariate correlations were calculated. Overall mean F/V intake met the daily recommendation of five servings (M=5.17; SD=3.43). Self-efficacy for eating, preparing, and asking for F/V was the SCT construct most strongly associated with F/V consumption (M=2.44; SD=0.41; r=0.50; p=0.01). Future research

should be designed to validate the SCT-based scales included in the *Food For Thought* questionnaire to provide a more robust, theoretically comprehensive assessment of factors of children's F/V intake.

Food For Thought: A Social Cognitive Approach to Assessing Children's Food Environments

by

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A Thesis

Approved by the Department of Health, Human Performance, and Recreation

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## CHAPTER ONE

### Introduction

#### *Significance and Purpose*

Nutrition-related issues of obesity and food insecurity threaten the well-being of children in the United States (US) (Eisenmann, Gundersen, Lohman, Garasky, & Stewart, 2011). A recent report of the data from the 2011-2012 National Health and Nutrition Examination Survey shows that 17% of children were obese (Ogden et al., 2014). On the other end of the food consumption spectrum, 21% of US children live in food insecure households, which means they live in households that do not have access to adequate quantities and quality of food due to financial or other resources limitations (Eisenmann et al., 2011; Anderson, 1990). Specifically, low-income and minority populations experience greater rates of obesity and food insecurity. These populations deserve concentrated efforts from researchers and practitioners to determine the factors associated with these disparities.

Community-, school-, and recreation-level interventions for the prevention of childhood obesity and food insecurity can be effective tools for addressing childhood obesity (Penney, Almiron-Roig, Shearer, McIsaac, & Kirk, 2014; WHO, 2012). Interventions should include food and nutrition education and be focused on amounts and types of fruits and vegetables (F/V) consumed (Lorson, Melgar-Quinonez, & Taylor, 2009; Holben, 2010). Successful interventions are behavior-change focused and driven by theory-based educational strategies (Hernández-Garbanzo, Brosh, Serrano, Cason, & Bhattarai, 2013). In particular, the Social Cognitive Theory (SCT) incorporates personal,

behavioral, and environmental mediators into a framework for behavior change, and is an effective structure for many child nutrition education programs and interventions (Hernández-Garbanzo et al., 2013; Bandura, 1986). The SCT proposes that these mediators are dynamic and influence behavior in a reciprocal manner (Bandura, 1986).

High quality measurement instruments are essential for developing interventions that are relevant and address the needs of the intended recipients (Gupta, 2011). However, comprehensive, SCT-based measures that provide a comprehensive snapshot of child food environments and knowledge are lacking (Penney et al., 2014). The current designs are limited in assessing environmental influences of food consumption and are dated and lengthy (Penney et al., 2014). There is an urgent need for the development of valid tools that are sensitive to complex environments and are attuned to reveal the needs of diverse, low-income populations (Hernández-Garbanzo et al., 2013).

The purpose of this study is to describe the process of developing and piloting an SCT-based assessment tool to capture the interaction between environmental and social determinants of child F/V consumption. It is the aim of this study to create an ethnically sensitive and statistically strong measure that is easily administered and interpreted. Upon further validation, communities and schools will be able to use the *Food For Thought* questionnaire to determine and address the specific nutritional needs of their children.

### *Research Questions*

- 1) Which theory-based interventions have been used most frequently and successfully to increase F/V intake in children from low-income and minority populations?

- 2) Which constructs of the SCT best indicate F/V intake, perceptions, and experiences?
- 3) Of the existing SCT-based F/V questionnaires for children, what combination of scales and items will most comprehensively capture determinants of F/V intake for children ages 8-12?
- 4) Which SCT constructs are associated with F/V consumption in low-income minority children?

### *Study Overview*

Development of the 64-item *Food For Thought* questionnaire included a three-stage process of initial item selection and modification; expert panel review to establish content and face validity, comprehensiveness, and cultural equivalence; and focus group refinement. All SCT-based F/V measures and scales to address each theoretical construct were identified. From this pool, scales and items were selected that most comprehensively captured behavioral, personal, and environmental factors that influence child F/V consumption. Eight public health, nutrition, and population of interest experts reviewed the modified scales and suggested changes to increase content and face validity. A focus group was conducted to make necessary modifications to ensure cultural equivalence.

The computer-based *Food For Thought* questionnaire was administered to 8-12 year old children who received parental consent at local community centers during after-school programming (n=42). Sample descriptives and bivariate correlations were used to analyze the relationships between SCT constructs, sociodemographic factors, and F/V intake.

### *Limitations*

A potential limitation of this study is the small number of participants (n=42). To establish validity and reliability of questionnaire items, a sample size of at least ten times the number of participants as items in the largest scale is needed (Tinsely and Tinsely, 1987). Due to the small sample size, validation of the SCT scales was outside the scope of this study. Additionally, a small sample size makes it difficult to generalize correlational findings of SCT constructs and F/V intake to populations outside the population of interest. However, trends in consumption and relationships between SCT variables are useful for determining future development of child nutrition education programming and food policies.

A second limitation is that modifications informed by the focus group and pilot test might not be culturally comprehensive due to all focus group participants being Hispanic. It is possible that the homogenous nature of the focus group masked modifications needed to increase cultural equivalence of the *Food For Thought* questionnaire.

Community centers in this study serve primarily low-income families; however, the SES proxy item revealed that 54.8% of the study population reported qualifying for cash assistance from a government welfare program. A third limitation to this study includes possible underreporting of the families who qualified for these programs due to potential bias from utilizing university students of dissimilar demographics to collect parental consent. Future studies in community organization settings should expand the involvement of community center staff to strengthen relationships with community partners and to utilize the expertise of the staff and the trust they have established with

the population of interest. Furthermore, partnering more closely with community organization directors and staff reduces potential bias introduced by volunteers and researchers who are unfamiliar with the community setting.

A fourth limitation of the *Food For Thought* study is the potential that questionnaire items may not be specific enough to be utilized for evaluative purposes of F/V programs, interventions, or curriculum. Future research is needed to determine the efficacy of program-specific assessments vs. general F/V assessments (Hernández-Garbanzo et al., 2013).

### *Public Health Benefits*

A leading public health concern as designated by Healthy People 2020, is the dramatic increase in childhood obesity rates in the US, which has risen to nearly 17% (Ogden et al., 2014). Moreover, children from low-income and minority populations experience disproportionately higher rates of obesity and, subsequently, chronic disease (Ogden et al., 2014). A recommendation and public health goal for addressing the rising rates of childhood obesity is to ensure that children have access to and consume healthful diets (USDHHS, 2015). Healthful diets, which include adequate amounts of F/V, help children maintain a healthy weight, optimize growth and cognitive development, and build strong immune systems (USDHHS, 2015). Increasing F/V consumption is an ideal public health strategy to address childhood obesity as F/V are naturally low in fat and calories; provide essential vitamins, minerals, and fiber; and reduce risk of chronic disease and cancer (CDC, 2006). The *Food For Thought* study is timely in that it seeks to add to current knowledge of determinants of F/V intake in children. Additionally, this study is centered on identifying factors of F/V intake specific to low-income and minority

populations, which are under represented in the literature (Hernandez-Garbanzo et al., 2013). Understanding the features of F/V intake can improve the quality and effectiveness of public health interventions for addressing childhood obesity.

A second public health benefit of the *Food For Thought* study is that it provides a theory-based assessment tool for communities and schools to identify and address inadequate F/V intake of their children. Prior to this study, the existing theory-based instruments for assessing factors of F/V intake were dated, lengthy, not theoretically comprehensive, and not studied with low-income or minority populations (Penney, Almiron-Roig, Shearer, McIsaac, & Kirk, 2014; Hernandez-Garbanzo et al., 2013). Public health agencies and community stakeholders will be able to independently administer the computer-based *Food For Thought* questionnaire and capture a snapshot of the F/V needs of their children. Results from the *Food For Thought* questionnaire will help inform development of interventions and programs customized to the needs of the population of interest to increase F/V intake.

## CHAPTER TWO

### Overview of Child Nutrition Issues and Interventions

#### *Introduction*

The health and future of children in the United States (US) is dependent on food intake that provides sufficient quantity and quality of nutrients and energy to support ideal physical, social, and cognitive development (Stang & Bayerl, 2003). Children who do not receive adequate nutrients and energy from the food they consume are at greater risk for poor health outcomes, including an increased risk of developing chronic disease and obesity (Cook and Frank, 2008). Additionally, low-income families and minority subgroups are more susceptible to household food insecurity, which contributes to poor health outcomes due to micronutrient deficiencies and malnourishment (Cook and Frank, 2008). The nutrition-related issues of obesity and food insecurity threaten the well-being of children in the US (Eisenmann, Gundersen, Lohman, Garasky, & Stewart, 2011).

#### *Childhood Obesity*

Obesity is a major public health concern in the US. Overweight is defined by an age specific BMI (body mass index) of  $\geq 85$ th percentile and  $< 95$ th percentile for children and adolescents, while obesity is defined as an age specific BMI of  $\geq 95$ th percentile (Barlow, 2007). Approximately 35% of adults and 17% of children in the US are obese (Ogden, Carroll, Kit, & Flegal, 2014). Alarming, the percentage of children aged 6-11 years in the US who were obese increased from 7% in 1980 to nearly 18% in



2012 (Ogden, Carroll, Kit, & Flegal, 2014). Recent estimates indicate that 27% of children aged 2-5 years are overweight while another 12% are obese (Ogden et al., 2012).

Obesity is the leading cause of preventable death in the US as it has numerous health, social, and economic consequences at both the individual and population levels (Goldschmidt, Wilfley, Paluch, Roemmich, & Epstein, 2013; Ickes, McMullen, Haider, & Sharma, 2014). High prevalence of obesity accounts for 5.7% of national health care costs, which places financial strain the healthcare system (Goldschmidt et al., 2013; Ickes et al., 2014). Additionally, persons struggling with obesity have yearly medical costs an average of 30% greater than persons who are not obese (Withrow & Alter, 2011). The issue of pediatric obesity in the US is complex, with interrelated interactions between genetics, diet, physical activity, and broad environmental determinants (e.g. opportunities for physical activity and accessibility to healthy foods) (Scherr, Cox, Feenstra, & Zidenberg-Cherr, 2013; Biro & Wien, 2010). More specifically, childhood obesity also includes factors such as pre- and post-natal maternal behaviors, family food environments and dietary behaviors, and other influences within the first years of life (Sharma & Ickes, 2008; Rennie, Johnson, & Jebb, 2005; RWJF, 2013). Overweight and obese children are at greater risk for developing health problems as adults such as heart disease, type two diabetes, stroke, osteoarthritis, etc. (Kim et al., 2014). Children who are obese will experience short-term health effects usually unheard of in childhood. These “adult” health issues include high cholesterol or blood pressure, prediabetes, bone and joint problems, sleep apnea, insulin resistance, and glucose intolerance (Kim et al., 2014; Yanovski & Yanovski, 2011; Ickes et al., 2014). Children who are obese may also experience a range of social and emotional problems such as sadness, loneliness,

nervousness, anxiety, and increased participation in high-risk behaviors (Olds et al., 2011). Furthermore, unpleasant stereotyping of poor health, academic and social incompetence, and poor hygiene may also plague children who are overweight and obese (Hill & Silver, 1995).

Although some recent studies have reported that obesity rates in the US seem to be plateauing, the prevalence of obesity within certain subgroups is masked by socioeconomic status (SES; Taveras, Gillman, Kleinman, Rich-Edwards, & Rifas-Shiman, 2013; Biro & Wein, 2010). In 2014, 78.6 million (34.9%) adults in the US were obese (Ogden et al., 2014). However, obesity rates among non-Hispanic Blacks (47.8%) and Hispanics (42.5%) were greater than the national average and differed from non-Hispanic whites (32.6%) and non-Hispanic Asians (10.8%) (Ogden et al., 2014). Additionally, some studies have shown a significant relationship between SES and prevalence of obesity (Sobal and Stunkard, 1989; McLaren, 2007). The overall trend in childhood obesity rates masks a significant and increasing gap between children from high and low SES households (Frederick, Snellman, & Putnam, 2014). Obesity rates were similar for all SES groups until 2002, but since then the prevalence of obesity among high SES children has decreased while the prevalence of obesity among low SES children has increased (Frederick, Snellman, & Putnam, 2014). A recent report from Taveras and colleagues (2013) suggests that racial and ethnic minority children disproportionately experience obesity and that this health disparity gap may be widening (Ogden et al., 2012; Olds et al., 2011).

It is widely known that children and adolescents who are overweight and obese are more likely to track excess weight into adulthood (Guo, Wu, Chumlea, & Roche,

2002; Thomas, 1995). As many as half of children who are overweight will remain overweight or obese as adults (Freedman, Khan, Serdula, Dietz, Srinivasan, & Berenson, 2004). Although health outcomes of obesity are deleterious, the reversal of childhood overweight is possible and can decrease the risk of potential negative health effects (Goldschmidt et al., 2013). For this reason, the most optimal time for public health action to address modifiable obesity risk factors is during early-childhood and adolescence (Taveras et al., 2013). Given the link between childhood obesity, household SES, and minority subgroup membership, future consideration for childhood obesity interventions and policies should be given to these populations (Ickes et al., 2014).

### *Food Insecurity*

On the other end of the food consumption spectrum, is household food insecurity, which is defined as inaccessibility to nutritionally adequate foods owing to financial or other resource limitations (Anderson, 1990). In 2013, 14.3% of household in the US were food insecure (USDA ERA, 2013). Families with low food security, defined as obtaining enough food to only minimally disrupt eating patterns and food intake through coping strategies, accounted for 8.7% of food insecure households, while 5.6% of families experienced very low food security, which is defined as the disruption of normal eating patterns and food intake because of insufficient financial and environmental resources (USDA ERS 2013). Likewise in 2013, 8.6 million children lived in food insecure households. These percentages remain virtually unchanged since 2008. Rates of food insecurity are higher than the national average (14.3%) for many subgroups: households with children (19.5%), African American households (26.1%), Hispanic households

(23.7%), and households at or below 185% of the federal poverty threshold (34.8%; USDA ERS, 2013).

Consistent access to and intake of nutritious foods is vital for physiological, cognitive, and emotional development and health in childhood (Cook and Frank, 2008). However, households that experience food insecurity are also subject to nutritional and overall family stress leading to poor health outcomes (Cook and Frank, 2008). Inadequate consumption of quality and quantities of nutrients are an indicator of food insecurity (Cook and Frank, 2008). As noted above, food insecurity and hunger are more prevalent among families with limited household resources (Hamilton, Cook, and Thompson, 1997). Food insecurity is often denoted as a “resource restrained” or “poverty-related” condition (Cook and Frank, 2008). To combat persistent hunger associated with food insecurity, household grocery shoppers purchase less expensive, energy-dense but nutritionally sparse foods, which when consumed in inappropriate amounts can lead to weight gain (Drewnowski & Specter, 2004; Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004). The inverse relationship between inexpensive, energy-dense foods and more expensive, nutrient-dense foods is linked to micronutrient deficiency and is also a contributing factor to childhood obesity and overweight in adults (Drewnowski & Specter, 2004; Olson, 1999; Adams, Grummer-Strawn, & Chavez, 2003). Furthermore, the threshold severity level of household food insecurity at which adverse health effects are possible occurs long before physical indicators such as underweight or malnutrition (Cook and Frank, 2008). Household food insecurity, even at its least severe level, is a risk to the growth, health, and cognitive and behavioral potential of children in the US, especially children from low-income households (Cook and Frank, 2008).

Poor nutrition due to food insecurity in childhood can influence health and well-being during all life-stages (Pollitt, 1994; Kretchmer, Beard, and Carlson, 1996). Children that eventually transition out of food insecure conditions continue to experience long-term academic and social functioning impairments (Howard, 2011). Household food insecurity substantially affects a child's health outcomes, and is associated with behavior problems, undesirable social exchanges, poor school performance, inadequate dietary intake and physical activity, and school absenteeism (Wunderlich & Norwood, 2006; Fram, Frongillo, Fishbein, & Burke, 2014; Casey et al., 2005). Children experiencing food insecurity also have higher rates of anxiety, exposure to traumatic events, chronic illness, iron deficiency, stomachaches, headaches, and colds (Kleinman et al., 1998; Weinreb et al., 2002; Alaimo, Olson, & Frongillo, 2001).

Moreover, food insecurity is a risk factor for obesity that is mediated by SES (Frongillo, 2013; Martin, 2012). Some studies claim that the association between food insecurity and obesity is unclear; however, recent reviews of the literature demonstrate that food insecurity and obesity coexist in families that are impoverished, and that claims of paradoxical association are false (Frongillo, 2013). An explanation of the coexistence of food insecurity and obesity associated with low SES is that households with low food security increase reinforcement of unhealthy food consumption and facilitate excess energy intake (Lin, Carr, Fletcher, & Epstein, 2013). Specifically, children from low SES households may experience reinforcement due to restricted access to sufficient quantities of food (Lin et al., 2013). Children experience cognitive, emotional, and physical awareness of food insecurity, which may encourage them develop strategies to obtain additional food (Frongillo, 2013; Bernal, Frongillo, Herrera, & Rivera, 2012; Fram et al.,

2011). Thus, increased intake of nutrient-poor, energy-dense foods due to household food insecurity contributes to childhood obesity.

Food insecurity is mediated by familial, societal, and macroeconomic factors (Habicht, Pelto, Frongillo, & Rose, 2004). Familial factors include the health and energy of parents to provide care and developmental stimulation for their children, physical limitations of the parents and care providers, and the emotional and mental well-being of the parents, which includes self-esteem and maternal depression (Bhargava, Jolliffe, & Howard, 2008; Heflin, Corcoran, & Siefert, 2007; Whitaker, Phillips, & Orzol, 2006). Additionally, societal factors such as neighborhood access to quality and sufficient quantities of nutrient-dense foods and the presence of food deserts in both urban and rural areas influence food security (Ver Ploeg, 2010). Public policy investments in the form of nutrition assistance programs, nutrition education programs, and an increase of environments that support affordable, healthy food options are vital for addressing household food insecurity and developing healthy communities (Vericker & Mills, 2012).

### *Fruit and Vegetable Intake*

Health disparities and food insecurity disproportionately affect individuals and families of minority subgroups and low SES, increasing the susceptibility of these populations to chronic diseases, such as adult overweight and childhood obesity (Braveman, Cubbin, Egerter, Williams, & Pamuk, 2010; USDA ERS, 2013; Ogden et al., 2014). Quantity and quality of dietary intake is an important contributor to disease-related disparities (Satia, 2009). The elimination of these health disparities, in particular, childhood obesity, from minority subgroups is a public health priority in the US (Satia, 2009). Recent data on food and nutrient intake of children suggest that mean energy

intake has steadily increased in the past two decades while intake of nutrient-dense foods has decreased (Stang & Bayerl, 2003; Skinner, Steiner, & Perrin, 2012). Most of the additional energy intake occurs at snack time and/or evening meals (Gleason & Sutor, 2001). Although energy intake has increased, mean intake of vitamins and minerals, including potassium, dietary fiber, calcium, and vitamin D have decreased (Berner, Keast, Bailey, & Dwyer, 2014; McGuire, 2011).

Fruits and vegetables (F/V) are generally low in energy density and provide many essential micronutrients (Slavin & Lloyd, 2012). The Dietary Guidelines for Americans 2010 advises that eating the recommended amount of F/V increases intake of under consumed nutrients, reduces risk of chronic disease and death, and can encourage maintenance of healthy body weight (McGuire, 2011). Because F/V provide substantial health benefits and childhood dietary patterns carry over into adulthood, increasing fruit and vegetable intake during childhood is a public health priority (Due et al., 2011; Kim et al., 2014). However, most of the US population consumes too few F/V (Kim et al., 2014). Children in families of low SES have lower F/V intake than children in families of medium and high SES (Rasmussen et al., 2006; Cameron et al., 2012). In 2010, the U.S. Department of Agriculture Food Patterns reported that 60% of children ages 1-18 did not meet the daily fruit recommendations, and 93% did not meet vegetable recommendations (USDA, 2010). Healthy People 2020 objectives NWS-14 and NWS-15 specifically call for an increase in the contribution of F/V to the diets of the population aged 2 years and older (USDHHS, 2010). Fruit intake is suggested to increase from 0.53 cup equivalent of fruits per 1,000 calories (2001-2004) to 0.90 cup equivalent per 1,000 calories by 2020. Similarly, vegetable intake is suggested to increase from 0.77 cup

equivalent of total vegetables per 1,000 (2001-2004) to 1.14 cup equivalent per 1,000 calories by 2020 (USDHHS, 2010).

Increasing F/V intake to sufficient amounts is an important goal of childhood obesity prevention because the health effects of F/V consumption are substantial and persistent through further life stages (Lock, Pomerleau, Causer, Altmann, & McKee, 2005; Nagel et al., 2009). F/V consumption has been proposed as a solution to childhood obesity as F/V may be protective against obesity because of the natural displacement of energy-dense, nutrient-sparse foods (Rolls, Ello-Martin, & Tohill, 2004; Fisher, Liu, Birch, & Rolls, 2007). Additionally, F/V have high water and fiber content and are low in energy, which contributes to their preventative effects against adiposity (Ledoux, Hingle, & Baranowski, 2011; Amine et al., 2003; Vioque, Weinbrenner, Castelló, Asensio, & Hera, 2008). The high fiber content of many F/V creates a satiating effect, and can reduce daily caloric intake (Howarth, Saltzman, Roberts, 2001).

Continued public health efforts are needed to increase F/V intake among children (Kim et al., 2014). In the context of the obesity epidemic and the prevalence of food insecurity in the US, evidence suggests that children from minority subgroups and low SES households would specifically benefit from increasing F/V intake (Flegal, Carroll, Ogden, & Curtin, 2010; Skelton, Cook, Auinger, Klein, & Barlow, 2009). However, this finding has implications for improvement beyond a child's individual dietary choices to the availability of F/V in homes, schools and neighborhood grocery stores, cultural practice and preferences, and biological differences between population subgroups (Kirkpatrick et al., 2012; Krebs-Smith, Reedy, & Bosire, 2010; Williams, Mohammed, Leavell, Collins, 2010; Beaulac, Kristjansson, & Cummins, 2009; Larson, Story, &



Nelson, 2009; Satia, 2009). Parents, schools, child caregivers, business leaders, and community stakeholders can influence nutrition environments and improve children's F/V consumption through nutrition education and policies that promote healthful eating (McGuire, 2011; Benjamin, 2010).

### *Fruit and Vegetable Interventions*

Although many federally and non-federally funded interventions for increasing intake of nutrient-rich foods have been developed, the process of dietary behavior change among school-age adolescents is not well understood (Hernandez-Garbanzo et al., Brosh, Serrano, Cason, & Bhattarai, 2013). Further assessments, program evaluation, and best practice research is needed to understand the influencing factors of dietary behavior change in children (Waters et al., 2011; Penney et al., 2014). Likewise, development of rigorously tested needs assessment and evaluation tools that are attuned to the experiences of racially and economically diverse populations is needed (Hernandez-Garbanzo et al. et al., 2013; Penney et al., 2014). Best practices can be embedded and validated assessment tools can inform federal nutrition education programs and region-wide nutrition interventions in children (Hernandez-Garbanzo et al. et al., 2013). Dietary intake of nutrient-rich foods is a highly modifiable health behavior and is therefore a natural target for childhood obesity prevention programs and interventions (Magarey et al., 2011).

Many federal agencies have acknowledged the childhood obesity issue in the US and have undertaken the task of developing and administering prevention programs and initiatives. The American Dietetics Association calls for additional development and implementation of nutrition education initiatives as they play a vital role in consumption

of healthful food (Stang, 2010). In 2010, First Lady Michelle Obama, the Surgeon General, and the U.S. Department of Health and Human services released an initiative stating the critical need for improved food environments and dietary behaviors among children (USDHHS, 2010). In response, President Obama called for the establishments of the federal Task Force on Childhood Obesity (WHTF, 2010) to develop and implement an inter-agency action plan to end the problem of childhood obesity. Strategies include increasing access to healthy and affordable foods at home and school, increasing physical activity, empowering parents and caregivers to make healthier food choices, and reducing the risk of obesity in childhood years through early nutrition education. The Institutes of Medicine have urged key stakeholders at the federal and local levels to commit to childhood obesity prevention by developing innovative adolescent nutrition education programs to increase F/V consumption (CPPCO, 2007).

Interventions to increase healthful eating and F/V consumption during childhood are pertinent and recommended for several reasons (Goldschmidt et al., 2013). First, the habits of children are less engrained and are more modifiable than adults, making behavior change interventions more successful (Epstein, Valoski, Kalarchian, & McCurley, 1995; Northstone & Emmett, 2008). Likewise, children who are overweight or obese are less likely to experience comorbidities such as diabetes or hypertension, which can complicate treatment and intervention development (Wannamethee & Shaper, 1999; Alpert et al., 1997; Goldschmidt et al., 2013). Finally, because children experience frequent height growth, interventions that produce relatively modest changes in diet can significantly decrease prevalence of overweight within program populations (Epstein et al., 1993). Childhood obesity is a vital point of intervention for preventing adult obesity

and related complications health problems. Thus, there is a demand for determining best practices for how to intervene with interventions safely and as early as possible (Yanovski & Yanovski, 2011). To optimize nutritional knowledge, growth, and development, strategies should be multi-faceted, tailored to the needs of the target population, and include evaluation pieces to ensure the effectiveness of the intervention (Yanovski & Yanovski, 2011; Bourke, Whittaker, & Verma, 2014; Ickes et al., 2014, Hernandez-Garbanzo et al. et al., 2013).

### *Development and Evaluation*

Information on population specific determinants of behavior also needs to be collected prior to intervention development (Satia, 2009). Formative research, in the form of needs assessments and qualitative data collection methods, should be conducted prior to program development (Ickes et al., 2014; Stang, Taft, & Flatt, 2006). Utilizing formative research to tailor programs to specific population needs increases the sustainability of the program and probability of significant behavior changes (Ickes et al., 2014). Interventions specifically developed for low-income children seem to be particularly successful when influenced by needs assessments (Ickes et al., 2014). Although the importance of determining the needs of a population is clear, self-report instruments developed for assessing children's dietary behavior are lacking (Hernandez-Garbanzo et al. et al., 2013). Development of valid and reliable instruments to assess food environments and determinants of child dietary behaviors is critical for understanding the causes of diet-related disparities and developing programs to address these issues (Lytle, 2009). In addition to developing programs that are informed by needs assessments, childhood dietary interventions should contain a comprehensive evaluation component to

ensure the quality and effectiveness of program activities (Hernandez-Garbanzo et al., 2013). Program evaluation components should include valid and reliable measures that are culturally and demographically appropriate and are theory-driven (Townsend, Kaiser, Allen, Joy, & Murphy, 2003; Sherwood, Story, Neumark-Sztainer, Adkins, & Davis, 2003).

### *Multi-faceted*

Childhood obesity and other nutrition-related health problems are complex and have numerous contributing factors. It is for this reason these issues cannot be solved through interventions that address one contributing factor (Scherr et al., 2013). The call for multi-pronged programs has been echoed by many governmental and non-governmental agencies in the US (Scherr et al., 2013). Effective interventions require commitment from stakeholders to address the causes and consequences obesity and food insecurity at multiple levels (Yanovski & Yanovski, 2011). Specifically, adolescent behavior change programs for diet should be behaviorally focused and target mediators of change such as knowledge, skills, social support, and environmental factors (Cerin, Barnett, & Baranowski, 2009; Baranowski, Cerin, & Baranowski, 2009; Contento, Randell, & Basch, 2002).

### *Tailored*

The prevalence rates of childhood obesity and food insecurity are higher among certain ethnic and socioeconomic groups. The disparities experienced by these groups pose major challenges for researchers and practitioners planning nutritional interventions for children (Kumanyika & Greir, 2006). To reduce diet-related disparities, research and

nutrition education and interventions should be adaptable, innovative, and tailored to the needs of the population of interest (Satia, 2009; RWJF, 2013). Strategies that attempt to address the prevalence of these issues in the overall population must include interventions that are purposely developed for children from low-income and minority families (Kumanyika & Grier, 2006). Specifically, interventions aiming to increase F/V consumptions should be tailored to ethnically diverse, low and medium income families (Jong, Visscher, HiraSing, Seidell, & Renders, 2014).

### *Rationale for Theory-Based Interventions*

In addition to being multi-faceted and tailored to the needs of the population of interest, behavior change interventions must be theory-driven to affect children's F/V intake (Klepp et al., 2005). In a review of the usefulness of theory application to diet behavior change interventions, Brug and colleagues state that theory-based health behavior interventions are equivalent to evidence-based clinical methods as behavior change theories have been rigorously tested and modified (Brug, Oenema, & Ferreira, 2005). Theories are generalized and systematically developed frameworks of empirical evidence, and are a vital source of insight for intervention development (Brug, Oenema, & Ferreira, 2005). Subsequently, Brug affirms that grounding diet-related interventions in proven theories of behavior change is the only suitable and established way to promote diet modification and should increase the likelihood of successful programs (Brug, Oenema, & Ferreira, 2005). Behavioral theories provide a structure for the development and evaluation of health behavior interventions, and increases understanding of the many influences of behavior change (Abraham & Michie, 2008; Nigg, Allegrante, & Ory, 2002; Lubans, Foster, & Biddle, 2008).

As discussed previously, dietary behaviors are influenced by many interwoven factors such as access, skills, motivation, and self-efficacy. Additionally, personal, social, and environmental conditions contribute to diet behaviors. The importance and level of influence of each of these factors differs across all populations and individuals (Brug, Oenema, & Ferreira, 2005). Because these factors are dynamic, the most applicable determinants of behavior change may change over time in all sub-populations (Brug, Oenema, & Ferreira, 2005). Because behavior change theories provide conceptual frameworks for connecting multiple aspects of dietary behavior, theories are key to the development, implementation, and evaluation of effective diet-modification interventions (Story et al., 2008). Thus, it is vital to inform the development of dietary behavior change interventions with current theory-based assessments of the population of interest. Failing to ground intervention development and implementation in behavior change theories may limit the effectiveness of the intervention and potentially exacerbate diet-related health disparities (Kirkpatrick et al., 2012).

### *Review of Theory-Based Fruit and Vegetable Interventions*

Theory-based behavior change interventions to increase children's F/V intake are supported as more successful than those not premised in behavior change theory (Blanchette & Brug, 2005). However, increasing child F/V consumption to current recommended daily intake levels will require substantial, well-designed interventions to produce significant changes in dietary behaviors (CDC, 2011). Two previously published literature reviews summarize the application of behavioral theory to F/V consumption among children from 1996 to 2010 (Thomson & Ravia, 2011; Rasmussen et al., 2006).

Although these reviews are described in-depth elsewhere, they are summarized below (Thomson & Ravia, 2011; Rasmussen et al., 2006).

Rasmussen et al. (2006) identified all quantitative studies from 1958 to 2006 that examined the determinants of F/V intake among children and adolescents ages 6-18 years old. Ninety-eight studies were identified and described by study location, sample size, age group, instrument for measuring F/V intake, theoretical basis, sociodemographic factors etc. The determinants of F/V intake most supported by the reviewed studies were: age, gender, socio-economic status, preferences, parental intake, and home availability/accessibility of F/V. Rasmussen et al. concluded that more longitudinal, theory-based interventions considering both personal and environmental factors of F/V intake are needed to more thoroughly understand the identified determinants of F/V intake.

Thomson and Ravia (2011) identified all behavior-based interventions to promote F/V intake in adults and children. This report updated earlier reviews to focus on interventions that explicitly reported utilizing a behavioral-theory framework from 2005-2010 (Ammerman, Lindquist, Lohr, & Hersey, 2002; Pomerleau, Lock, Knai, & McKee, 2005). Results from the 34 identified studies showed that F/V interventions for children were successful in increasing F/V intake by an average of +0.39 servings per day. Moreover, F/V interventions involving minority and low-income populations increased F/V intake by an average of +0.97 servings per day. Thomson and Ravia concluded that further research is needed to determine best practices for promoting optimal dietary behavior and which behavioral theories are most associated with sustained F/V intake.

To build upon the findings of these studies and contribute novel insight into F/V intake of a unique population, an additional literature review was conducted to identify and describe all theory-based interventions aimed at increasing F/V intake among children from low SES and minority populations. Thus, all F/V interventions for low SES and minority populations were specifically searched to identify and describe any not included in the two previously published literature reviews (Thomson & Ravia, 2011; Rasmussen et al., 2006). Secondary aims of this literature review were to identify limitations in the current development of theory-based interventions and assessment measures and suggest future directions for future theory-based interventions to increase children's F/V intake.

#### *Literature Review Methods*

Specific combinations of terms were searched on the search engines PubMed, PsycINFO, Web of Science, and Google Scholar: [(fruit OR vegetable) AND (intervention OR program) AND (child OR adolescent)]. Studies were also identified through previously completed literature reviews of F/V interventions (Thomson & Ravia, 2011; Rasmussen et al., 2006; Contento, Randell, & Basch, 2002; Blanchette & Brug, 2005). To focus results on interventions with greatest significance to low-SES and minority health diet-related health disparities in the US, the following were applied as inclusionary criteria: US-studies only, experimental study design, outcome of concern was F/V consumption, children and adolescents aged 6-14, predominantly (>50%) low-SES and minority populations. Additionally, only interventions that were behaviorally based with explicit report of an applied theoretical framework or theoretical constructs/concepts were included. Unlike some previous reviews, which only included



school or home settings, interventions in all settings (e.g. school, home, after-school programs, etc.) were included (Showell et al., 2013; Evans, Christian, Cleghorn, Greenwood, & Cade, 2012).

### *Literature Review Results*

Thirteen studies were identified that met inclusion criteria. Identified studies were published between 1993 and 2012. Results of the review are presented in Table I and include study reference and title, location and duration, population demographics, study design, behavior theory and constructs, dietary and behavior measurement instruments, and results. Most studies provided demographic data describing the study populations, though some were incomplete. Likewise, some studies did not comprehensively apply or measure all constructs of the theoretical framework. Use of the Social Cognitive Theory (SCT) and associated constructs was reported in nine studies, and the related Social Learning Theory was reported in two additional studies. The Transtheoretical Model Stages of Change and Resiliency Theory, in combination with reciprocal determinism, were each reported for one study respectively. Eleven interventions were implemented in elementary schools and two were conducted in youth service organizations.

The most frequently reported concepts used in intervention design were preferences (Baranowski et al., 2003; Domel et al., 1993; Gatto et al., 2002; Somerville et al., 2012; Tuuri et al., 2009; Perry et al., 1998), self-efficacy (Cullen et al., 2007; Gatto et al., 2002; Somerville et al., 2012; Stables et al., 2005; Tuuri et al., 2009; Di Noia, Contento, & Prochaska, 2008), preparation skills (Baranowski et al., 2003; Cullen et al., 2007; Domel et al., 1993; Perry et al., 1998; Stables et al., 2005), knowledge (Blom-Hoffman et al., 2004; Domel et al., 1993; Stables et al., 2005; Perry et al., 1998), problem

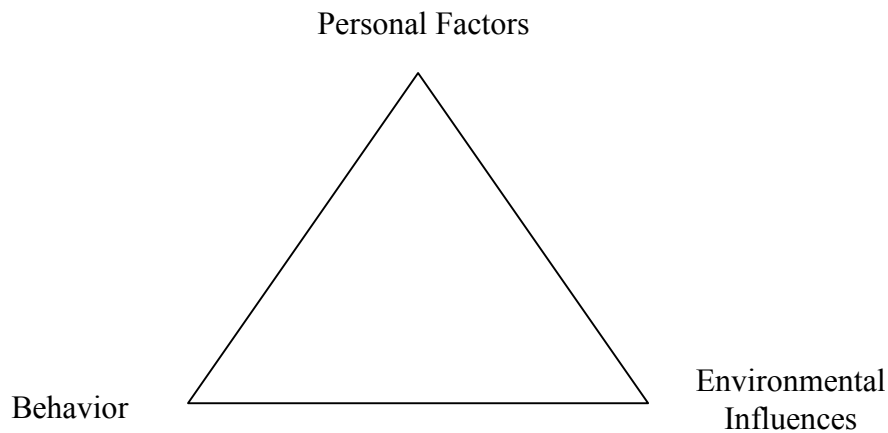
solving skills (Baranowski et al., 2003; Cullen et al., 2007; Domel et al., 1993; Perry et al., 1998), and asking behaviors (Baranowski et al., 2003; Cullen et al., 2007; Domel et al., 1993). Although some constructs were used to develop intervention activities, many were not measured as intervention outcomes. The most common outcome measures used to determine intervention effect on consumption of F/V were plate waste observations (n=5; Blom-Hoffman et al., 2004; Stables et al., 2005; Di Noia, Orr, & Byrd-Bredbenner, 2014), self-report surveys (n=3; Di Noia, Contento, & Prochaska, 2008; Perry et al., 1998, Somerville et al., 2012) and food diaries (n=2; Domel et al., 1993; Foerster et al., 1998). Preferences for F/V was the second-most measured concept for determining intervention effectiveness (n=4). Results were measured by self-report survey and researcher observations (Cullen et al., 2007, Domel et al., 1993, Tuuri et al., 2009, Somerville et al., 2012). Self-efficacy (e.g. for eating, preparing, asking for F/V, etc.) was the third-most measured construct (n=3) with all three studies utilizing self-report questionnaires (Di Noia, Contento, & Prochaska, 2008; Tuuri et al., 2009, Cullen et al., 2007). Knowledge of F/V was measured in two studies with self-report questionnaires (Blom-Hoffman et al., 2004, Domel et al., 1993). Other measures such as The Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA) and Motivation for Healthy Behaving were also used (Gatto et al., 2012).

### *Social Cognitive Theory-Based Interventions*

The SCT, developed by Albert Bandura in 1986, provides a framework for understanding participation in and maintenance of health behaviors (Bandura, 1986; Bandura, 2004; Stacey et al., 2014). The SCT has been successful as a framework for behavioral interventions, including many interventions to increase F/V consumption

(Anderson-Bill, Winett, & Wojcik, 2007; Anderson, Winett, & Wojcik, 2003). The key constructs of the SCT include: (1) self-efficacy (confidence or belief in one's ability to perform a given behavior); (2) environment (factors physically external to the person); (3) situation (person's perception of the environment); (4) behavioral capability (knowledge and skills to perform desired behavior); (5) outcome expectations and expectancies (beliefs about the likelihood and value of the benefits and consequences of behavioral choices); (6) self-regulation (controlling oneself through self-monitoring, goal-setting, feedback, self-reward, self-instruction, and enlistment of social support); (7) facilitation (tools, resources, or environmental changes that make new behaviors easier to perform); (8) observational learning (beliefs based on observing similar individuals or role models perform a new behavior); (Glanz, Rimer, & Viswanath, 2008; Bandura, 2004; Glanz, Rimer, & Lewis, 2003; Hayden, 2013).

An overarching concept of the SCT is reciprocal determinism in which behavior is influenced by and understood as the interplay behavioral, cognitive, and environmental factors (see Figure 1; Bandura, 1978). Although general knowledge of the health behavior is necessary for behavior change, further skills and assets are needed to facilitate and maintain behavior change (Bandura, 2004). For example, self-efficacy, another central construct of the SCT, influences behavior through one's belief in his or her ability to apply skills, knowledge, and resources in situations to influence outcome expectations, self-regulatory strategies such as goal setting, and barriers and benefits (Bandura, 2004). Thus, in a reciprocal relationship, behavior is the outcome of environmental and personal factors, and behaviors influence the environment and personal factors (Baranowski, Perry, & Parcel, 1997; Bandura, 2004).



*Figure 1: Interplay of Social Cognitive Theory Concepts. This figure demonstrates the concept of reciprocal determinism.*

SCT-based interventions to increase F/V intake in children have been successful, specifically in low-income and minority populations (Rasmussen et al., 2006; Baranowski et al., 2003; Cullen et al., 2007; Domel et al., 1993; Gatto et al., 2002; Somerville et al., 2012; Stables et al., 2005; Tuuri et al., 2009). Predictive factors of F/V consumption in children have been identified through the application of the SCT, and have been used to develop interventions to increase intake of F/V (Thompson et al., 2003; Molaison, Connell, Stuff, Yadrick, & Bogle, 2005; Tabak, Tate, Stevens, Siega-Riz, & Ward, 2012). The SCT also provides a framework for understanding how SES impacts children's diets as cognitive factors have been found to be the strongest mediators of F/V intake (Ball et al., 2009).

Table II depicts the lack of comprehensive application of SCT constructs to both intervention design and outcome measurement. To achieve utmost effectiveness, behavior change interventions should be comprehensive in application of constructs and to each intervention activity (Michie, van Stralen, & West, 2011). Moreover, because the

SCT is grounded in the interaction between behavioral, personal, and environmental factors, it is vital that each of these aspects is represented in design and outcome measurement. Table II depicts an emphasis on behavioral (e.g. asking behaviors, consumption, and goal setting) and personal factors (e.g. preferences, preparation skills, self-efficacy, knowledge, outcome expectations, and attitudes), while incorporation of environmental determinants (e.g. modeling, social norms, accessibility, perceived support, and facilitation) into design and outcome measurement is lacking. Future interventions using the SCT as a framework for increasing child F/V intake need to include environmental determinants as children have limited control over the environments in which dietary choices are made, while being influenced by parents, peers, access, and availability (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003; Glanz, Sallis, Saelens, & Frank, 2005; Campbell, Crawford, & Ball, 2006; Ding et al., 2012).

### *Conclusion*

Although much research has established that children from low-income and minority populations have insufficient intake of F/V, current understanding of SCT mediators of consumption is still considerably limited (Di Noia & Byrd-Bredbenner, 2014; McCabe, Plotnikoff, Dewar, Collins, & Lubans, 2015). Further research and development of assessment tools is vital for establishing a base of evidence to frame F/V interventions in these at-risk populations (Di Noia & Byrd-Bredbenner, 2014). In their review of 58 studies of the determinants of F/V intake in children, Di Noia and Byrd-Bredbenner (2014) establish that race/ethnicity, F/V preferences, and maternal F/V intake are major contributors to F/V consumption; however, they report that the influence of

many possible determinants cannot be solidified because of the limited number of studies. In addition to addressing the influence of race when designing dietary interventions for children's F/V intake, more studies are needed to determine if influential determinants of F/V intake are compulsory (Di Noia & Byrd-Bredbenner, 2014). Likewise, comprehensive, SCT-based measures that provide a snapshot of child food environments, knowledge, and determinants of consumption behavior are lacking (Penney et al., 2014; Lytle, 2009). Thus, because the SCT is supported as an effective framework for discovering these determinants, there is a need for the development of robust F/V instruments grounded in the SCT.

In a recent review of nutrition self-report instruments for children, Hernandez-Garbanzo and colleagues (2013) suggested that development of vigorous psychosocial measures for dietary behaviors is needed for children from low-income and minority populations. Current instrument designs are limited in assessing environmental influences of food consumption and are dated and lengthy (Penney et al., 2014; Di Noia & Byrd-Bredbenner, 2014). Moreover, there is an urgent need for the development of valid tools that are sensitive to complex environments and are attuned to reveal the needs of diverse, low-income populations (Hernández-Garbanzo et al., 2013; Craig et al., 2008). In addition to establishing rigorous psychometrics, instrument reliability also needs to be established through expert reviews and pilot studies (Hernández-Garbanzo et al., 2013). Cognitive interviews such as these establish content and/or face validity and ensure that language and wording is culturally and age appropriate (Barry, Chaney, Piazza-Gardner, & Chavarria, 2014). This study responds to this call for development of SCT-based measures that capture the interaction of environmental and social determinants of child

F/V consumption among low-income and minority populations. The aim of this study was to establish and pilot measures for SCT constructs that are sensitive to minority and low SES populations and can be easily administered and interpreted, allowing communities and schools the ability to use these measures to better determine and address specific dietary needs of the children they serve.

## CHAPTER THREE

### Methods

The following sections describe the methods for resolving each research question of the *Food For Thought* study. A review of the research questions and methods and analyses conducted to address each question can be found in the Table 1.

Table 1

#### *Food For Thought Study Research Questions, Methods, and Analyses*

<i>Food For Thought Study Research Questions</i>	<i>Methods and Analyses to Address Research Questions</i>
1. Which theory-based interventions have been used most frequently and successfully to increase F/V intake in children from low-income and minority populations?	The literature was systematically reviewed to identify and describe all theory-based interventions aimed at increasing F/V intake among children from low SES and minority populations. All F/V interventions for low SES and minority populations were specifically searched to identify and describe any theoretically-based interventions not included in previously published literature reviews.
2. Which constructs of the SCT are supported in the literature as important for explaining F/V intake, perceptions, and experiences?	All SCT F/V interventions and studies describing SCT determinants of child F/V intake were examined to identify SCT constructs most applicable to F/V intake.
3. Of the existing SCT-based F/V questionnaires for children, what combination of scales and items will most comprehensively capture determinants of F/V intake for children ages 8-12?	A three-stage process of item modification, expert panel review, and focus group discussion facilitated development of a seven SCT-based scales for F/V intake.
4. Which SCT constructs are associated with F/V consumption in low-income, minority children?	Bivariate correlations were used to analyze relationships between the <i>Food For Thought</i> questionnaire SCT construct scales and F/V intake.



### *Pilot Study*

In the summer of 2014, the principal investigator completed a practicum as part of the requirements for a Master of Public Health degree. During the practicum, the principal investigator worked with a colleague to develop a nutrition education program for Summer Youth Camps at local community centers hosted by Waco Parks and Recreation. A review of the literature was conducted to determine the best approach and instruments for a nutrition needs assessment to inform program development. Search engines PubMed, PsycINFO, and Web of Science were searched using combinations of the search terms: [(nutrition education) AND (intervention OR program) AND (child OR adolescent) AND (theory OR model)]. The review revealed that SCT-based F/V interventions were successful and the most widely implemented and repeated interventions for children.

After reviewing existing SCT-based psychosocial measures and self-report instruments for children, the researchers concluded that utilizing one existing SCT-based assessment instrument would be insufficient for capturing a comprehensive snapshot of children's food environments and dietary behaviors, as these instruments were dated, not theoretically comprehensive, and lengthy. SCT constructs and nutrition concepts (e.g. knowledge and preferences) were reviewed to determine which constructs and concepts are supported the strongest in the literature, while being cognizant of potential participant burden and cognitive abilities of children. SCT constructs most supported in the literature were observational learning (Cullen, Baranowski, Rittenberry, & Olvera, 2000; Gibson, Wardle, & Watts, 1998; Reniscover et al., 1997; Reynolds, Yaroch, Franklin, & Maloy, 2002; Krolner, Rasmussen, Brug, Klepp, Wind, & Due, 2011); outcome expectations

(Renisow et al., 1997; Reynolds et al., 2002; Davis et al., 2000; Krolner et al., 2011); and self-efficacy (Hernandez-Garbanzo et al., 2013; Rivera et al., 2013). Nutrition concepts supported the strongest in the literature and most often included in SCT-based F/V interventions for children were preferences (Blanchette & Brug, 2005); knowledge (Hernandez-Garbanzo et al., 2013); and intake measures (Blom-Hoffman et al., 2004; Cullen et al., 2007; Domel et al., 1993; Somerville et al., 2012; Stables et al., 2005).

The resulting questionnaire was created by combining six existing validated and reliable scales developed for concepts associated with F/V: self-efficacy (Baranowski et al., 2000); knowledge (Baranowski et al., 2000); perceived adult support (Vereecken, Van Damme, & Maes, 2005); encouragement and socialization (Vereecken, Van Damme, & Maes, 2005); access (Hearn et al., 1998); outcome expectations (Baranowski et al., 2000); and asking behaviors (Baranowski et al., 2000). Minor modifications were made to some scales and are indicated in Tables 6.1-6.7.

The pilot questionnaire was administered to 125 children ages 6-13 years old from the Summer Youth Camps. Although the racial, ethnic, and SES characteristics of the sampled population were not collected, the community centers primarily serve low-income, minority families. Descriptive and analytic results were derived using Statistical Analysis System (SAS). Results of this needs assessment were used to inform the development of a nutrition education program. Through this process, researchers concluded that robust psychosocial measures to assess nutritional needs of children are severely limited and not theoretically comprehensive. Experiences and results from this pilot project identified the need for the present study and facilitated the development of

methods for the current study. The aim of this study is to create and validate a SCT-based F/V needs assessment for children ages 8-12 from low income and minority populations.

### *Participants and Procedure*

A convenience sample of children ages 8-12 years was recruited from three local community center after-school programs to participate in the study (n=42). Recruitment and data collection occurred from January-February 2015. An informational flyer describing the study was sent home with the children (potential participants) three days prior to parental consent collection (Appendix A). Parental consent forms were distributed and collected over multiple days during child pick-up times by a trained team of undergraduate students (n=2) and graduate public health students who had completed Collaborative Institutional Training Initiative (CITI) training (n=5). CITI training is a world-renown web-based training program for research education concerning human subjects protections and the responsible conduct of research. The consent form collection team received instructional training prior to contact with potential participant parents to ensure consistency and that ethical standard were upheld (Appendix B). To collect information regarding SES, the parental consent forms included the question, “Did you or any family members living with you qualify for or receive any cash assistance from a state or county welfare program such as Medicare, Medicaid, WIC, school free lunch program, in 2014?” (Nicholson, Slater, Chriqui, & Chaloupka, 2014).

After all parental consent forms were collected, the researchers returned to the after school programs to administer the *Food For Thought* questionnaire. Each child was matched to his or her parental consent form to confirm eligibility for participating in the questionnaire (n=42). The SES proxy measure from the parental consent forms were

matched with each child and entered into the Qualtrics system as each child began the questionnaire. Researchers administered the questionnaire according to protocol (Appendix C), and participants completed the questionnaire through Qualtrics, a password-protected data collection website. The questionnaire took approximately 13 minutes to complete, and answers were automatically recorded into Qualtrics and attached with an anonymous identification number, site ID, and amount of time used to complete the questionnaire.

### *Instrument Development*

The three-stage process to generate instrument development included (1) initial item selection and improvement; (2) expert panel review for improvement and establishing content and face validity, comprehensiveness, and cultural equivalence; and (3) refinement from a pilot test and focus group. Scale selection process and modifications made to each item are documented within the description of each stage.

### *Item Selection*

Three researchers reviewed the literature to identify existing instruments with the aim of generating an item pool to represent food behavior concepts and influential SCT constructs of F/V intake. Given the substantial legwork accomplished during the summer pilot study, the questionnaire designed and used during the pilot study was the foundation for the current project. To achieve stated objectives, the summer pilot questionnaire was built upon and modified in the present *Food for Thought* study. Existing SCT-based F/V scales and studies of child F/V intake determinants were reviewed to ensure that the item pool included all relevant SCT constructs and that items were representative of all facets

of these constructs. Additionally, the literature was reviewed to identify practical questionnaire completion times and appropriate reading levels and terminology for children ages 8-12. All items were initially pulled from each of the scales with wording and answer responses as published by the original authors. The final *Food For Thought* questionnaire included items from eight previously validated and reliable F/V scales: behavioral capability (knowledge) (Baranowski et al., 2000); F/V consumption (Thiagarajah et al., 2008; Ling, King, Speck, Kim, & Wu, 2014); self-efficacy for eating, preparing, and asking (Baranowski et al., 2000; Davis et al., 2000; Baranowski et al., 1995; Reynolds, Yaroch, Franklin, & Maloy, 2002); modeling (perceived adult support) (Vereecken & Van Damme, 2005); social environment (encouragement and socialization) (Vereecken & Van Damme, 2005); physical environment (accessibility) (Hearn et al., 1998); outcome expectations (Reynolds et al., 2002; Baranowski et al., 2000); and self-regulation (asking behaviors) (Baranowski et al., 2000). Items to ascertain non-identifying demographic information were also included (CDC, 2015).

*Initial item improvement and modification.* To make items more comprehensible for children, original scales that included 4- and 5-item Likert response options (Baranowski et al., 2000; Hearn et al., 1998) were modified to have 3-item response options, (Borgers & Hox, 2000; Hernandez-Garbanzo et al., 2013). Additionally, self-efficacy items (Davis et al., 2000) were modified to ask how “*sure*” the participant was of his or her ability to eat F/V (e.g. “For lunch at school, I’m sure I can eat a vegetable that’s served.”). The verbiage “I’m sure I can” was used in place of “I think I can” as it has been more widely validated in existing self-efficacy scales (Baranowski et al., 2002; Reynolds et al., 2002; Tuuri et al., 2009). In the pilot study, self-efficacy for eating F/V

was the only self-efficacy concept included; however, in the final *Food For Thought* questionnaire, self-efficacy items for preparing and asking for F/V were added, as these skills can also increase the availability and accessibility of F/V (Reynolds, Hinton, Shewchuk, Hickey, 2001; Blanchette & Brug, 2005).

Items in the behavioral capability (knowledge) scale focus on nutritional benefits of eating F/V, daily intake goals, and mealtime decision-making skills. Goal setting behavior items from the original knowledge scale (Baranowski et al, 2000) were excluded as the literature is still somewhat limited concerning the effects of goal setting among children, and recent literature discussing influences on children's dietary behavior questions whether goal setting is a "child-friendly change procedure" (Shilts, Horowitz, & Townsend, 2004; Baranowski, Diep, & Baranowski, 2013). Additionally, although goal setting has been a moderately successful piece of F/V interventions, its influence is complex and is moderated by F/V availability, preferences, and social desirability (Baranowski et al., 2003; Beckman, Hawley, Bishop, 2004; Cullen, Baranowski, Owens, Marsh, Rittenberry, & de Moor, 2003; Cullen, Zakeri, Pryor, Baranowski, Baranowski, & Watson, 2004; Latif et al., 2011).

Modeling and social environment (perceived adult support and encouragement and socialization) items were modified to inquire about the adults in a child's life instead of only his or her parents (e.g. "How often do the *adults* in your life eat vegetables?") (Vereecken, Van Damme, & Maes, 2005; See Tables V and VI for original item wording and final item wording). This modification was made because child F/V consumption can be influenced by teachers, extended family members, and social group elders (Reinaerts, de Nooijer, Candel, & de Vries, 2007; Kumanyika, 2008). The original pilot

questionnaire included two items from Hearn et al. (1998) to measure accessibility of F/V in the home environment (i.e. “At your home, do you have vegetables/fresh fruits to eat?”). Two additional accessibility items from Hearn et al. (1998) were added to inquire about a child’s access to F/V that have been prepared for immediate consumption. These questions highlight an important dimension of accessibility as many fruits and vegetables need preparation (e.g. washing and chopping) before consuming, and children may not possess these skills (Dresler- Hawke & Veer, 2006; Snethen, Hewitt, & Petering, 2007; Reynolds et al., 1999).

The original pilot questionnaire included ten outcome expectations items from Baranowski et al. (2000), four of which were negative outcome expectations and six were positive. These Baranowski et al. (2000) items were replaced by the positive outcome expectations scale from Reynolds et al. (2002). Positive outcome expectations have been shown to be more predictive of F/V intake than negative outcome expectations (Reynolds et al., 2002; Tuuri et al., 2009). The Reynolds et al. (2002) scale was developed for use at a cancer research center and included the item: “Eating fruits and vegetables will keep me from getting cancer.” Thus, this item was not included. Additionally, the item: “If I eat fruits and vegetables every day my friends will make fun of me” from Baranowski et al. (2000) was added to inquire about social outcome expectations since the Reynolds et al. (2002) items did not address this.

Asking behaviors items (Baranowski et al., 2000) were modified to include only behaviors children 8-12 years of age could feasibly complete on their own. Therefore, items inquiring about choosing a restaurant because of F/V food options and purchasing

F/V from the store were both removed. Additionally, writing F/V on the family grocery list was also removed, as some families do not utilize shopping lists.

#### *Content and Face Validation – Expert Panel Review*

A panel of experts reviewed the instrument for content validity. Experts were chosen based on research experience, an advanced degree in public health or nutritional sciences, and field expertise. Panel experts (n=8) consisted of two PhDs in Health Promotion or Health Education, one PhD in Epidemiologic Science, one registered dietician with a PhD in Nutrition, one Master of Public Health graduate student who has worked with the population of interest, two after-school program directors of Hispanic and African American heritage, and one elementary English as a Second Language (ESL) teacher. Experts were given a questionnaire review packet (Appendix D) that included a chart of all constructs to be measured along with conceptual definitions for each. Experts were asked to review the instrument to confirm item relevancy, placement, and construct consistency. Experts were also given specific questions to guide their review of the readability and cultural sensitivity of the item

*Modifications from expert panel.* Four panel reviewers advised that picture examples of F/V should be provided during questionnaire administration to increase validity and ensure all children respond with reference to similar definitions of F/V. A handout was created with examples of fruits and all examples of vegetables from the consumption questions and was given to each participant during questionnaire administration (Appendix E). The handout was given to each participant after completion of knowledge items, so item responses would not be biased by the examples of F/V.



Additionally, to increase cultural sensitivity, a reviewer noted that the examples of F/V listed in the consumption items should be expanded to include F/V distinct to African American and Hispanic cultures. Turnip greens, tomatillos, avocado, pineapple, and mango were identified as cultural specific F/V and were added to the consumption items and F/V examples handout (Grigsby-Toussaint, Zenk, Odoms-Young, Ruggiero, & Moise, 2010).

A reviewer also noted that the knowledge items should be moved to the beginning of the questionnaire so that consumption items would not bias these items. Another reviewer suggested that researchers refrain from administering the questionnaire on a Monday so that results are not biased by weekend F/V consumption, which is not representative of the environments in which children are most. Finally, the expert panel revealed potential confusion with the race and ethnicity items (see Table X). If a participant selected “yes” to the “Are you Hispanic or Latino?” item, then he or she would possibly not have a reasonable answer option for the next item (Q64). To remedy potential confusion, these items were merged to be “What is your race?”. Participants are given the option to select one or more responses with answer options of: a) American Indian or Alaska Native, b) Asian, c) Black or African American, d) Native Hawaiian or Other Pacific Islander, e) White, f) Hispanic, or g) Latino.

#### *Comprehension and Cultural Equivalence – Pilot Test and Focus Group*

A detailed pilot test and focus group (90 minutes) with a subset of eight participants from one community center was conducted before questionnaire implementation. Focus group participants were all of Hispanic ethnicity. Three participants were female, and five participants were male. During the pilot test, the

children were administered the questionnaire guided by the questionnaire protocol (Appendix C). Seven participants completed the questionnaire without additional assistance from the researchers. One participant required reading assistance from a researcher. The participants were then lead in a focus group discussion by the researchers (Appendix F). Participants reviewed each item, explained her or his understanding of each item inquiry, and determined if item wording should be modified. Questions and concerns from the children about the questionnaire items were also addressed during this time.

*Modifications from focus group.* A minor modification was made to the questionnaire administration protocol to have all participants leave the computer room once they complete the questionnaire. Original protocol stated that all participants should remain in the computer room until every participant completed the questionnaire, but this proved to be a distraction to other participants during the pilot test.

Prior to the focus group, all items including juice were modified to be “100% fruit juice,” as 100% juice can complement whole fruit consumption and provide a convenient way to increase daily fruit intake (Nicklas, Keinman, & O’Neil, 2012). To determine conception of and ability to identify 100% fruit juice, all focus group participants were provided with a handout of pictures of 100% juice and other fruit-flavored beverages (e.g. Gatorade and Sunny D; Appendix G). Participants were asked to circle the items they would choose if they were trying to drink juice to eat more fruit. Participants were then given a second copy of the same handout and were asked to circle the items they believed were 100% fruit juice. All participants incorrectly identified at least one item for each question. Results from this activity revealed that the study population was not able

to distinguish 100% juice. Therefore, all references to fruit juice were removed from the following concept scales: self-efficacy, accessibility, and outcome expectations (see Tables 6.1, 6.5, and 6.6).

Demographic item “What is your sex?” created disturbance during the pilot test and caused distress for many of the participants. During the focus group, this item was discussed in depth with the participants. The item was described as “awkward,” and participants suggested the item be modified. At the suggestion of the focus group participants, this item was modified to “Are you are boy or a girl?”. The summer pilot study utilized this wording, which further validates the modification of this item.

Two self-efficacy items (Q9 and Q11) originally included the phrase “*raw* vegetable.” An expert panel reviewer identified this phrase as potentially confusing for participants and suggested that “or uncooked” be added to the item. During the focus group, this concern was validated when some participants identified “raw vegetables” as “old vegetables.” As a result of this discussion, the word “raw” was removed from these two items. However, upon further reviewing of terms to describe the packaged and cooked state of F/V (e.g. cooked, uncooked, canned, fresh, etc.), the literature clearly demonstrates that fresh, frozen, and canned and cooked and uncooked F/V are nutritionally equal (Miller & Knudson, 2014; Weaver et al., 2014; Adefegha & Oboh, 2011; Rickman, Barrett, & Bruhn, 2007). Additionally, consuming F/V in many diverse conditions increases the likelihood that one will consume the recommended daily servings of F/V (Herman, Harrison, & Jenks, 2006; CDC, 2013). Thus, all terms describing the state and packaging of F/V were removed from the *Food For Thought* questionnaire to ensure the accurate data collection.

### *Sample Descriptives and Bivariate Correlations*

Overall composite mean scores were calculated for all SCT scales except the behavioral capability and F/V consumption scales. An overall summary score was calculated for the F/V consumption scale to determine total times F/V were eaten during the previous day. Similarly, an overall summary score was calculated for behavioral capability items to determine mean percentage of items answered correctly from 0-100%. Revised items to ascertain non-identifying demographic information were also included.<sup>32</sup> Preliminary descriptive and bivariate analyses were then conducted using SPSS v. 22.

## CHAPTER FOUR

### Food For Thought: A Social Cognitive Approach to Assessing Children's Food Environments

#### *Abstract*

**Objective:** The objective of this study was to describe the process of developing and piloting a Social Cognitive Theory (SCT)-based assessment tool to capture the interaction between environmental and social determinants of child fruit and vegetable F/V intake in low-income, minority children.

**Methods:** A three-stage process of (1) item modifications determined by a comprehensive literature review to generate an item pool, (2) expert panel review to ensure cultural appropriateness and establish content validity, and (3) pilot test and focus group discussion facilitated development of SCT scales. Children ages 8-12 (n=42) were administered a computer-based questionnaire during after-school programs. Descriptive statistics and bivariate correlations were calculated.

**Results:** Seven SCT construct scales were developed or modified (behavioral capability, F/V consumption, self-efficacy, observational learning, environment/situation (social and physical), outcome expectations, and self-regulation) to create the 64-item *Food For Thought* questionnaire. Overall F/V intake met daily recommendations of five servings (M=5.17; SD=3.43). Self-efficacy for eating, preparing, and asking for F/V was the SCT construct most strongly associated with F/V consumption ( $r=0.50$ ;  $p=0.01$ ).

**Conclusions and Implications:** Future research should be designed to validate the SCT-based scales included in the *Food For Thought* questionnaire to provide a robust,

theoretically comprehensive assessment of factors of low-income and minority children's F/V intake.

Key words: nutrition education, fruit, vegetables, needs assessment, theory, instrument

### *Introduction*

Nutrition-related issues of obesity and food insecurity are public health priorities in the United States (US),<sup>1</sup> because 16.9% of children are obese.<sup>2</sup> Additionally, 21% of US children live in food insecure households without access to adequate quantities and quality of food due to financial or other resources limitations.<sup>1</sup> Food insecurity and obesity rates threaten the health outcomes and futures of children in the US.<sup>3</sup>

Evidence<sup>4,5</sup> supports community, school, and recreation interventions as potentially effective for childhood obesity and food insecurity prevention. Specifically, interventions should include food and nutrition education and focus on amounts and types of fruits and vegetables (F/V) consumed.<sup>8,9</sup> Psychosocial influences on children's eating behaviors are important for developing effective weight gain prevention interventions.<sup>10,11</sup> Moreover, many social and environmental factors contribute to these issues; suggesting that food intake behaviors extend beyond individual choice.<sup>5,12</sup>

Grounding interventions in behavior-change theories can provide a foundation for determining not only individual and social mediators, but also for understanding environmental mediators of children's food choices and nutrition-related health outcomes.<sup>13,14</sup> Thus, evidence supports interventions that are behavior-change focused and founded in theory.<sup>15</sup> In particular, the Social Cognitive Theory (SCT) incorporates psychosocial mediators into a framework for behavior change and is supported as an effective structure for many child nutrition education interventions.<sup>15,16</sup> The SCT is based

on the premise that personal, behavioral, and environmental factors are dynamic and influence behavior in a reciprocal manner.<sup>16</sup> Key constructs of the SCT include self-efficacy, environment, situation, behavioral capabilities, outcome expectations and expectancies, self-regulation, and observational learning (see Table 2).<sup>17,18,19,20</sup>

High quality measurement instruments are essential for developing interventions that are relevant and address the needs of priority populations.<sup>21,22</sup> However, comprehensive, SCT theory-based measures that provide a snapshot of children's food environments and psychosocial factors are lacking.<sup>4,14</sup> Current designs are limited in assessing environmental influences of food intake and are dated and lengthy.<sup>4</sup> There is an urgent need for the development of valid tools to measure dietary behaviors, F/V consumption in particular, that are sensitive to complex environments and are attuned to reveal the needs of diverse, low-income populations.<sup>15,23</sup> The aim of this study was to develop and pilot-test SCT-based, ethnically sensitive measures that are easily administered and interpreted. A second aim of this study was to conduct a preliminary analysis to describe the SCT constructs and examine which are associated with F/V intake among low-income minority children.

## *Methods*

### *Priority Population*

Participants were recruited from three local community centers located in regions serving residents who are predominantly from low-income, minority households.<sup>42</sup> Community centers were selected based on hosting after-school programming for

children within the target age range of 8-12 years old and the ability to support a computer-based survey (Each center had 8-10 computers with Internet access.).

### *Procedures*

SCT measures for F/V consumption, referred to as the “*Food For Thought* questionnaire,” were developed and amended through a three-stage formative process: (1) initial item selection and modification; (2) expert panel review for improvement and establishing content and face validity and comprehensiveness; and (3) cultural equivalence refinement based on outcomes of a pilot test and focus group. These processes are supported as fundamental phases instrument development.<sup>13,43,44</sup> Formative data collection and subsequent preliminary descriptive and bivariate analyses followed questionnaire development.

*Initial item selection and modification.* A comprehensive literature review was conducted to identify all SCT F/V measures designed for children ages 8-12 years of age to generate an item pool to represent food behavior concepts and influential SCT constructs of F/V intake. Additionally, the literature review was used to identify practical questionnaire completion times (< 20 minutes) and appropriate reading levels and terminology for children ages 8-12.<sup>13</sup> Prior to item modification, all original items and response options were identified from eight previously-validated and reliable SCT F/V measures: F/V consumption;<sup>25,26</sup> behavioral capability (knowledge);<sup>24</sup> self-efficacy for eating, preparing, and asking behaviors;<sup>24,27,28,29</sup> social environment and modeling (perceived adult support<sup>30</sup> and encouragement and socialization);<sup>30</sup> physical environment



(accessibility);<sup>31</sup> outcome expectations;<sup>24,29</sup> and self-regulation (asking behaviors).<sup>24</sup>

Items used to ascertain non-identifying demographic information were also included.<sup>32</sup>

Items with four- and five- item Likert response options were modified to three-item response options to make items more comprehensible for children.<sup>13</sup> Self-efficacy response options were modified using the verbiage “I’m sure” versus “I think”, as this response has been more widely validated in existing self-efficacy scales.<sup>22,27</sup> Perceived adult support and encouragement and socialization items were modified to inquire about the adults in a child’s life instead of only parents as child F/V consumption can be influenced by teachers, extended family members, and social group elders.<sup>39</sup>

Additionally, many children from low-income, minority households live with and are raised by adults other than their parents.<sup>41</sup> Only positive outcome expectations items were included as they are more predictive of F/V intake than negative outcome expectations.<sup>27</sup>

Please see Table 3 for item descriptions.

*Expert panel review.* A panel of eight experts reviewed the instrument to establish content and face validity. Experts were identified based on research experience; an advanced degree in public health or nutritional sciences; and community experience with low-income, minority children. Experts were given a questionnaire review packet that identified all included constructs and conceptual definitions for each construct.

Experts were asked to review all items to confirm item relevancy, measure sequencing, cultural sensitivity, readability, and construct consistency. Modifications resulting from the expert panel included (1) provision of a participant handout with picture examples of F/V, (2) expansion of F/V examples to include culturally distinct F/V (e.g. turnip greens, tomatillos, mango), (3) modification of all fruit juice items to “100% fruit juice,”

as 100% fruit juice can complement whole fruit consumption and provide a convenient way to increase daily fruit intake,<sup>33</sup> and (4) combining race and ethnicity questions to reduce potential confusion.

*Pilot test and focus group.* After obtaining institutional review board approval from the referent institution, a detailed pilot test and focus group with a subset of eight participants from one local community center was conducted to ensure cultural equivalence of the instrument, further refine scale items to increase readability, and to pilot questionnaire administration procedures. Recruitment and data collection for this portion of the study occurred in January 2015. Parental consent, child assent, and questionnaire administration occurred following procedures approved and employed for formative data collection (see below). Pilot test participants completed all SCT measures, and then participated in a focus group discussion facilitated by two researchers who both had successfully completed Collaborative Institutional Training Initiative (CITI) training. Each participant reviewed each item, explained her or his understanding of each item, and suggested modifications if determined necessary. All pilot test participants (n=8) self-identified as Hispanic; 38% were girls, mean age of participants was 9.0 (SD=2.07); and 100% were living in households that were eligible for or received cash assistance from governmental programs in 2014.

To determine children's conception of and ability to identify 100% fruit juice, all focus group participants were provided with a handout of pictures of 100% juice and other fruit-flavored beverages (e.g., Gatorade, Sunny D, etc.; see Image 1). Participants were asked to (1) circle items they would choose if they were trying to drink juice to eat more fruit. After completing this activity participants were then given a second copy of

the same handout and were asked (2) to circle the items they believed were 100% fruit juice. All participants incorrectly identified at least one item for each question (mean incorrect responses for question 2=2; SD=1.91; ex: Gatorade). Results from this activity revealed that the study population was not able to accurately identify 100% juice. Therefore, all items concerning fruit juice were removed from the *Food For Thought* questionnaire.

During the pilot test, the demographic item “What is your sex?” was confusing for participants and described as “awkward.” At the suggestion of focus group participants, this item was modified to read “Are you are boy or a girl?”. During the focus group discussion, several participants identified “raw vegetables” as “old vegetables.” As a result, the word “raw” was removed from two self-efficacy items. However, upon further review, all terms describing the packaged and cooked states of F/V (e.g., “fresh”) were removed; literature clearly demonstrates that fresh, frozen, canned, cooked, and uncooked F/V are nutritionally equal.<sup>34,35,36,37</sup> Additionally, consuming F/V in many diverse conditions increases the likelihood that one will consume the recommended daily servings of F/V.<sup>38,39</sup> Please see Table 3 for item and modification descriptions.

*Formative data collection.* Recruitment and data collection for this portion of the study occurred from January-February 2015 at three community centers in conjunction with after school programming. A team of undergraduate community health students (n=2) and graduate public health students (n=5) who had successfully completed CITI training obtained written parental consent during child pick-up times. The consent form collection team received instructional training prior to contact with parents/legal guardians of potential participants to ensure consistency and that ethical standards were

upheld. To collect information regarding SES, parental consent forms included the question, “Did you or any family members living with you qualify for or receive any cash assistance from a state or county welfare program such as Medicare, Medicaid, WIC, school free lunch program, in 2014?”<sup>40</sup>

After all parental consent forms were collected, researchers returned to the after school programs to administer the online *Food For Thought* questionnaire. Community center computers were set up prior to children arriving, with the online survey start page loaded on each computer. Each child was matched to his or her parental consent form to confirm eligibility for participating in the questionnaire. The SES proxy measure from the parental consent forms was matched with each child and entered into the system as each child began the questionnaire. All SCT-based F/V scales revised in the previously-described steps were included (see Table 2): F/V consumption (5 items; *options of 0-5 times F/V were eaten the previous day*);<sup>25,26</sup> behavioral capability (8 items; *five multiple choice options coded correct or incorrect*);<sup>24</sup> self-efficacy for eating (10 items; *not sure, somewhat sure, very sure*), preparing (3 items; *not sure, somewhat sure, very sure*), and asking behaviors (3 items; *not sure, somewhat sure, very sure*);<sup>24,27,28,29</sup> social environment: adult support (2 items; *almost never, sometimes, almost every day or every day*)<sup>30</sup> and adult modeling (8 items; *never, sometimes, almost every day or every day*);<sup>28</sup> physical environment (4 items; *almost never, sometimes, always*);<sup>31</sup> outcome expectations (11 items; *disagree, not sure, agree*);<sup>24,29</sup> and self-regulation (6 items; *yes/no*).<sup>24</sup>

Overall composite mean scores were calculated for all SCT scales except the behavioral capability and F/V consumption scales. An overall summary score was calculated for the F/V consumption scale to determine total times F/V were eaten during

the previous day. Similarly, an overall summary score was calculated for behavioral capability items to determine mean percentage of items answered correctly from 0-100%. Revised items to ascertain non-identifying demographic information were also included.<sup>32</sup> Preliminary descriptive and bivariate analyses were then conducted using SPSS v. 22.

## *Results*

### *Descriptive Results*

The questionnaire took an average of 13 minutes (SD=4.14) to complete. Three local community centers partnered with the investigators to administer the online SCT measures through the *Food For Thought* questionnaire during after-school program hours. Participants in the *Food For Thought* study were all children between the ages of 8-12 (mean age=9.76 years; SD=1.41), in grades 1<sup>st</sup> through 7<sup>th</sup>, who gave their own assent and had parental consent (N=42). Participants were 64.3% male (n=27) and 35.7% female (n=15). Participants self-identified as African American (42.9%, n=18), Hispanic (16.7%, n=7), white (9.5%, n=4), or indicated multiple races and/or ethnicities (19.0%, n=8). Just over half (54.8%) of children were living in households that were eligible for or received cash assistance from governmental programs in 2014.

Mean daily fruit intake was less than the daily recommendation of two servings (M=1.62; SD=1.396). However, when vegetable intake was considered without starchy vegetables (e.g., potatoes, sweet potatoes, corn, and peas), mean daily vegetable intake was above the daily-recommended servings (M=3.55; SD=3.125). Overall mean F/V intake met the daily recommendation of five servings per day when starches were not included (M=5.17; SD=3.43).

The mean score for behavioral capability (knowledge) (n=8-items) on a 0-100% scale was 62%. Frequencies for each item indicated lack of knowledge about certain nutritional concepts. For example, “Fruits and vegetables have lots of...” was answered incorrectly by 54.8% of participants; 47.6% of participants answered “protein,” while 45.2% chose the correct response “vitamins”. The most frequently missed knowledge item was, “How many servings of fruits and vegetables do you think a person should eat each day for good health?” The incorrect response of “three servings” was chosen by 52.4% (n=22) of participants, while 16.7% (n=7) selected the correct answer of “five servings”.

Overall mean score for self-efficacy for eating (n=10-items), preparing (n=3-items), and asking for (n=3-items) F/V was 2.44 (SD=0.41; Range=1-3). Responses included 1=not sure, 2=somewhat sure, and 3=very sure. The mean score for self-efficacy for eating fruits was 2.54 (SD=0.44; Range=1-3), and the mean score for self-efficacy for eating vegetables was 2.27 (SD=0.47; Range=1-3). The mean score for self-efficacy for preparing F/V and meals including F/V was 2.42 (SD=0.60; Range=1-3), and the mean score for self-efficacy for asking for F/V was 2.55 (SD=0.52; Range=1-3).

Mean score for adult modeling of F/V consumption was 2.52 (SD=0.52; Range=1-3). Responses included 1=almost never, 2=sometimes, and 3=almost every day or every day. The mean score for social F/V environment (receiving support for eating F/V from adults) was 2.49 (SD=0.47; Range=1-3). Mean score for encouragement and positive socialization for eating fruits was 2.58 (SD=0.55; Range=1-3), and the mean score for encouragement and positive socialization for eating vegetables was 2.41

(SD=0.47; Range=1-3). Responses included 1=never, 2=sometimes, and 3=almost every day or every day.

Home environment for F/V consumption (accessibility) was examined with four items: two items to determine availability of F/V within the home and two items to determine access to ready-to-eat F/V as snacks. Responses included 1=almost never, 2=sometimes, and 3=always. The overall mean score across these items was 2.43 (SD=0.48; Range=1-3). Constant availability of fruits within the home had a mean of 2.57 (SD=0.67; Range=1-3), and availability of vegetables within the home had a mean of 2.38 (SD=0.66; Range=1-3). For 88% of children, F/V were “sometimes” or “always” available as a snack on the kitchen counter or somewhere in the open. Although this percentage is high, responses indicated that F/V may be available in the home, but are not always in ready-to-eat form, as 47% responded that fruit and vegetables are “never” or “sometimes” cut up and in the refrigerator as snacks.

Most respondents reported positive outcome expectations of eating F/V on their physical and cognitive wellness and abilities (M=2.57; SD=0.30; Range=1-3). Responses included 1=disagree, 2=not sure, and 3=agree. Self-regulation (asking behaviors) used dichotomous answer response options of “yes” (1) or “no” (0). The mean score for asking behaviors was 0.70 (SD=0.32; Range=0-1).

### *Bivariate Results*

Bivariate correlations are presented in Table 4 for all SCT scales and consumption variables. In this low-income, minority sample of children, greater overall F/V consumption was related ( $p \leq 0.05$ ) with greater overall self-efficacy ( $r=.49$ ), self-efficacy for eating F/V ( $r=.41$ ), self-efficacy for preparing F/V ( $r=.40$ ), and self-efficacy for

asking for F/V ( $r=.54$ ). Greater fruit consumption was related ( $p\leq 0.05$ ) with greater overall self-efficacy ( $r=.21$ ), self-efficacy for preparing F/V ( $r=.28$ ), outcome expectations ( $r=.33$ ), and self-regulation (asking behaviors;  $r=.29$ ). Greater vegetable consumption was related ( $p\leq 0.05$ ) with greater overall self-efficacy ( $r=.45$ ), self-efficacy for eating F/V ( $r=.38$ ), self-efficacy for preparing F/V ( $r=.32$ ), and self-efficacy for asking for F/V ( $r=.51$ ).

### *Discussion and Conclusions*

In this study, researchers reviewed the literature to identify SCT-based scales of F/V intake to facilitate the development of a theoretically comprehensive F/V assessment for children ages 8-12 years old from low-income and minority households and to examine which SCT constructs are associated with F/V intake in this population. Development of these scales was prompted by a call for the improvement of instruments to assess dietary behavior for diverse, socioeconomically disadvantaged children.<sup>13</sup> Developmental phases employed in this study (literature review, expert panel review, and pilot testing) are supported as fundamental phases of instrument development.<sup>13,43,44</sup>

Findings from the pilot focus group indicated that participants in the current study had difficulty distinguishing 100% fruit juice from fruit-flavored beverages. Previous literature indicates that inferences of a food item's nutritional content are influenced by brand names and packaging, and that children are particularly susceptible to "extreme confusion" in the marketplace.<sup>56</sup> Moreover, fruit-like packaged products, such as juice flavored beverages, are easily mistaken for products that have positive health benefits.<sup>56</sup> Consumption of 100% fruit juice is a convenient approach to increase fruit intake; however, prior to encouraging consumption of 100% fruit juice, efforts should be made



to ensure that children possess the skills to distinguish 100% fruit juice from other fruit-flavored beverages.

*Qualtrics*, an online data collection website, was used to record questionnaire responses for this study. Participants responded well to taking the questionnaire on the computer and navigated the web-based format with ease. Previous studies with children have also reported the successful use of computer-based questionnaires.<sup>56,57,58</sup> Future studies should seek to use computer-based surveying methods to reduce missing data, data entry errors, cost of administration, and increase participant interest in the study.<sup>59</sup>

This study revealed that children 8-12 years old who participate in after-school programming at the community centers consumed recommended amounts of F/V on the day prior to questionnaire administration. Self-efficacy for eating, preparing, and asking for F/V was related with F/V consumption, which is supported by previous research about F/V intake determinants in minority, low-income children.<sup>13,45</sup> Outcome expectations was positively correlated with fruit consumption (see Table 3). Previous literature supports this finding, but indicates that outcome expectations are also correlated with vegetable and overall F/V intake in at-risk child populations similar to the participants of this study.<sup>13</sup> Knowledge of nutrition concepts in the population of interest was moderate. Future child nutrition education and interventions should provide children with opportunities to learn about nutritional concepts and make informed choices about dietary behavior.<sup>40,46,47</sup> Particularly, increasing knowledge of nutritional concepts and how to identify nutritional components of foods to increase consumption of F/V should be priority for nutrition education programs.<sup>40</sup> Knowledge of these concepts facilitates food choices and may help to reduce the prevalence of childhood obesity.<sup>46,47</sup>

Moreover, response frequencies to self-efficacy items indicated a trend that confidence for choosing F/V as a snack decreases when unhealthy snack options are available (see Table 3; self-efficacy for eating items #4, #6-#8). This finding has implications at the practice-level for increasing knowledge and personal value of the benefits of F/V and preference for the taste of F/V to improve confidence in choosing F/V as snacks and during mealtimes.<sup>46,48</sup> At the policy-level, child nutrition advocates and school wellness coalitions should attempt to increase the availability of F/V during mealtimes as well as to reduce the number of competing unhealthy food options.<sup>49-51</sup>

Dissimilarities from previous studies include lack of correlation between F/V consumption and perceived adult modeling and support and accessibility of F/V.<sup>52,53</sup> These results were unexpected, as home environment is supported as a determinant of child F/V consumption.<sup>52,54</sup> Lack of power and variability due to sample size in this study may mask the correlation of home environment to F/V consumption. Additionally, in further development with this study and future studies of F/V measurement, measures of availability and accessibility may need to be disaggregated to allow for examination of how each of these constructs contribute to F/V intake.<sup>55</sup> The *Food For Thought* questionnaire provides opportunity for separate analyses for these constructs (see physical environment in Table 3).

### *Limitations*

There are four primary limitations to this study. Modifications informed by the focus group and pilot test may not be culturally comprehensive due to all focus group participants being Hispanic. It is possible that the homogenous nature of the focus group masked modifications needed to increase cultural equivalence of questionnaire items.

Second, this study had a small sample size ( $n=42$ ), which put validation of the SCT scales outside the scope of this study. Future studies should seek to establish structural validity so that relationships between SCT constructs and F/V intake can be further examined for children ages 8-12 from diverse, low-income households. Additionally, due to the small sample size, it is difficult to generalize correlational findings of SCT constructs and F/V intake to populations outside the population of interest. However, trends in F/V consumption and relationships with SCT variables are useful for determining future development of child nutrition education programming and food policies.

Community centers in this study serve primarily low-income families; however, the SES proxy item revealed that only 54.8% of the study sample reported qualifying for cash assistance from a government welfare program. This suggests a third limitation related to possible underreporting of families who qualified for these programs. Future studies in community organization settings should expand the involvement of community center staff to strengthen relationships with community partners and to capitalize on the expertise of the staff and the trust they have established with the community of interest. Moreover, partnering more closely with community organization directors and staff could reduce potential bias introduced by volunteers and researchers who are unfamiliar with the community setting.

Finally, a fourth limitation is possible instrumentation bias of self-regulation (asking behaviors) and F/V consumption scales. The self-regulation dichotomous answer options of “yes” or “no” forced respondents to choose an absolute response about their behavior when the respondents may desire a less exact response option. Further validation of this questionnaire should explore 3-item Likert response options for this

scale. Self-report fruit consumption was less than self-report vegetable consumption, which is consistent with two previous studies utilizing this scale.<sup>23,62</sup> However, this finding differentiates from current national epidemiological data that indicates children's daily fruit intake is increasing, but vegetable intake is continuing to be below recommended levels.<sup>63</sup> The consumption scale to measure F/V intake on the previous day may facilitate over reporting of vegetable intake and underreporting of fruit intake, as there is an uneven number of items asking about fruits and vegetables (see Table 3). This limitation parallels current literature that identifies child self-report dietary intake scales as less reliable than parental or observational report measures (e.g. dietary records and plate waste observations).<sup>55</sup> Future research should consider a companion parental survey to capture F/V intake within the home and to establish accuracy of child self-report F/V intake.<sup>61</sup>

### *Implications for Research and Practice*

There is great need for further child dietary intake research, particularly for F/V intake, in youth oriented settings other than schools.<sup>55</sup> This study expands methodology and provides guidance for partnering with community organizations to better understand child F/V intake. Future research should seek to validate the SCT-based scales included in the *Food For Thought* questionnaire to provide a more robust, comprehensive SCT-based assessment of the influence of children's behavior, beliefs, and environment on F/V consumption for assessment and potential intervention evaluation. There is a "great urgency" for validation of dietary assessments with *both* ethnically diverse and low-income children as they experience greater health disparities and higher rates of obesity than their counterparts.<sup>13</sup> The SCT-based scales included in the *Food For Thought*

questionnaire show promise in contributing to better understanding of the intersection of behavior and environmental influences on child F/V intake. Upon further validation, these SCT-scales could be used by communities to develop programming attuned to the dietary needs of the children they serve.

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Table 2

*Food For Thought Social Cognitive Theory (SCT) Scales & SCT Construct Definitions*

<i>SCT construct</i>	<i>Definition of SCT construct</i>
Behavioral capability (knowledge)	The knowledge and skills to perform desired behavior
Behavior (F/V consumption)	n/a
Self-efficacy (eating, preparing, asking behaviors)	The confidence or belief in one's ability to perform a given behavior
Observational learning (perceived adult F/V behavior)	Beliefs based on observing similar individuals or role models perform a new behavior
Environment/situation (perceived encouragement/socialization)	Factors physically external to the person; A person's perception of the environment
Environment/situation (accessibility)	Factors physically external to the person; A person's perception of the environment
Outcome expectations	Beliefs about the likelihood and value of the benefits and consequences of behavioral choices
Self-regulation (asking behaviors)	Controlling oneself through self-monitoring, goal-setting, feedback, self-reward, self-instruction, and enlistment of social support

Table 3

*SCT Construct Scales, Items, and Modifications*

<i>SCT construct/scale</i>	<i>Food For Thought item</i>	<i>Item Modifications</i>
F/V Consumption <sup>25,26</sup>	<p>1. Yesterday, did you eat fruit? Fruits are all fresh, frozen, canned, or dried fruits. Do not count fruit juice.</p> <p>2. Yesterday, did you eat any starchy vegetables like potatoes, corn, or peas? Do not count French fries or chips.</p> <p>3. Yesterday, did you eat any orange vegetables like carrots, squash, or sweet potatoes?</p> <p>4. Yesterday, did you eat a salad made with lettuce, or any green vegetables like spinach, green beans, broccoli, turnip greens, or other greens?</p> <p>5. Yesterday, did you eat any other vegetables like peppers, tomatoes, zucchini, asparagus, cabbage, cauliflowers, cucumbers, mushrooms, eggplant, celery, artichokes, avocados, or tomatillos?</p>	<p>Item #4:</p> <ul style="list-style-type: none"> <li>• “Turnip greens” added</li> </ul> <p>Item #5</p> <ul style="list-style-type: none"> <li>• “Avocados” and “tomatillos” added</li> </ul>
Behavioral capability (knowledge) <sup>24</sup>	<p>1. Fruits and vegetables have lots of (a) fat (b) protein (c) cholesterol (d) vitamins (e) calories</p> <p>2. How many servings of fruits and vegetables do you think a person should eat each day for good health? (a) 1 (b) 2 (c) 3 (d) 5 (e) 7</p> <p>3. Who needs to eat plenty of fruits and vegetables? (a) children (b) adults (c) teenagers (d) grandparents (e) all of the above</p> <p>4. Let’s say you are about to eat breakfast. You have dry cereal with milk, toast with butter, and apple juice. Which of these foods could you add if you are trying to eat more fruits and vegetables? (a) Orange Kool-aid (b) Apple butter on toast (c) Banana on cereal (d) Blueberry donut (e) Strawberry pop-tart</p>	<p>Item #4:</p> <ul style="list-style-type: none"> <li>• “Butter” replaced “margarine”</li> <li>• “Whole (sliced)” removed from answer option c</li> </ul> <p>Item #6:</p> <ul style="list-style-type: none"> <li>• “If you are trying to eat more fruits and vegetables” was added</li> <li>• “Strawberry jelly” replaced “grape jelly” in answer option c</li> </ul> <p>Item #8:</p> <ul style="list-style-type: none"> <li>• “Dinner (the evening meal)” replaced “supper”</li> <li>• “Pie” replaced “turnover”</li> </ul>

*Continued*

<i>SCT construct/scale</i>	<i>Food For Thought item</i>	<i>Item Modifications</i>
	<p>5. Let's say you are about to eat dinner (the evening meal). You have fried chicken, corn, roll with butter, and milk. Which of these foods could you add if you are trying to eat more fruits and vegetables?</p> <p>(a) Potato chips (b) Macaroni and cheese (c) Rice (d) Peach pie (e) Broccoli</p> <p>6. Let's say you set a goal to eat grapes as a snack after school. When you got home from school, all the grapes were gone. If you are trying to eat more fruits and vegetables, what could you have done instead?</p> <p>(a) Eaten a fruit roll-up (b) Eaten an apple (c) Eaten a peanut butter and strawberry jelly sandwich (d) Eaten some corn chips (e) Drank grape Hi-C</p> <p>7. Let's say your family is going on a picnic. You are trying to eat more fruits and vegetables so you could:</p> <p>(a) Make sure the potato chips get packed. (b) Offer to pack some oranges and bananas. (c) Offer to pack the grape jelly. (d) Offer to pack the orange sodas. (e) Make sure the apple pie gets packed.</p> <p>8. Pretend your family is going out to eat dinner (the evening meal) at a fast food place. You order a hamburger, fries and a milkshake. How could you add another serving of fruit and vegetable to your meal?</p> <p>(a) Order a cherry pie for dessert. (b) Make sure you ordered a strawberry milkshake instead of a chocolate one. (c) Order a slice of pickle on your burger. (d) Order orange juice to drink. (e) Eat ketchup on your fries.</p>	
Self-efficacy <sup>24,27-29</sup>	<p><i>Eating self-efficacy</i></p> <ol style="list-style-type: none"> <li>1. For breakfast, I'm sure I can add fruit to my cereal.</li> <li>2. For lunch at school, I'm sure I can eat a vegetable that's served.</li> <li>3. For lunch at school, I'm sure I can eat a fruit that's served.</li> <li>4. For lunch at home, I'm sure I can eat a carrot or celery sticks instead of chips.</li> <li>5. For lunch at home, I'm sure I can eat a fruit that's served.</li> <li>6. For a snack, I'm sure I can choose my favorite fruit instead of my favorite cookie or candy bar.</li> <li>7. For a snack, I'm sure I can choose my favorite vegetable instead of my favorite cookie or candy bar.</li> <li>8. For a snack, I'm sure I can choose my favorite vegetable instead of chips.</li> <li>9. For dinner, I'm sure I can eat a vegetable that's served.</li> <li>10. For dinner, I'm sure I can eat my favorite fruit as my dessert.</li> </ol>	<p>All items:</p> <ul style="list-style-type: none"> <li>• "I'm sure" replaced "I think"</li> <li>• Answer options reduced to 3 items</li> </ul> <p>Item #5:</p> <ul style="list-style-type: none"> <li>• "...instead of my usual dessert"</li> </ul> <p>Items #7:</p> <ul style="list-style-type: none"> <li>• "Cookie" and "candy bar" merged</li> </ul> <p>Item #8:</p> <ul style="list-style-type: none"> <li>• "Cookie" and "candy bar" merged</li> <li>• "Raw" removed from vegetable</li> </ul> <p>Item #9:</p> <ul style="list-style-type: none"> <li>• Original item stated: "...eat a big serving of vegetables."</li> </ul>

*Continued*

<i>SCT construct/scale</i>	<i>Food For Thought item</i>	<i>Item Modifications</i>
	<p><i>Preparation self-efficacy</i></p> <ol style="list-style-type: none"> <li>1. I am sure I can prepare my favorite fruit or vegetable to eat.</li> <li>2. I am sure I can make my own dinner (the evening meal) that includes a fruit when someone else doesn't have time to cook.</li> <li>3. I am sure I can make my own dinner (the evening meal) that includes a vegetable when someone else doesn't have time to cook.</li> </ol>	<p>All items:</p> <ul style="list-style-type: none"> <li>• Answer options reduced to 3 items</li> </ul> <p>Items #2 and #3:</p> <ul style="list-style-type: none"> <li>• “(the evening meal)” was added</li> <li>• Original items include both fruit and vegetable</li> </ul>
	<p><i>Asking self-efficacy</i></p> <ol style="list-style-type: none"> <li>1. I am sure I can ask someone in my family to buy my favorite fruit or vegetable.</li> <li>2. I am sure I can ask someone in my family to make by favorite vegetable dish for dinner.</li> <li>3. I am sure I can ask someone in my family to have fruit and vegetables where I can reach them.</li> </ol>	<p>All items:</p> <ul style="list-style-type: none"> <li>• “I'm sure” replaced “I think”</li> <li>• Answer options reduced to 3 items</li> </ul> <p>Item #3:</p> <ul style="list-style-type: none"> <li>• Fruit and vegetables were merged from two items</li> </ul>
<i>(Perceived adult support)</i> <sup>30</sup>	<ol style="list-style-type: none"> <li>1. How often do the adults in your life eat fruit?</li> <li>2. How often do the adults in your life eat vegetables?</li> </ol>	<p>All items:</p> <ul style="list-style-type: none"> <li>• Modified to “adults”</li> <li>• Modified to “eat”</li> <li>• Answer options reduced to 3 items</li> </ul>
<i>(Perceived socialization and encouragement)</i> <sup>28</sup>	<ol style="list-style-type: none"> <li>1. How often do the adults in your life tell you that vegetables are good for you?</li> <li>2. How often do the adults in your life tell you that vegetables are healthy?</li> <li>3. How often do the adults in your life tell you that vegetables taste good?</li> <li>4. How often do the adults in your life tell you to eat vegetables every day?</li> <li>5. How often do the adults in your life tell you that fruit is good for you?</li> <li>6. How often do the adults in your life tell you that fruit is healthy?</li> <li>7. How often do the adults in your life tell you that fruit taste good?</li> <li>8. How often do the adults in your life tell you to eat fruit every day?</li> </ol>	<p>All items:</p> <ul style="list-style-type: none"> <li>• Modified to “adults in your life”</li> </ul>
Physical environment <i>(accessibility)</i> <sup>31</sup>	<ol style="list-style-type: none"> <li>1. At your home, do you have fruit to eat?</li> <li>2. At your home, do you have vegetable to eat?</li> <li>3. In the past week, was there fruit or vegetables on the kitchen counter or somewhere in the open?</li> <li>4. In the past week, was there fruit or cut up fresh vegetables in the refrigerator as a snack?</li> </ol>	<p>All items:</p> <ul style="list-style-type: none"> <li>• Modified to a 3-item answer option.</li> </ul> <p>Item #4:</p> <ul style="list-style-type: none"> <li>• 100% juice removed from item list</li> </ul>

*Continued*

<i>SCT construct/scale</i>	<i>Food For Thought item</i>	<i>Item Modifications</i>
Outcome expectations <sup>24,29</sup>	<ol style="list-style-type: none"> <li>1. Eating fruits and vegetables every day will make me strong.</li> <li>2. I will be better at sports if I eat fruits and vegetables.</li> <li>3. I will get sick more often if I don't eat fruits and vegetables.</li> <li>4. Eating fruit and vegetables will help me grow.</li> <li>5. I will have healthier skin if I eat fruits and vegetables.</li> <li>6. If I eat fruit and vegetables, my family will be proud of me.</li> <li>7. Eating fruits and vegetables will help me see better.</li> <li>8. If I eat fruits and vegetables at breakfast, I will be able to think better in class.</li> <li>9. Eating fruits and vegetable will keep me from getting cavities.</li> <li>10. If I eat fruits and vegetables, I won't get fat.</li> <li>11. If I eat fruits and vegetables every day my friends will make fun of me.<sup>29</sup></li> </ol>	<p>Item #1:</p> <ul style="list-style-type: none"> <li>• “Strong” replaced “smarter”</li> </ul> <p>Item #7:</p> <ul style="list-style-type: none"> <li>• “At night” removed</li> </ul>
Self-regulation ( <i>asking behaviors</i> ) <sup>24</sup>	<ol style="list-style-type: none"> <li>1. In the last two weeks, did you ask someone in your family to have fruit or vegetables at home for breakfast?</li> <li>2. In the last two weeks, did you ask someone in your family to have fruit or vegetables at home for snacks?</li> <li>3. In the last two weeks, did you ask someone in your family to have fruit or vegetables at home for dinner?</li> <li>4. In the last two weeks, did you ask someone in your family to have fruit or vegetables when you went out to eat?</li> <li>5. In the last two weeks, did you ask someone in your family to buy fruit or vegetables?</li> <li>6. In the last two weeks, did you ask someone in your family to have fruit or vegetables so you can reach them in your house?</li> </ol>	All items: No modifications

Table 4

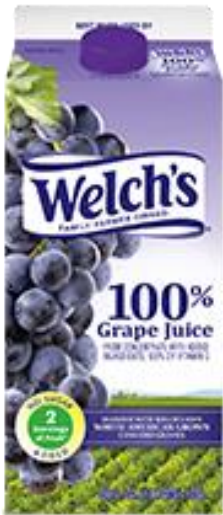
Food For Thought *Questionnaire Scales and Social Cognitive Construct Correlates of Fruit and Vegetable Consumption (n=42)*

	Mean (SD)	Range	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Knowledge	0.62 (0.25)	0.0-1.0	-															
2. Self-efficacy	2.44 (0.41)	1.0-3.0	.21	-														
3. Self-efficacy for eating	2.40 (0.41)	1.0-3.0	.30	<b>.93</b>	-													
4. Self-efficacy for preparation	2.42 (0.60)	1.0-3.0	.05	<b>.77</b>	<b>.56</b>	-												
5. Self-efficacy for asking	2.55 (0.52)	1.0-3.0	.07	<b>.78</b>	<b>.64</b>	<b>.55</b>	-											
6. Perceived adult support	2.52 (0.52)	1.0-3.0	-.06	.09	-.03	.29	.03	-										
7. Perceived socialization and encouragement	2.49 (0.47)	1.0-3.0	.17	.18	.14	.19	.15	.30	-									
8. Accessibility	2.43 (0.48)	1.0-3.0	.18	<b>.39</b>	.26	<b>.39</b>	<b>.33</b>	.28	.05	-								
9. Outcome expectations	2.57 (0.30)	1.0-3.0	.21	<b>.34</b>	.24	<b>.45</b>	.26	<b>.43</b>	<b>.43</b>	<b>.47</b>	-							
10. Asking behaviors	0.70 (0.32)	0.0-1.0	-.06	<b>.33</b>	.17	<b>.41</b>	.21	.24	<b>.43</b>	.25	<b>.38</b>	-						
11. Age	9.76 (1.41)	8-12	<b>.40</b>	.02	.02	-.11	.02	-.04	.06	.17	.13	-.11	-					
12. Gender	-	-	-.12	.05	.06	.05	.03	.12	-.04	.13	-.05	.09	-.05	-				
13. SES	-	-	-.28	-.04	-.17	.08	.19	.04	.05	.11	-.05	.15	.24	-.10	-			
14. Overall F/V consumption	5.17 (3.43)	-	-.20	<b>.50</b>	<b>.41</b>	<b>.40</b>	<b>.54</b>	.11	.02	.00	.15	.09	-.16	.18	-.10	-		
15. Overall fruit consumption	1.62 (1.40)	-	.05	.21	.16	.28	.20	.26	.27	.16	<b>.33</b>	.29	-.04	-.08	.05	<b>.41</b>	-	
16. Overall vegetable consumption <sup>1</sup>	3.55 (3.13)	-	-.24	<b>.45</b>	<b>.38</b>	<b>.32</b>	<b>.51</b>	.01	-.10	-.07	.02	-.04	-.16	.24	-.13	<b>.91</b>	.05	-

<sup>1</sup> Overall vegetable consumption does not include starches



Image 1



## TABLES

Table 5

*Theory-based Fruit and Vegetable Interventions for Children from Low-income and Minority Populations*

<i>Intervention</i>	<i>Location (duration)</i>	<i>Race</i>	<i>SES</i>	<i>Gender &amp; Age</i>	<i>Study Design</i>	<i>Theory</i>	<i>F/V Measures</i>	<i>Results</i>
1. Baranowski (2003) – Squire’s Quest!	Elementary schools in Houston, TX (5 weeks)	(n=1,578) 17.4% African American, 44.8% Euro-American, 30.9% Hispanic, 6.8% Other	Not given	52.2% female; 8-12 year olds	RCT	SCT	Dietary intake: Food Intake Recording Software System (FIRSS) (multiple pass, 24-hour dietary intake interview directly with children)	+1.0 F/V servings/day +0.52 F servings/day +0.24 V servings/day
2. Blom-Hoffman (2004) – Every Day, Lots of Ways	Urban elementary school in the Northeastern US (5 weeks)	100% African American	95% of students in the school eligible for free breakfast and lunch	55% female; 5-7 year olds	RCT	SLT	Knowledge: Curriculum-based measure developed by EDLW authors (test-retest = .64)  Dietary intake: Plate waste (Mean percentage agreement of assistants = 91%)	Students in experimental group increased knowledge (M=88.46, SD=13.74) sig. compared to control group (M=64.12, SD=20.46) Students in experimental group (M=3.21, SD=1.88) did not increase in F/V intake behavior compared to the control group (M=3.27, SD=1.87)

*Continued*

<i>Intervention</i>	<i>Location (duration)</i>	<i>Race</i>	<i>SES</i>	<i>Gender &amp; Age</i>	<i>Study Design</i>	<i>Theory</i>	<i>F/V Measures</i>	<i>Results</i>
3. Cullen (2007) – Squire’s Quest!	Elementary schools in Houston, TX (5 weeks)	(n=671) 43% African American; 31% Hispanic; 18% white; 8% Asian	65.7% of students in school district eligible for free or reduced lunches	52% female; 8-10 year olds	RCT	SCT	Dietary intake: Food Intake Recording Software System (FIRSSt) (multiple pass, 24-hour dietary intake interview directly with children)  Preference: F/Vs (1 item, fruit juice $\alpha=0.82$ , vegetable $\alpha=0.80$ )  Self-efficacy: Substitution (8 items, $\alpha=0.87$ ); Availability (10 items, $\alpha=0.80$ ); Eating (5 items, $\alpha=0.72$ )	+1.0 F/V servings/day +0.52 F servings/day +0.24 V servings/day
4. Di Noia (2008)	From 27 youth services organization s in northeastern states (4 weeks)	(n=507) 100% African American	87% of participants from communiti es in which 20% or more of families had income below the federal poverty level	61% female; 11-14 years old	Pretest- posttest quasi- experim ental	TTM Stages of Change	Dietary intake: “About how many servings of F/V do you usually eat each day?”  Self-efficacy: (17 items, $\alpha=0.86$ )  Pros-Cons: Benefits (18 items, $\alpha=0.91$ ); Barriers (14 items, $\alpha=0.85$ )	F/V servings at 2 weeks: Intervention = 3.25 Control = 2.46 Post intervention showed a +0.9 serving in intervention with no change in the control group. Significant difference.

*Continued*

<i>Intervention</i>	<i>Location (duration)</i>	<i>Race</i>	<i>SES</i>	<i>Gender &amp; Age</i>	<i>Study Design</i>	<i>Theory</i>	<i>F/V Measures</i>	<i>Results</i>
5. Domel (1993) – Gimme 5	Two elementary schools in Richland County Georgia (2 months)	(n=301) “Just over half were African American, and the rest were predomin- antly Anglo- American.”	48-63% were eligible for free or reduced lunch prices	51.2% female; 9-11 year olds	RCT	SCT	Preference: F/Vs (31 items; internal consistency $\alpha=0.70$ - 0.74.)  Knowledge: (16 items; internal consistency $\alpha=0.59$ .)  Dietary intake: students’ pre-post intervention food diaries	Significant increase in knowledge ( $F=55.10$ ; $P=0.000$ );  Significant increase preference for fruits ( $F=4.02$ , $P=0.046$ ) and F/V snacks ( $F=16.57$ , $P=0.000$ ) but not V; Did not increase F/V consumption
6. Foerster (1998) – 5- a-day power play	49 Elementary schools in California (1 year)	(n=2,684) Ethnicity not specifically measured; Percent of Hispanic children in the school districts ranged from 30%-90+%	All 49 schools qualified as “severe need” schools by the USDA School Meal Program	53% female; 9-11 year olds	RCT	Resiliency Theory; Reciprocal Determinism	Dietary intake & Attitudes: California Children’s Food Survey	+0.2 F/V serving/day for school intervention only; +0.4 F/V serving/day for school with community interventions; affect, skills, norms were predictive of increased intake

*Continued*

<i>Intervention</i>	<i>Location (duration)</i>	<i>Race</i>	<i>SES</i>	<i>Gender &amp; Age</i>	<i>Study Design</i>	<i>Theory</i>	<i>F/V Measures</i>	<i>Results</i>
7. Gatto (2002) – LA Sprouts	One elementary school within Los Angeles Unified School District (12 weeks)	(n=104) 85.3% Latino; 14.7% mixed	94% of student body eligible for free or reduced- price school meals	61.8% female; 9–11 year olds	Quasi- experim ental pilot study	SCT	The Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA) used to assess acculturation to the dominant culture (8 items)  Behavior change: Adapted version of the Motivation for Healthy Behaving measure from the Self- Regulation Questionnaire (17 items, intrinsic motivation $\alpha=0.83$ , extrinsic motivation scale $\alpha=0.87$ )	Experimental group had 16% greater increase in preference for vegetables compared with control group ( $P=.009$ )
8. Perry (1998) – 5-a-day power plus	20 elementary school in the urban Twin Cities metropolitan area of Minnesota (1 year)	(n=1750) 48% white; 25.2% Asian; 19.1% African American; 6.4% Hispanic; 1.3% Native American	More than 60% of students received free or reduced- cost school lunches	Not given; 9-11 year olds	RCT	SLT	Dietary intake: 24- hour recall; lunchroom observations; parent telephone survey (6 items; $\alpha=0.60-0.67$ )  Behavior change: Health behavior questionnaire (9 items, $\alpha$ ranges from 0.65- 0.92)	+0.58 F/V serving/day

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<i>Intervention</i>	<i>Location (duration)</i>	<i>Race</i>	<i>SES</i>	<i>Gender &amp; Age</i>	<i>Study Design</i>	<i>Theory</i>	<i>F/V Measures</i>	<i>Results</i>
9. Somerville (2012)	Boys and Girls Club afterschool program in southern California (4 months)	(n=40) 83% Hispanic	Not given	Not given; 6-12 year olds	One group pre- post-test design	SCT	Dietary intake: Self- report Sylva, Townsend, Martin, & Metz, 2010) (5 items)  Preference: Observation of snack choices	Self-reported daily fruit servings increased (from M=2.23, SD=4.18 to M=4.13, SD=2.16); Self- reported daily vegetables servings increased (from M=2.17, SD=1.82 to M=3.07, SD=1.87)
10. Stables (2005) – Integrated Nutrition Project 1996	Colorado (1 year)	(n=226) 52% Hispanic; 28% African American; 20% white	75% free or reduced lunch	Not given; 8-10 year olds	Pretest- posttest quasi- experim ental	SCT, Piaget's Cognitive Development Theory	Dietary intake: Plate waste	+0.4 F/V serving/lunch (attributed to decreased intake in control group. Increase intake in treatment group)
11. Stables (2005) – Integrated Nutrition Project 1997	Colorado (1 year)	(n=502) 90% Hispanic	80% free or reduced lunch	Not given; 7-10 year olds	Pretest- posttest quasi- experim ental	SCT	Dietary intake: Plate waste	+0.35 F/V serving/lunch (attributed to decreased intake in control group. Increase intake in treatment group)

*Continued*

<i>Intervention</i>	<i>Location (duration)</i>	<i>Race</i>	<i>SES</i>	<i>Gender &amp; Age</i>	<i>Study Design</i>	<i>Theory</i>	<i>F/V Measures</i>	<i>Results</i>
12. Stables (2005) – Integrated Nutrition Project 1998	Colorado (1 year)	(n=319) 90% Hispanic	80% free or reduced lunch	Not given; 8-9 year olds	Pretest- posttest quasi- experim ental	SCT	Dietary intake: Plate waste	+0.22 F/V serving/lunch (both treatment and control group declined in intake)
13. Tuuri (2009) – Smart Bodies	Urban elementary schools in southeast Louisiana (12 weeks)	(n=560) 82% African American; 10% white; 5% Asian; 2% other; 1% Hispanic	68.2%– 98.5% of students enrolled in National School Lunch Program	58.2% female; 9-11 year olds	RCT	SCT	Self-efficacy ( $\alpha=+0.70$ )  Preferences ( $\alpha=+0.70$ )  Outcome expectations: Positive ( $\alpha=+0.70$ ); Negative ( $\alpha<0.70$ )  Social norms ( $\alpha<0.70$ )	Treatment group increase in nutrition knowledge (F=6.99, P=0.00); self- efficacy (F=14.36, P=0.00); preferences for vegetables decreased (F=8.38, P=0.00)



Table 6

*Social Cognitive Theory Constructs Utilized in Fruit and Vegetable Interventions*

<i>Study</i>	<i>Theory</i>	<i>Constructs for Intervention Design</i>		<i>Constructs for Outcome Measurement</i>
1. Baranowski (2003) Squire's Quest!	SCT	1. Preferences 2. Asking behaviors 3. Preparation skills 4. Decision making 5. Problem solving		1. Dietary intake
2. Blom-Hoffman (2004) Every Day, Lots of Ways	SLT	1. Knowledge 2. Dietary intake		1. Dietary intake 2. Knowledge
3. Cullen (2007) Squire's Quest!	SCT	1. Goal setting 3. Preparation skills 5. Self-efficacy 7. Dietary intake	2. Self-reward 4. Problem solving 6. Self-regulation 8. Asking behaviors	1. Dietary intake 2. Preferences 3. Self-efficacy
4. Domel (1993) Gimme 5	SCT	1. Dietary intake 3. Knowledge 5. Dietary intake 7. Preferences 9. Preparation skills 11. Goal setting	2. Self-monitoring 4. Problem solving 6. Social support 8. Asking behaviors 10. Modeling 12. Reciprocal determinism	1. Dietary intake 2. Knowledge 3. Preferences
5. Gatto (2002) LA Sprouts	SCT	1. Perceptions 2. Preference 3. Motivation 4. Self-efficacy		1. Acculturation, habits, & interests 2. Health behaviors

*Continued*

<i>Study</i>	<i>Theory</i>	<i>Constructs for Intervention Design</i>		<i>Constructs for Outcome Measurement</i>
6. Perry et al. (2005) 5-a-day Power Plus	SLT	1. Skill-building 2. Problem solving 3. Preparation skills 4. Preference		1. Dietary intake 2. Behavior change
7. Somerville (2012)	SCT	1. Self-efficacy 2. Dietary intake 3. Preference		1. Dietary intake 2. Preferences
8. Stables (1996-1998) Integrated Nutrition Project	SCT	1. Preparation skills 2. Self-efficacy 3. Dietary intake 4. Knowledge 5. Attitude		1. Dietary intake
9. Tuuri (2009) Smart Bodies	SCT	1. Knowledge 3. Modeling 5. Preferences	2. Self-efficacy 4. Outcome expectations 6. Social norms	1. Self-efficacy 2. Preferences 3. Outcome expectations 4. Social norms

Table 7.1

*Self-efficacy Scale Items and Modifications*

<i>Item</i>	<i>Inclusion Status and Modification(s)</i>	<i>Rationale for Inclusion or Modification(s)</i>
<i>Baranowski et al. (2000)</i>		
1. For breakfast, I think I can drink a glass of my favorite juice. a. I disagree very much b. I disagree a little c. I am not sure d. I agree a little e. I agree very much	Not included in questionnaire	<sup>d.</sup> Focus group revealed that children could not identify 100% juice
2. (Q14) For breakfast, I'm sure I can add fruit to my cereal. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items	i. <sup>b.</sup> "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. <sup>a. b.</sup> 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
3. (Q15) For lunch at school, I'm sure I can eat a vegetable that's served. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items	i. <sup>b.</sup> "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. <sup>a. b.</sup> 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
4. (Q16) For lunch at school, I'm sure I can eat a fruit that's served. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items	i. <sup>b.</sup> "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. <sup>a. b.</sup> 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)

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<i>Item</i>	<i>Inclusion Status and Modification(s)</i>	<i>Rationale for Inclusion or Modification(s)</i>
5. (Q17) For lunch at home, I'm sure I can eat a carrot or celery sticks instead of chips. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
6. (Q18) For lunch at home, I'm sure I can eat my favorite fruit. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items iii. "...instead of my usual dessert" removed	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013) iii. b. Not all children eat dessert at lunchtime
7. (Q19) For a snack, I'm sure I can choose my favorite fruit instead of my favorite cookie or candy bar. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items iii. "Cookie" and "candy bar" were merged from two separate items.	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013) iii. b. "Cookie" and "candy bar" both represent a sweet, energy-dense food item
8. For a snack I think I can choose my favorite fruit instead of my favorite candy bar. a. I disagree very much b. I disagree a little c. I am not sure d. I agree a little e. I agree very much	Not included in questionnaire	b. Merged with item #7

*Continued*

<i>Item</i>	<i>Inclusion Status and Modification(s)</i>	<i>Rationale for Inclusion or Modification(s)</i>
9. (Q20) For a snack, I'm sure I can choose my favorite vegetable instead of my favorite cookie or candy bar. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items iii. "Cookie" and "candy bar" were merged from two separate items. iv. "Raw" removed from vegetable	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013) iii. b. "Cookie" and "candy bar" both represent a sweet, energy-dense food item iv. b. d. Focus group revealed "raw" to be commonly misunderstood as "old." Fresh, canned, and frozen vegetables are equal in nutrient content (Miller & Knudson, 2014; Weaver et al., 2014).
10. For a snack I think I can choose my favorite raw vegetable with dip instead of my favorite candy bar. a. I disagree very much b. I disagree a little c. I am not sure d. I agree a little e. I agree very much	Not included in questionnaire	b. Merged with item #9
11. (Q21) For a snack, I'm sure I can choose my favorite vegetable with dip instead of chips. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items iii. "Raw" removed from vegetable	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013) iii. b. d. Focus group revealed "raw" to be commonly misunderstood as "old." Fresh, canned, and frozen vegetables are equal in nutrient content (Miller & Knudson, 2014; Weaver et al., 2014).

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<i>Item</i>	<i>Inclusion Status and Modification(s)</i>	<i>Rationale for Inclusion or Modification(s)</i>
12. (Q22) For dinner, I'm sure I can eat a vegetable that's served. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items iii. Original item stated: "...eat a big serving of vegetables."	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013) iii. b. Modified to maintain consistent wording across items, and to control for lack of serving size knowledge.
13. (Q23) For dinner, I'm sure I can eat my favorite fruit as my dessert. a. Not sure b. Somewhat sure c. Very sure d.	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
<i>Baranowski et al. (2002)</i>		
14. (Q24) I am sure I can prepare my favorite fruit or vegetable to eat. a. Not sure b. Somewhat sure c. Very sure	Answer options reduced to 3 items	b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
15. (Q25) I am sure I can make my own dinner (the evening meal) that includes a fruit when someone doesn't have time to cook. a. Not sure b. Somewhat sure c. Very sure	i. Answer options reduced to 3 items ii. "(the evening meal)" was added iii. Original items include both fruit and vegetable	i. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013) ii. c. Added to maintain consistency across scale items iii. b. Fruit and vegetable split into two items to distinguish between skills for preparing each

*Continued*

<i>Item</i>	<i>Inclusion Status and Modification(s)</i>	<i>Rationale for Inclusion or Modification(s)</i>
16. (Q26) I am sure I can make my own dinner (the evening meal) that includes a vegetable when someone doesn't have time to cook. a. Not sure b. Somewhat sure c. Very sure	i. Answer options reduced to 3 items ii. "(the evening meal)" was added iii. Original items include both fruit and vegetable	i. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013) ii. c. Added to maintain consistency across scale items iii. b. Fruit and vegetable split into two items to distinguish between skills for preparing each
<i>Davis et al. (2000)</i>		
17. (Q27) I am sure I can ask someone in my family to buy my favorite fruit or vegetable. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
18. (Q28) I am sure I can ask someone in my family to make my favorite vegetable dish for dinner. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
19. (Q29) I am sure I can ask someone in my family to have fruit and vegetables at home where I can reach them. a. Not sure b. Somewhat sure c. Very sure	i. "I'm sure" replaced "I think" ii. Answer options reduced to 3 items iii. Original scale split fruit and vegetables into two items. Two items were merged.	i. b. "I'm sure" is more frequently used to assess self-efficacy (Baranowski et al., 2002; Reynolds et al., 2002) ii. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013) iii. b. Asking for fruit and vegetables to be in reach is an identical behavior.
<sup>a.</sup> Pilot study <sup>b.</sup> Initial item modification and improvement <sup>c.</sup> Expert panel review <sup>d.</sup> Focus group		

Table 7.2

*Knowledge Scale Items and Modifications*

<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
1. (Q1) Fruits and vegetables have lots of <sup>1</sup> a. fat b. protein c. cholesterol d. vitamins e. calories	No modifications	N/A
2. (Q2) How many servings of fruits and vegetables do you think a person should eat each day for good health? <sup>1</sup> a. 1 b. 2 c. 3 d. 5 e. 7	No modifications	N/A
3. (Q3) Who needs to eat plenty of fruits and vegetables? <sup>1</sup> a. children b. adults c. teenagers d. grandparents e. all of the above	No modifications	N/A
4. What is an important first step in trying to change your own behavior? <sup>1</sup> a. Just do it. b. Set a realistic goal. c. Pick a reward for when you do change your behavior. d. Do what someone else tells you to do. e. Do something to remind you to think about it.	Not included in questionnaire	Literature limited concerning effects of goal setting efforts among children (Shilts, Horowitz, & Townsend, 2004; Baranowski, Diep, & Baranowski, 2013). Influence of goal setting is complex and moderated by F/V availability, preferences, and social desirability (Cullen et al. 2004; Latif et al., 2011).

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<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
5. When you set a goal, you need to decide <sup>1</sup> a. What you will do. b. When you will do it. c. Where you will do it. d. How you will do it. e. all of the above	Not included in questionnaire	See rational for item #4
6. Let's say you are used to eating 2 servings of fruits and vegetables every day, but you want to eat more. A realistic first goal would be for you to eat _____ servings of fruits and vegetables every day for a while. <sup>1</sup> a. 2 b. 3 c. 4 d. 5 e. 6	Not included in questionnaire	See rational for item #4
7. Let's say you've set a goal, but did not reach it. The first thing you should do to help you try to reach that goal is: <sup>1</sup> a. Make a new plan. b. Find other ways that might work. c. Choose the best way. d. Analyze what didn't work. e. Forget about that goal for awhile.	Not included in questionnaire	See rational for item #4
8. You will be more likely to get more fruits and vegetables at home when you ask for them if you: <sup>1</sup> a. Ask the family member who usually buys the food. b. Are positive and polite when you ask. c. Ask at the "right" time (or at an appropriate time). d. Are realistic in what you ask for. e. Do all of the above.	Not included in questionnaire	Item assessed in asking behaviors

*Continued*

<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
9. What could you do to decide whether to eat your favorite fruit or your favorite candy bar? <sup>1</sup> a. Think about all the qualities of fruits and candy bars that are important to you. b. Talk to your friends about what they like. c. Ask your mom what is best. d. See which one costs less. e. See what the people around you are eating.	Not included in questionnaire	Item too specific for questionnaire
10. (Q4) Let's say you are about to eat breakfast. You have dry cereal with milk, toast with butter, and apple juice. Which of these foods could you add if you are trying to eat more fruits and vegetables? <sup>1</sup> a. Orange Kool-aid b. Apple butter on toast c. Banana on cereal d. Blueberry donut e. Strawberry pop-tart	i. "Butter" replaced "margarine" ii. "Whole (sliced)" removed from answer option c	i. <sup>b</sup> Children are more likely to be familiar with butter. ii. <sup>b</sup> Simplified answer option
11. (Q5) Let's say you are about to eat dinner (the evening meal). You have fried chicken, corn, roll with butter, and milk. Which of these foods could you add if you are trying to eat more fruits and vegetables? <sup>1</sup> a. Potato chips b. Macaroni and cheese c. Rice d. Peach pie e. Broccoli	i. "Dinner (the evening meal)" replaced "supper" ii. "Butter" replaced "margarine"	i. <sup>c</sup> Dinner is a more widely recognized word for the evening meal ii. <sup>b</sup> Children are more likely to be familiar with butter.

*Continued*

<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
<p>12. (Q6) Let's say you set a goal to eat grapes as a snack after school. When you got home from school, all the grapes were gone. If you are trying to eat more fruits and vegetables, what could you have done instead? <sup>1</sup></p> <ul style="list-style-type: none"> <li>a. Eaten a fruit roll-up</li> <li>b. Eaten an apple</li> <li>c. Eaten a peanut butter and strawberry jelly sandwich</li> <li>d. Eaten some corn chips</li> <li>e. Drank grape Hi-C</li> </ul>	<ul style="list-style-type: none"> <li>i. "If you are trying to eat more fruits and vegetables" was added</li> <li>ii. "Strawberry" replaced "grape" in answer option c</li> </ul>	<ul style="list-style-type: none"> <li>i. <sup>c.</sup> To clarify the goal of eating more F/V and to maintain consistent wording across items</li> <li>ii. <sup>b.</sup> Serves the same purpose of a fruit jelly option without misguiding the reader to assume eating grape flavored food was the goal</li> </ul>
<p>13. Which of these things could one friend do to help another friend eat more fruits and vegetables at supper? <sup>1</sup></p> <ul style="list-style-type: none"> <li>a. Call them and remind them.</li> <li>b. Help them think of a specific fruit or vegetable to add.</li> <li>c. Help them practice asking their parents for more fruits and vegetables.</li> <li>d. Go to the store with them so they can buy a fruit or vegetable.</li> <li>e. All of the above.</li> </ul>	Not included in questionnaire	Item too specific for questionnaire
<p>14. Let's say you want to have more fruits and vegetables at home. Which of these is most likely to work best? <sup>1</sup></p> <ul style="list-style-type: none"> <li>a. Complain to your parents that they're not buying enough fruits and vegetables.</li> <li>b. Interrupt your parents while they are talking and ask them to buy more fruits and vegetables.</li> <li>c. Wait until your parents get back from the grocery store and then ask why they didn't buy more fruits and vegetables.</li> <li>d. Politely ask your parents to please buy more fruits and vegetables the next time they go to the grocery store.</li> <li>e. Go to the grocery store with your parents and put some fruit in the cart when they're not looking.</li> </ul>	Not included in questionnaire	Item too specific for questionnaire

*Continued*

<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
15. (Q7) Let's say your family is going on a picnic. You are trying to eat more fruits and vegetables so you could: <sup>1</sup> a. Make sure the potato chips get packed. b. Offer to pack some oranges and bananas. c. Offer to pack the grape jelly. d. Offer to pack the orange sodas. e. Make sure the apple pie gets packed.	No modifications	N/A
16. (Q8) Pretend your family is going out to eat dinner (the evening meal) at a fast food place. You order a hamburger, fries and a milkshake. How could you add another serving of fruit and vegetable to your meal? <sup>1</sup> a. Order a cherry pie for dessert. b. Make sure you ordered a strawberry milkshake instead of a chocolate one. c. Order a slice of pickle on your burger. d. Order orange juice to drink. e. Eat ketchup on your fries.	i. "Dinner (the evening meal)" replaced "supper" ii. "Pie" replaced "turnover"	i. <sup>c</sup> . Dinner is a more widely recognized word for the evening meal ii. <sup>b</sup> . Pie is a more widely recognized dessert
Original scale citation: Davis et al. (2000) <sup>1</sup>		
Stage in which modification was made: a. Pilot study b. Initial item modification and improvement c. Expert panel review d. Focus group		

Table 7.3

*Perceived Adult Support Scale Items and Modifications*

<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
1. (Q30) How often do the adults in your life eat fruit? a. Almost never b. Sometimes c. Almost every day or every day	Original items asked: “How often does your mother consume fruit?” and “How often does your father consume fruit?” i. Modified to “adults” ii. Modified to “eat” iii. Answer options reduced to 3 items	i. <sup>d</sup> Child F/V consumption can be influenced by teachers, extended family members, and social group elders (Reinaerts et al., 2007; Kumanyika, 2008) ii. <sup>d</sup> Children are more likely to be familiar with the word “eat” than “consume” iii. <sup>b</sup> 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
2. (Q31) How often do the adults in your life eat vegetables? a. Almost never b. Sometimes c. Almost every day or every day	Original items asked: “How often does your mother consume vegetables?” and “How often does your father consume vegetables?” i. Modified to “adults” ii. Modified to “eat” iii. Answer options reduced to 3 items	i. <sup>d</sup> Child F/V consumption can be influenced by teachers, extended family members, and social group elders (Reinaerts et al., 2007; Kumanyika, 2008) ii. <sup>d</sup> Children are more likely to be familiar with the word “eat” than “consume” iii. <sup>b</sup> 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
Original scale citation: Vereecken, Van Damme, & Maes (2005) <sup>1</sup>		
Stage in which modification was made: <sup>a</sup> . Pilot study <sup>b</sup> . Initial item modification and improvement <sup>c</sup> . Expert panel review <sup>d</sup> . Focus group		

Table 7.4

*Encouragement and Socialization Scale Items and Modifications*

<i>Modified Item &amp; Original Scale Citation</i>	<i>Original Item</i>
1. (Q32) How often do the adults in your life tell you that vegetables are good for you? <sup>1</sup>	1. How often do your parents tell you that vegetables are good for you?
2. (Q33) How often do the adults in your life tell you that vegetables are healthy? <sup>1</sup>	2. How often do your parents tell you that vegetables are healthy?
3. (Q34) How often do the adults in your life tell you that vegetables taste good? <sup>1</sup>	3. How often do your parents tell you that vegetables taste good?
4. (Q35) How often do the adults in your life tell you to eat vegetables every day? <sup>1</sup>	4. How often do your parents tell you to eat vegetables every day?
5. (Q36) How often do the adults in your life tell you that fruit is good for you? <sup>1</sup>	5. How often do your parents tell you that fruit is good for you?
6. (Q37) How often do the adults in your life tell you that fruit is healthy? <sup>1</sup>	6. How often do your parents tell you that fruit is healthy?
7. (Q38) How often do the adults in your life tell you that fruit taste good? <sup>1</sup>	7. How often do your parents tell you that fruit taste good?
8. (Q39) How often do the adults in your life tell you to eat fruit every day? <sup>1</sup>	8. How often do your parents tell you to eat fruit every day?
Original answer options: yes/no/I don't have to ask	
Modified answer options: almost never/sometimes/almost every day or every day	
Original scale citation: Vereecken, Van Damme, & Maes (2005) <sup>1</sup>	

Table 7.5

*Accessibility Scale Items and Modifications*

<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
1. (Q40) At your home, do you have fruit to eat? <sup>1</sup> a. Never b. Sometimes c. Always	Original item had dichotomous (yes/no) answer option. Modified to a 3-item answer option.	a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
2. (Q41) At your home, do you have vegetables to eat? <sup>1</sup> a. Never b. Sometimes c. Always	Original item had dichotomous (yes/no) answer option. Modified to a 3-item answer option.	a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
3. (Q42) In the past week, was there fruit or vegetables on the kitchen counter or somewhere in the open? <sup>1</sup> a. Never b. Sometimes c. Always	Original item had dichotomous (yes/no) answer option. Modified to a 3-item answer option.	a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
4. (Q43) In the past week, was there fruit or cut up fresh vegetables in the refrigerator as a snack? <sup>1</sup> a. Never b. Sometimes c. Always	i. Original item had dichotomous (yes/no) answer option. Modified to a 3-item answer option. ii. 100% juice removed from item list	i. a. b. 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013) ii. <sup>d.</sup> Focus group revealed that children could not identify 100% juice
Original scale citation: Hearn et al. (1998) <sup>1</sup>		
Stage in which modification was made:		
a. Pilot study		
b. Initial item modification and improvement		
c. Expert panel review		
d. Focus group		

Table 7.6

*Outcome Expectations Scale Items and Modifications*

<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
1. (Q44) Eating fruits and vegetables every day will make me strong. <sup>1</sup>	“Strong” replaced “smarter”	<sup>b</sup> . Item #9 addresses academic performance. Word was modified to “strong” to address physical outcomes of F/V consumption.
2. (Q45) I will be better at sports if I eat fruits and vegetables. <sup>1</sup>	No modifications	N/A
3. (Q46) I will get sick more often if I don’t eat fruits and vegetables. <sup>1</sup>	No modifications	N/A
4. (Q47) Eating fruit and vegetables will help me grow. <sup>1</sup>	No modifications	N/A
5. (Q48) I will have healthier skin if I eat fruits and vegetables. <sup>1</sup>	No modifications	N/A
6. Eating fruits and vegetables will keep me from getting cancer. <sup>1</sup>	Not included in questionnaire	<sup>b</sup> . Scale was developed for use at a cancer research center.
7. (Q49) If I eat fruit and vegetables, my family will be proud of me. <sup>1</sup>	No modifications	N/A
8. (Q50) Eating fruits and vegetables will help me see better. <sup>1</sup>	“At night” removed	<sup>b</sup> . Nutrients from F/V can benefit vision overall (Sommer, 2001).
9. (Q51) If I eat fruits and vegetables at breakfast, I will be able to think better in class. <sup>1</sup>	No modifications	N/A
10. Drinking juice will give me quick energy. <sup>1</sup>	Not included in questionnaire	<sup>d</sup> . Focus group revealed that children could not identify 100% juice
11. (Q52) Eating fruits and vegetable will keep me from getting cavities. <sup>1</sup>	No modifications	N/A
12. (Q53) If I eat fruits and vegetables, I won’t get fat. <sup>1</sup>	No modifications	N/A

*Continued*



<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
<i>Additional Items Added</i>		
13. (Q54) If I eat fruits and vegetables every day my friends will make fun of me. <sup>2</sup>	i. Researchers chose to include this item ii. Answer options reduced to 3 items	i. <sup>b</sup> . Included to inquire about social outcome expectations ii. <sup>b</sup> . 3-item response options are preferable for children (Hernandez-Garbanzo et al., 2013)
Answer options: disagree/not sure/agree		
Original scale citation: Reynolds et al. (2002) <sup>1</sup> Baranowski et al. (2000) <sup>2</sup>		
Stage in which modification was made: <sup>a</sup> . Pilot study <sup>b</sup> . Initial item modification and improvement <sup>c</sup> . Expert panel review <sup>d</sup> . Focus group		

Table 7.7

*Asking Behaviors Scale Items and Modifications*

<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Rationale for Inclusion or Modification(s)</i>
1. (Q55) In the last two weeks, did you ask someone in your family to have fruit or vegetables at home for breakfast? <sup>1</sup>	No modifications	N/A
2. (Q56) In the last two weeks, did you ask someone in your family to have fruit or vegetables at home for snacks? <sup>1</sup>	No modifications	N/A
3. (Q57) In the last two weeks, did you ask someone in your family to have fruit or vegetables at home for dinner? <sup>1</sup>	No modifications	N/A
4. (Q58) In the last two weeks, did you ask someone in your family to have fruit or vegetables when you went out to eat? <sup>1</sup>	No modifications	N/A
5. In the last two weeks, did you ask someone in your family to go with them shopping for fruits and vegetables? <sup>1</sup>	Not included in questionnaire	Not included to minimize survey burden and is similar to item #7.
6. In the last two weeks, did you ask someone in your family to go to a restaurant or fast food place because it serves fruit or vegetables? <sup>1</sup>	Not included in questionnaire	Not included to minimize survey burden and is similar to item #4.
7. (Q59) In the last two weeks, did you ask someone in your family to buy fruit or vegetables? <sup>1</sup>	No modifications	N/A
8. (Q60) In the last two weeks, did you ask someone in your family to have fruit or vegetables so you can reach them in your house? <sup>1</sup>	No modifications	N/A
9. In the last two weeks, did you write fruit or vegetables on the family grocery list? <sup>1</sup>	Not included in questionnaire	Some families do not utilize grocery lists.
Original answer options: yes/no/I don't have to ask Modified answer options: yes/no		
Original scale citation: Baranowski et al. (2000) <sup>1</sup>		

Table 7.8

*Demographics Scale Items and Modifications*

<i>Item &amp; Original Scale Citation</i>	<i>Inclusion Status and Modification(s)</i>	<i>Stage in Which Modification was Made &amp; Rationale for Inclusion or Modification(s)</i>
1. (Q61) How old are you? <sup>1</sup> a. 8 years old b. 9 years old c. 10 years old d. 11 years old e. 12 years old f. I am not any of these ages.	Answer options modified to fit study population	N/A
2. (Q62) Are you a boy or a girl? <sup>1</sup> a. Boy b. Girl	Original item: “What is your sex?” with answer options of male or female. Answer options modified to fit study population	<sup>d</sup> . Focus group revealed that this question caused distraction and confusion. Focus group discussion confirmed the options of “boy” and “girl.”
3. (Q63) In what grade are you? <sup>1</sup> a. 1 <sup>st</sup> grade b. 2 <sup>nd</sup> grade c. 3 <sup>rd</sup> grade d. 4 <sup>th</sup> grade e. 5 <sup>th</sup> grade f. 6 <sup>th</sup> grade g. 7 <sup>th</sup> grade	Answer options modified to fit study population	N/A
4. Are you Hispanic or Latino? <sup>1</sup> a. Yes b. No	Not included in questionnaire	<sup>c</sup> . Expert panel revealed potential confusion when a child selected “yes” as the next question does not have an option for Hispanic and Latino respondents. Item was merged with item #5.
5. (Q64) What is your race? (Select one or more responses.) <sup>1</sup> a. American Indian or Alaska Native b. Asian c. Black or African American d. Native Hawaiian or Other Pacific Islander e. White f. Hispanic g. Latino	Hispanic and Latino added to answer options.	<sup>c</sup> . To reduce confusion from item #4.

Original scale citation: CDC YRBS (2015) <sup>1</sup>  
Stage in which modification was made:  
<sup>a</sup>. Pilot study  
<sup>b</sup>. Initial item modification and improvement  
<sup>c</sup>. Expert panel review  
<sup>d</sup>. Focus group

## APPENDICES

APPENDIX A  
Recruitment Flyer

# Be involved with a Baylor research project!

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Participate in a child nutrition research study and be entered in a drawing for two Baylor University t-shirts!

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Dear parents and guardians,

Baylor University wants to know more about the food knowledge of children in Waco, but we need your permission first! During the week of \_\_\_\_\_, volunteers from Baylor University will be at the after-school program parent pick-up to collect parental consent forms so your child can participate in a short survey about food (15-30 minutes). The survey will be given at a later date during after-school program hours. Names and personal information about your child *will not* be collected. Signing the form to let your child take the survey enters you into the drawing for two t-shirts (one adults and one youth size)! A total of 34 pairs of t-shirts will be given away.

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**Please contact Jasmin Sumrall ([jasmin\\_sumrall@baylor.edu](mailto:jasmin_sumrall@baylor.edu))  
with any questions or concerns.**

## APPENDIX B

### Parental Consent Collection Training

Instructor: Jasmin Sumrall (PI)

Participants: undergraduate and graduate students

Materials: (1) clipboards (2) pens (3) copies of parental consent forms

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1. Introductions (~2 minutes)
2. Project introduction and purpose of parental consent collection (~5 minutes)
3. Expected conduct (~1 minute)
4. Schedule (~2 minutes)
  - a. Leave BU (~3:30pm)
  - b. Arrive at community center (3:45-4:00pm)
  - c. Introductions to staff (4:00-4:15pm)
  - d. Parents begin arriving and consent form collection begins (4:15-5:30pm)
  - e. Head back to campus (5:30pm)
5. Distribute copies of parental consent forms.
6. Instructions for approaching parents about child participation in the study (~7 minutes)
  - a. "Hi, how are you today? My name is..."
  - b. "Baylor University and the community centers in town are partnering to learn more about child health and nutrition in Waco..."
  - c. "We will be giving a brief survey to the children who attend the after-school program here in a couple days, and we are wondering if you are willing to let your child participate in the questionnaire? It will take them about 20 minutes to complete. For participating you both will be entered into a drawing to win two Baylor University t-shirts."
  - d. IF NO → "Okay, thank you for your time. If you change your mind, please let the community center staff know and they will put you in contact with us."
  - e. IF YES → "Great! Just a couple questions beforehand: How many children do you have that attend the after-school program? What are their ages?" [Be sure that all participants are 8-12 years old.]
  - f. "This form is to ensure you that your name and your child's name will not be connected to their questionnaire answers. They can also choose to not participate at any time during the process and there will be absolutely no

- g. penalty. We will enter your name into the drawing, and let the staff know if you win. Thank you so much! Do you have any questions I can answer?"
7. **IMPORTANT:** Please be sure that *all* items on the back page of the survey are filled. We will not be able to use any information or let their child take the questionnaire if these items are not filled. Be sure that you can read the name of the child. If you cannot, please clarify with the parent.
  8. Pair up and practice a few times! Find the phrasing that works for you and get comfortable with it. (~13 minutes)

If you have any issues, please feel free to ask me questions. Do not hesitate to ask for my input or help with collecting consent. Most parents are willing to let their child participate, so do not feel like you must *convince* them that this is a good idea. Be relaxed and comfortable! We are partners with the community center staff, so please engage them and use them as a resource (the parents trust and know them).

Thank you so much for volunteering!

## APPENDIX C

### Questionnaire Administration Protocol

1. Greet the participants. Ask them what activity they just came from, how they are doing today, and so on. Keep the environment light and friendly, not scientific and rigid.
  - “Welcome, everyone! Today we are going to complete a short questionnaire about food, but before we begin, we need to get your signature saying you are okay with taking a survey.”
2. Give each child an assent form. Read the assent form out loud, and then collect signatures from each child. If a child wishes to not sign the assent form and not participate in the study, thank them for their time, reassure them that there it okay they do not want to participate, and tell them that they can return to what they were doing previously.
3. As each child completes the form, check to make sure they received parent consent. If the child did not receive parental consent, thank them for their time and tell them that they can return to the activity they were doing previously. If the child received parental consent, enter the SES proxy response into the appropriate survey response box.
4. Once all children have signed the assent form and the SES proxy response has been entered, proceed with survey protocol.
  - “There are NO right or wrong answers for these questions, just your opinions and thoughts. This is not a test or a quiz, and no one will know how you individually answer.”
  - “This should take you about 20-30 minutes, and you can go back to your activity as soon as you are done. Make sure you answer every question. If you skip a question, it will not let you go forward until it is answered.”
  - “Please raise your hand if you need help or get stuck. When you are done with the survey, you may leave the room and go back to your activity. Thank you so much for helping us out! Okay, you may begin whenever you are ready.”
5. Watch to see when children finish the knowledge questions. Give them the FV handout for reference during the remaining sections of the survey.
6. Avoid reading the questions or answers for them **AS MUCH AS POSSIBLE**. It is easy to see that the closer an interviewer gets, the more it impacts the way the participant responds. If you have to, read one question and then step back from the computer. Do **NOT** hover over the participant. If you have to read to a participant, please make sure that exactly what you did is documented. When participants finish, quietly thank them and tell them that they can return to what they were doing previously.

C O M P U T E R   A D M I N I S T R A T I O N		
BEST PRACTICE	BEST ALTERNATIVE	UNACCEPTABLE
<ul style="list-style-type: none"> <li>Have all computers up on the Qualtrics site when the youth come in.</li> <li>Have room set up to preserve confidentiality</li> <li>Have an outlet for those who are done (excused to another supervised area).</li> <li>Remain in close proximity to address questions</li> </ul>	<ul style="list-style-type: none"> <li>Write the email link on the board and have them link themselves.</li> <li>Have all youth wait to leave until all are finished (may call attention to slow readers or lower comprehension).</li> <li>Using alternatives words or rephrasing to aide comprehension.</li> </ul>	<ul style="list-style-type: none"> <li>Allowing youth to discuss answers with one another or see each other's responses during the administration.</li> <li>Watching a youth take the survey and viewing their responses.</li> <li>Reading or looking at responses without permission.</li> <li>Excessive changing of words or meaning to assist youth</li> <li>Staff unavailable for questions during survey process</li> </ul>



## APPENDIX D

### Expert Panel Review Feedback Packet

Dear Food For Thought survey reviewer,

You have been named an expert in the area of child nutrition, education, or public health research. For that reason, you have been chosen to help validate the items on the Food For Thought survey. Thank you for being willing to participate! I appreciate your assistance in deciding whether each item on the survey measures what it is intended to measure. Please begin by familiarizing yourself with each construct category and conceptual definitions below.

Construct	Conceptual Definition
<b>Consumption</b> (Behavior)	Types and amounts of fruits and vegetables that were consumed on the previous day.
<b>Self-efficacy</b>	Child's beliefs in their capability to exercise control over. Confidence in one's ability to participate in a behavior (Glanz, 2008) (e.g. eating, preparing, and asking for fruits and vegetables).
<b>Knowledge</b> (Behavioral capability)	Possessing sufficient knowledge of nutritional skills to make healthy choices concerning meal/snack-time consumption.
<b>Perceived Adult Support</b> (Environment; Observational learning)	Learning through observed experience of others can occurs through reinforcement and modeling (Bruce-Simmons Morton, McLeroy, & Wendel, 2011). Does a child witness the adults in their life eating fruits and vegetables?
<b>Encouragement and Socialization</b> (Environment)	Positive reinforcement is a consequence of a person's behavior that increase the frequency or likelihood that the behavior will occur again (Bruce-Simmons Morton, McLeroy, & Wendel, 2011). Do the adults in the child's life reinforce that fruit and vegetables are healthy and taste good?
<b>Accessibility</b> (Environment)	Accessibility describes whether a food item is available in a form, location, and time facilitating consumption (Terry-McElrath, O'Malley, & Johnston, 2014).
<b>Outcome Expectations</b>	Outcome expectations refer to beliefs about the likelihood and value of the consequences of behavioral choices (Glanz, 2008). Outcome expectations can be health-related or not health-related. Does the child believe that eating fruits and vegetables will bring positive outcomes?
<b>Asking Behaviors</b> (Behavior)	Behavior is not just an outcome of interest, but it is also an input. Children learn from the consequences of their behavior (Bruce-Simmons Morton, McLeroy, & Wendel, 2011). Thus, behavior can change environment. Is the child asking the people in their family to have fruit and vegetables available for snacks and meals?



Now that you are familiar with the constructs we wish to capture with the Food For Thought survey, we would like to get your feedback about the content and format of the survey.

The PDF version of the survey (attached to the email) contains the construct labels for each section of the survey. Please use this document to answer questions regarding the

*constructs*. The actual survey that the children will take can be found at this link: [https://baylor.qualtrics.com/SE/?SID=SV\\_1Bs3NRhqb7j4dpj](https://baylor.qualtrics.com/SE/?SID=SV_1Bs3NRhqb7j4dpj) Please use this version of the survey to answer questions regarding the *format* and *aesthetic appearance* of the survey.

The questions to guide your review are listed below. Please respond beneath each question. We would like to gather any and all feedback— so don't hold back. ☺ When you have completed the review, please save the document and email it to me ([jasmin\\_sumrall@baylor.edu](mailto:jasmin_sumrall@baylor.edu)). Do not hesitate to email me with any questions. Thank you, again!

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#### Target audience

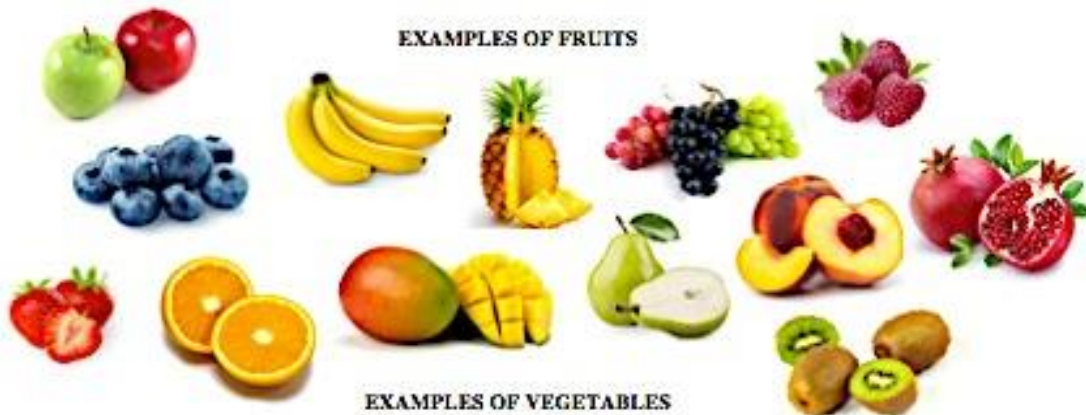
- Children aged 8-12 years old in Waco, Texas
- Majority African-American and Hispanic
- Possibly low-socioeconomic status

#### Questions

1. Do examples of fruits and vegetables need to be provided? If so, where?
2. Please read over survey protocol (page 3). Do you have any suggestions for additions or edits to the protocol?
3. Is the survey title appropriate (Food For Thought)?
4. Do the questions represent each construct completely and appropriately? If they don't please provide a description of why and what you think is missing.
5. Are the questions clearly worded and unambiguous?
6. Are the questions appropriate for the target audience (e.g. age, reading level, cultural sensitivity, etc.)?
7. Are the response options adequate for each question?
8. Please list *any* comments you have about the questions— are there any you would add, delete, or reword?
9. Is the order of the questions appropriate?
10. Additional comments or concerns?

## APPENDIX E

### Handout of Examples of Fruits and Vegetables



Starchy vegetables: potatoes, corn, and peas



Orange vegetables: carrots, squash, and sweet potatoes



Green vegetables: lettuce, spinach, green beans, broccoli, turnip greens and other greens



Other vegetables: peppers, tomatoes, zucchini, asparagus, cabbage, cauliflower, cucumbers, mushrooms, eggplant, celery, artichokes, avocados, or tomatillos



## APPENDIX F

### Focus Group Discussion Guide

Moderators & note takers: Jasmin Sumrall (PI) and Jacob Creighton

Participants: 5-10 children with parental consent

Materials: (1) Paper copies of the survey (2) Pictures of “juice” (3) Examples of FV  
(4) Crayons

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#### Phase I – Focus Group (part 1)

- ❖ Introduce yourselves. Make the kids feel comfortable and explain how the focus group will work. Ask them how they are, names, ages, grades, etc.
- ❖ Pass out assent forms, read through them, have the kids sign them.
- ❖ Discuss first three questions.

#### Phase II – Participants take the computer-based survey

- ❖ Follow guidelines from Interviewer Protocol.
- ❖ Ask children to remain seated and wait for everyone to complete the survey.

#### Phase III – Focus Group (part 2)

- ❖ When everyone has completed the survey, ask children to join a round table for group discussion.
- ❖ Pass out paper copies of the survey.
- ❖ Begin focus group discussion.
- ❖ When the focus group has ended, thank the participants and allow them to go back to their activities. Collect their t-shirt sizes, and let them know that they will receive a Baylor t-shirt in a few days.

#### Focus group questions:

1. Let's brainstorm a bit. Please name some fruits.
2. Please name some vegetables.
3. [1<sup>st</sup> juice handout] When you drink juice to eat more fruit, what kind of juice do you drink? Please circle all that you would choose.  
[2<sup>nd</sup> juice handout] Please circle all of the pictures that you think are 100% fruit juice.
4. What does “raw vegetables” mean to you?
5. Did you find the survey easy or difficult?
  - a. Probe: What was easy or difficult about it?
  - b. Probe: Were there any words that were difficult to read or understand?
6. Were there any parts of the survey that you did not understand?
7. Did you think the survey was too long or too short?
8. Please look at the questions on page \_\_ (self-efficacy). What do you think these questions are asking?
9. Please look at the questions on page \_\_ (knowledge). Are there any food items listed that you do not know what they are?
10. Is there anything else you would like to tell us about the survey?

## APPENDIX G

### Juice Activity Handout



## APPENDIX H

### Food For Thought Questionnaire

#### KNOWLEDGE

Directions: These questions are about fruits and vegetables. Please choose the best answer for each of the following questions.

1. Fruits and vegetables have lots of
  - ☐ a. Fat
  - ☐ b. Protein
  - ☐ c. Cholesterol
  - ☐ d. Vitamins
  - ☐ e. Calories
2. How many servings of fruits and vegetables do you think a person should eat each day for good health?
  - ☐ a. 1
  - ☐ b. 2
  - ☐ c. 3
  - ☐ d. 5
  - ☐ e. 7
3. Who needs to eat plenty of fruits and vegetables?
  - ☐ a. Children
  - ☐ b. Adults
  - ☐ c. Teenagers
  - ☐ d. Grandparents
  - ☐ e. All of the above
4. Let's say you are about to eat breakfast. You have dry cereal with milk, toast with butter, and apple juice. Which of these foods could you add if you are trying to eat more fruits and vegetables?
  - ☐ a. Orange Kool-aid
  - ☐ b. Apple butter on toast
  - ☐ c. Sliced banana on cereal
  - ☐ d. Blueberry donut
  - ☐ e. Strawberry pop-tart

5. Let's say you are about to eat dinner (the evening meal). You have fried chicken, corn, roll with butter, and milk. Which of these foods could you add if you are trying to eat more fruits and vegetables?
- ☐ a. Potato chips
  - ☐ b. Macaroni and cheese
  - ☐ c. Rice
  - ☐ d. Peach pie
  - ☐ e. Broccoli
6. Let's say you set a goal to eat grapes as a snack after school. When you got home from school, all the grapes were gone. If you are trying to eat more fruits and vegetables, what could you have done instead?
- ☐ a. Eaten a fruit roll-up
  - ☐ b. Eaten an apple
  - ☐ c. Eaten a peanut butter and strawberry jelly sandwich
  - ☐ d. Eaten some corn chips
  - ☐ e. Drank grape Hi-C
7. Let's say your family is going on a picnic. You are trying to eat more fruits and vegetables so you could:
- ☐ a. Make sure the potato chips get packed.
  - ☐ b. Offer to pack some oranges and bananas.
  - ☐ c. Offer to pack the grape jelly.
  - ☐ d. Offer to pack the orange sodas.
  - ☐ e. Make sure the apple pie gets packed.

8. Pretend your family is going out to eat dinner (the evening meal) at a fast food place. You order a hamburger, fries and a milkshake. How could you add another serving of fruit and vegetables to your meal?
- ☐ a. Order a cherry pie for dessert.
  - ☐ b. Make sure you ordered a strawberry milkshake instead of a chocolate one.
  - ☐ c. Order a slice of pickle on your burger.
  - ☐ d. Order orange juice to drink.
  - ☐ e. Eat ketchup on your fries.

### CONSUMPTION

Directions: These questions are about the fruits and vegetables you eat. There are no right or wrong answers. Please choose one answer to each question.

9. Yesterday, did you eat fruit? Fruits are all fresh, frozen, canned, or dried fruits. Do not count fruit juice.
- ☐ No, I didn't eat any fruit yesterday.
  - ☐ Yes, I ate fruit 1 time yesterday.
  - ☐ Yes, I ate fruit 2 times yesterday.
  - ☐ Yes, I ate fruit 3 times yesterday.
  - ☐ Yes, I ate fruit 4 times yesterday.
  - ☐ Yes, I ate fruit 5 or more times yesterday.
10. Yesterday, did you eat any starchy vegetables like potatoes, corn, or peas? Do not count French fries or chips.
- ☐ No, I didn't eat any of the foods listed above yesterday.
  - ☐ Yes, I ate one of these foods 1 time yesterday.
  - ☐ Yes, I ate one of these foods 2 times yesterday.
  - ☐ Yes, I ate one of these foods 3 or more times yesterday.
11. Yesterday, did you eat any orange vegetables like carrots, squash, or sweet potatoes?
- ☐ No, I didn't eat any orange vegetables yesterday.
  - ☐ Yes, I ate orange vegetables 1 time yesterday.
  - ☐ Yes, I ate orange vegetables 2 times yesterday.
  - ☐ Yes, I ate orange vegetables 3 times yesterday.
  - ☐ Yes, I ate orange vegetables 4 times yesterday.
  - ☐ Yes, I ate orange vegetables 5 or more times yesterday.



12. Yesterday, did you eat a salad made with lettuce, or any green vegetables like spinach, green beans, broccoli, turnip greens, or other greens?

- ☐ No, I didn't eat any salad or green vegetables yesterday.
- ☐ Yes, I ate salad or green vegetables 1 time yesterday.
- ☐ Yes, I ate salad or green vegetables 2 times yesterday.
- ☐ Yes, I ate salad or green vegetables 3 times yesterday.
- ☐ Yes, I ate salad or green vegetables 4 times yesterday.
- ☐ Yes, I ate salad or green vegetables 5 or more times yesterday.

13. Yesterday, did you eat any other vegetables like peppers, tomatoes, zucchini, asparagus, cabbage, cauliflower, cucumbers, mushrooms, eggplant, celery, artichokes, avocados, or tomatillos?

- ☐ No, I didn't eat any of the foods listed above yesterday.
- ☐ Yes, I ate one of these foods 1 time yesterday.
- ☐ Yes, I ate one of these foods 2 times yesterday.
- ☐ Yes, I ate one of these foods 3 times yesterday.
- ☐ Yes, I ate one of these foods 4 times yesterday.
- ☐ Yes, I ate one of these foods 5 or more times yesterday.

#### SELF-EFFICACY


Directions: These questions are about how you eat fruits and vegetables. There are no right or wrong answers, just what you think you can do.



	not sure	somewhat sure	very sure
14. For breakfast, I'm sure I can add fruit to my cereal.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
15. For lunch at school, I'm sure I can eat a vegetable that's served.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
16. For lunch at school, I'm sure I can eat a fruit that's served.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
17. For lunch at home, I'm sure I can eat carrot or celery sticks instead of chips.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
18. For lunch at home, I'm sure I can eat my favorite fruit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
19. For a snack, I'm sure I can choose my favorite fruit instead of my favorite cookie or candy bar.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
20. For a snack, I'm sure I can choose my favorite vegetable instead of my favorite cookie or candy bar.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
21. For a snack, I'm sure I can choose my favorite vegetable with dip instead of chips.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
22. For dinner, I'm sure I can eat a vegetable that's served.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
23. For dinner, I'm sure I can eat my favorite fruit as my dessert.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
24. I am sure I can prepare my favorite fruit or vegetable to eat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	not sure	somewhat sure	very sure
25. I am sure I can make my own dinner (the evening meal) that includes a fruit when someone else doesn't have time to cook.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
26. I am sure I can make my own dinner (the evening meal) that includes a vegetable when someone else doesn't have time to cook.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
27. I am sure I can ask someone in my family to buy my favorite fruit or vegetable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
28. I am sure I can ask someone in my family to make my favorite vegetable dish for dinner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	not sure	somewhat sure	very sure
29. I am sure I can ask someone in my family to have fruit and vegetables where I can reach them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### PERCEIVED ADULT SUPPORT

Directions: The questions in this part ask how often the adults in your life eat fruit and vegetables. Please choose one answer to each question.

	almost never	sometimes	almost every day or every day
30. How often do the adults in your life eat fruit?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>





	almost never	sometimes	almost every day or every day
31. How often do the adults in your life eat vegetables?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### ENCOURAGEMENT-SOCIALIZATION

Directions: The questions in this part ask what the adults in your life tell you about eating fruit and vegetables. Please choose one answer to each question.

	Never	Sometimes	almost every day or every day
32. Do the adults in your life tell you that vegetables are good for you?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	Never	Sometimes	almost every day or every day
33. Do the adults in your life tell you that vegetables are healthy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Never	Sometimes	almost every day or every day
34. Do the adults in your life tell you that vegetables taste good?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Never	Sometimes	almost every day or every day
35. Do the adults in your life tell you to eat vegetables every day?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Never	Sometimes	almost every day or every day
36. Do the adults in your life tell you that fruit is good for you?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	Never	Sometimes	almost every day or every day
37. Do the adults in your life tell you that fruit is healthy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Never	Sometimes	almost every day or every day
38. Do the adults in your life tell you that fruit tastes good?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Never	Sometimes	almost every day or every day
39. Do the adults in your life tell you to eat fruit every day?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### ACCESSIBILITY

Directions: The questions in this part ask why you may or may not eat fruits and vegetables. Please fill in one answer for each question.

	Almost never	sometimes	always
40. At your home, do you have fruit to eat?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Almost never	sometimes	always
41. At you home, do you have vegetables to eat?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	Almost never	sometimes	always
42. In the past week, was there fruit or vegetables on the kitchen counter or somewhere in the open?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Almost never	sometimes	always
43. In the past week, was there fruit or cut up fresh vegetables in the refrigerator as a snack?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### OUTCOME EXPECTATIONS

Directions: We want to know what you think will happen if you eat fruit and vegetables every day. There are no right or wrong answers, just your opinion. Please choose the response that best describes how much you agree or disagree with each of the below sentences.

	disagree	not sure	agree
44. Eating fruits and vegetables every day will make me strong.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45. I will be better at sports if I eat fruits and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
46. I will get sick more often if I don't eat fruit and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
47. Eating fruits and vegetables will help me grow.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
48. I will have healthier skin if I eat fruits and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
49. If I eat fruits and vegetables, my family will be proud of me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
50. Eating fruits and vegetables will help me see better.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
51. If I eat fruits and vegetables at breakfast, I will be able to think better in class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
52. Eating fruits and vegetables will keep me from getting cavities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
53. If I eat fruits and vegetables I won't get fat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
54. If I eat fruits and vegetables every day my friends will make fun of me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



### ASKING BEHAVIORS

Directions: We are interested in what you have asked members of your family, for example your mom, dad, or guardian, about having fruit and vegetables. We are only interested in what you asked them to do in the last 2 weeks, even if they didn't do it. There are no right or wrong answers, just what you did.



	No	Yes
55. In the last two weeks, did you ask someone in your family to have fruit and vegetables at home for breakfast?	<input type="radio"/>	<input type="radio"/>

	No	Yes
56. In the last two weeks, did you ask someone in your family to have fruit or vegetables at home for snacks?	<input type="radio"/>	<input type="radio"/>

	No	Yes
57. In the last two weeks, did you ask someone in your family to have fruit or vegetables at home for dinner?	<input type="radio"/>	<input type="radio"/>

	No	Yes
58. In the last two weeks, did you ask someone in your family to have fruit or vegetables when you went out to eat?	<input type="radio"/>	<input type="radio"/>

	No	Yes
59. In the last two weeks, did you ask someone in your family to buy fruit or vegetables?	<input type="radio"/>	<input type="radio"/>

	No	Yes
60. In the last two weeks, did you ask someone in your family to have fruit or vegetables so you can reach them in your house?	<input type="radio"/>	<input type="radio"/>

## DEMOGRAPHICS

61. How old are you?

- ☐ 8 years old
- ☐ 9 years old
- ☐ 10 years old
- ☐ 11 years old
- ☐ 12 years old
- ☐ I am not any of these ages.

62. Are you a boy or a girl?

- ☐ Boy
- ☐ Girl

63. In what grade are you?

- ☐ 1st grade
- ☐ 2nd grade
- ☐ 3rd grade
- ☐ 4th grade
- ☐ 5th grade
- ☐ 6th grade
- ☐ 7th grade

64. What is your race? (Select one or more responses.)

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Hispanic
- ☐ Latino



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