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Preschool Children's Perceptions of Fruit and Vegetable Messages and Their Relationship to Parenting Practices, and Child Knowledge, Preference, and Consumption

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PRESCHOOL CHILDREN'S PERCEPTIONS OF FRUIT AND VEGETABLE MESSAGES AND THEIR RELATIONSHIP TO PARENTING PRACTICES, AND CHILD KNOWLEDGE, PREFERENCE, AND CONSUMPTION

by

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(Under the Direction of Moya Alfonso)

ABSTRACT

Studies involving school aged children (>5 years of age) have reported that positive and negative outcome messages influence a child's fruit and vegetable (F&V) consumption. Positive outcome messages have the most significant mediating effect. However, there is a deficiency of studies involving children <5 years of age. The purpose of this study was to gain insight into the perceptions preschool aged children (4 years old) have about F&V messages and how these perceptions relate to F&V knowledge, preference, and consumption. Methods: Parents (n =175) were surveyed about their nutrition behavior, parenting practices and the home food environment. Children's (n = 201) school lunch-time F&V consumption was recorded over five days. Children (n=195) were individually interviewed about their knowledge, preference, and perceptions of F&Vs. Child perceived messages were operationalized into Social Cognitive Theory (SCT) constructs to assist in behavior explanation. Pearson's correlations were used to determine variable relationships and an independent samples t-test was done to determine gender and socioeconomic status (SES) group differences. Results: Preschool children conveyed positive outcome expectancies (POE), negative outcome expectancies (NOE), and prompts most frequently when describing F&Vs. Knowledge was positively correlated to prompts, POE and NOE. Child preference (likes) was negatively correlated to NOE. Dislikes were positively

correlated to NOE. Differences between income levels were observed. Discussion: This study provides information about the food environment from the perspective of both parent and child. Providing appropriate messages early in the developmental years of a child's life can play dividends for positive future health outcomes.

INDEX WORDS: Preschool, Fruit and vegetable messages, Social Cognitive Theory (SCT), Outcome expectations/expectancies, Positive reinforcement, Negative Reinforcement, Consumption, Knowledge, Preference, Parenting practices.

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DEDICATION

This dissertation is dedicated to my wife and daughter. Their love and support have made my work better, my life better, and me a better person.

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CHAPTER 1

BACKGROUND AND SIGNIFICANCE

Introduction

The number of overweight and obese children has increased over the past 30 years and continues to grow, with more than 43 million children under the age of five classified as obese worldwide (World Health Organization, 2011). Obesity is a problem among both rich and poor nations and is related to more deaths than underweight (WHO, 2011). Children who are overweight and obese are more likely to be so in adulthood, potentially adding to the already staggering costs related to adult obesity (Summerbell et al., 2005). Eighty percent of the children who were obese from ages 10-15 were obese at age 25 (Centers for Disease Control and Prevention, n.d). In the United States, the prevalence of obesity among all ages and races is approximately 32% of the population (CDC, 2008). Obesity added $78.5 billion or 9.1% to healthcare costs in 1998, with approximately an additional $50 billion of indirect costs associated to lost productivity (Finkelstein, Fiebelkorn, & Wang, 2003). In 2003, it was estimated obesity accounted for 300,000 deaths annually relating to chronic diseases such as diabetes, stroke, and heart disease (CDC, 2008). The precursors of these obesity related diseases, hypertension, atherosclerosis, and blood lipid and insulin disorders, begin in childhood (Cole, Bellizzi, Flegal, & Dietz, 2000).

Body mass index (BMI) is a standard method used to assess overweight or obesity status in adults and children. It is non-invasive, and only requires height and weight for calculations. BMI cannot be used to measure the actual amount of fat in a human. Hence, muscular individuals may be assessed a false positive for overweight or obesity. Since children have such variability in height and weight from year to year, children are categorized based on sex and age.

A child is only compared to children of the same age and sex when assessed with a BMI percentile chart. Children between the ages of 2 and 19 are considered overweight (at risk for obesity) if their body mass index is in the 85th to 95th percentile range when compared to children in their same sex and age group. Exceeding the 95th percentile categorizes a child as obese (Barlow & Dietz, 1998; Cole, Waldrop, D'Auria, & Garner, 2006; Krebs et al., 2007; Ogden, Carroll, Curtin, Lamb, & Flegal, 2010).

The prevalence of obesity from 1976 to 2008 for all races among preschool-aged children, aged 2–5 years, increased from 5.0% to 10.4%. However, this 2008 prevalence rate represents a decline from the 2003-2004 rate (i.e., 13.9%). Obesity prevalence rates from 1976-2008 increased from 6.5% to 19.6% for children of school age, 6-11 years. In the adolescent age group, 12-19 years, the increase was from 5% to 18.1% (Ogden et al., 2010). When children who are overweight (at risk for obesity) are included in the percentages, the prevalence rates for 2003-2004 increase to 26.2% for children aged 2-5, 37.2% aged 6-11, and 34.3% aged 12-19 (Ogden et al., 2006). Lower-income, preschool-aged children bear a heavier burden of obesity as prevalence rates have increased from 12.4% in 1998 to 14.5% in 2003. Rates have remained stable since, with a prevalence of 14.6% in 2008 (CDC, 2010).

Diet influences the trend toward or away from obesity. Diets high in fruit and vegetables are associated with a lower risk of obesity, diabetes, cancer, and cardiovascular disease (CDC, 2008; Do et al., 2011). However, most Americans do not eat the recommended five servings of fruits and vegetables each day (USDA, 2007). During the time span 2000-2009, the percentage of the nationwide population aged 18-65 who ate fruit two or more times a day dropped to 32.5% from 34.4%. The change for vegetables was 26.7% to 26.3% (CDC, 2010). The United States Department of Agriculture (USDA), (2007) reported that in the 2-5 year old population, boys

consumed an average of 2.3 servings of vegetables and girls 2.1 servings. Overall for the 2-5 year old age group, 35% of boys and 36% of girls consumed less than one serving of vegetables, 31% of boys and 27% of girls consumed the minimum three servings, and 31% of boys and 27% of girls consumed servings recommended based on caloric needs. Fruit servings consumed by the 2-5 year old age group were 2.6 servings for boys and 2.2 servings for girls. Also in the 2-5 year old age group, 33% of boys and 36% of girls consumed less than one serving, 48% of boys and 42% of girls consumed the recommend two servings and 48% of boys and 42% of girls consumed servings recommended based on caloric needs. The data for this Pyramid Servings Intake report were collected from 1999-2002 and based on one day recalls (USDA, 2007).

In an independent study (Guenther, Dodd, Reedy, & Krebs-Smith, 2006), only 40% of the population met the five a day recommendation. Additionally, 48% of children aged 2-3, consumed four or more servings of fruits and vegetables, and only 27% consumed five or more. Thirty-three percent of children aged 4-8 consumed four or more servings and only 14% consumed five or more (Guenther et al., 2006). Notably, fruit juice was counted as a fruit serving. The USDA (2010) considers 100% fruit juice a suitable component of a healthy diet; however, they recommend that most servings of fruit come from consuming the fresh whole version of fruit. Frozen, canned, or dried fruit are also recommend over juice as all still contain dietary fiber that juice does not (USDA, 2010). In another study specific to preschoolers, 80% of children consumed the recommended fruit intake. However, fruit juice accounted for 54% of the fruit servings leaving approximately 26% of children actually eating a piece of fruit. Only 25% of children met the vegetable intake recommendations (Dennison, Rockwell, & Baker 1998). Statistics for fruit and vegetable intake were not found for pre-school children in Georgia. In addition, there is no statement or set of objectives in Georgia's Nutrition and

Physical Activity Report specifically targeting preschools and elementary schools (Georgia Department of Human Resources, Division of Public Health, 2005).

Research and interventions addressing the obesity crisis have been predominantly targeted at school aged children (Anzman, Rollins, & Birch, 2010; Birch & Ventura, 2009) accounting for approximately 80% of the research (Contento, Randell, & Basch, 2002). In a review of obesity intervention research, Bluford, Sherry, and Scanlon (2007) found only four evaluated interventions specifically targeting obesity in children under age 5 that were effective in reducing obesity at these ages. This early developmental age of children has been widely documented as a critical time to help children start healthy behaviors (Nicklas, Baranowski, Baranowski, Cullen, & et al., 2001). Younger children can be guided onto a healthier path before the complexities of life impede the process (Anzman et al., 2010). Parents of young children (Anzman et al., 2010; Birch & Ventura 2009; Haire-Joshu et al., 2008; O'Connor, Hughes, et al., 2010) and childcare centers are ideal targets for interventions and are yet to be fully engaged (Kaphingst & Story, 2009). Low socioeconomic status (SES) families participating in Head Start programs are the one population with children under age 5 who have been well researched. More research is needed that involves all populations of all SES levels, incorporates a longitudinal component, and has a sound experimental design (O'Connor, Hughes, et al., 2010). Additionally, using a design that allows participants input into the study strengthens the context of the research. O'Conner, Hughes, et al. (2010) reported that their study was unique in utilizing an "emic approach" to develop parenting practices assessments. The emic approach studies groups from within, enabling participants to explain phenomena from their own point of view.

Statement of the Problem

The obesity prevalence in young children is at a historical high (WHO, 2011). Children's behaviors that lead to obesity need to be addressed earlier before their taste preferences are dominated by caloric dense foods high in fat, salt, and sugar (Nicklas et al., 2001). Research and interventions are lacking for preschool aged children and their parents (Anzman et al., 2010) with the exception of Head Start programs (O'Conner, Hughes, et al., 2010). In general, working with preschool aged children is a missed opportunity since 20% of children are already at risk by school age, 6-11 years old (Birch & Ventura, 2009).

There is a need for interventions that are simple, quick, effective, and sustainable by parents. The easiest intervention is to make fruits and vegetables readily available in a child's environment since exposure is a key determinant to consumption (Cerin, Barnett, & Baranowski, 2009; Dwyer, Needham, Simpson, & Heeney, 2008; Krolner et al., 2011; Pérez-Escamilla, Hromi-Fiedler, Vega-López, Bermúdez-Millán, & Segura-Pérez, 2008; Phometsi, Kruger, & Van't Riet, 2006; Rasmussen et al., 2006). However, making fresh fruits and vegetables consistently available at home can be a challenge for low SES families (Thomas, 2006; O'Connor, Hughes, et al., 2010). Interventions need a more universal approach if all SES groups are expected to implement an intervention. Ensuring all SES groups are on a level playing field would allow for the intervention effects to be more readily measureable since there is an established common denominator (Thomas, 2006). Alternately, many parenting practices used for feeding children have been identified by low SES parents; however, interventions serving a broader range of SES groups may require additional qualitative input from participating parents (O'Conner, Hughes, et al., 2010). Parents are the main role model and provider for the child's fruit and vegetable consumption (Cerin, et al., 2009; Dwyer et al., 2008). However, as children

get older and move into childcare programs and preschool, the parent is in less control of the child's environment. If modeling is not always possible, parents need to provide positive messages about fruits and vegetables. Care must be taken with the type of communication as persistent prompting such as "Finish your vegetables, please," can actually have a negative effect on consumption (Galloway, Fiorito, Francis, & Birch, 2006). In contrast, specific prompts that involve a choice (Schwartz, 2007), positive outcome messages (Reynolds, Yaroch, Franklin & Maloy et al., 2002), and negative outcomes messages have shown promise with children, 5-11 years of age, (Bannon & Schwartz, 2006).

Purpose of the Study

Children receive and process a variety of messages pertaining to why they should eat fruits and vegetables. Studies (Bannon & Schwartz, 2006; Reynolds et al., 2002; Reynolds et al., 2004) that have assessed the influence of positive or negative outcome messages have reported an increase in fruit and vegetable consumption. Reynolds et al. (2002) reported a strong mediational effect of positive outcome expectancies on 4th grade student's consumption of fruit and vegetables. Based on a review of the literature for this study, preschool aged children (i.e., 4 years old) have yet to be assessed on what messages they report hearing and remembering. Using Social Cognitive Theory (SCT) as the theoretical framework, the purpose of this study was to gain insight into preschool children's perceptions of fruit and vegetable messages. In addition, the relationship (if any) between child perceived messages and fruit and vegetable consumption, knowledge and preference was explored.

Research Design

This was a cross-sectional study with concurrent transformative strategy (Creswell, 2009). Qualitative and quantitative data were collected for the purpose of supplementing each

other in an effort to answer specific research questions. In this study, qualitative data collected from children were transformed into quantitative data so parent and child responses could be more easily compared and triangulated (Creswell, 2009) for concordance.

Significance of the Study

Research (Skinner et al., 1998) involving preschool children aged 4-5 has studied the concordance of food preferences between family members. Results demonstrated weak, but significant correlations. However, correlations have been shown both with related family members within the home environment and with non-family members in the social context. Children aged 4-5 have also been asked to provide information on how they categorize food based on likes and dislikes (Zeinstra, Koelen, Kok, & de Graaf, 2007). The children used texture, taste, and appearance for categorization. As children matured into the 6-11 year old age groups, more complex categorizations were used such as bitter or sweet. Matheson, Spranger, and Saxe (2002) used play to determine children's perceptions of their food environment. Kitchen play sets and other toys aided the children to classify foods and re-create what happens at meal time. Messages parents conveyed to children were elicited through the play activities, however, none of these messages were categorized or framed into theory, compared to parent self-reported messages, or child consumption. Additionally, children's responses covered the whole food experience as the study was not designed to determine what relates to healthy eating. In contrast, the current study focused on children's perception of fruit and vegetable messages given by parents and explored how they related to actual fruit and vegetable consumption. Similar to methodology in Matheson et al (2002), the use of picture cards and open-ended questions directed the children through imaginary play to reveal recollections of parent's messages about fruit and vegetable consumption. However, this study shortened the interview

time, compared to Matheson et al (2002), to provide the ability to interview a larger number of children.

This dissertation utilized Social Cognitive Theory (SCT) to provide a framework to explain behavior. SCT contains multiple constructs that support the notion that communication of the desired behavior is important in learning healthy behavior (Bandura, 1977; Baranowski, Perry, & Parcel, 2002). Specific components related to communication include a person's perception of the environment, known as situation (interpretation of messages), outcome expectancies (value placed on the outcome message) and reinforcement (praise and reward messages). Reynolds et al. (2002) reported that communication was an area in need of further exploration. This dissertation examined the deficit in literature pertaining to communication by examining fruit and vegetable messages given by parents and perceived by children. Additionally, how these messages related to fruit and vegetable consumption was assessed.

CHAPTER 2

LITERATURE REVIEW

The purpose of this study is to gain insight into preschool aged children's (i.e., 4 year olds) perceptions of fruit and vegetable messages given by their parents, or primary caregiver if parents are not present. To address this purpose adequately a number of different types of studies were reviewed. In general, nutrition interventions address many factors that influence a person's decision to eat healthy. Preschool aged children are influenced predominantly by their parent's actions, childcare environment, and limited by their developmental level. This section will review literature that addresses factors, such as mediators, determinants, and intervention design associated with an intervention's success. Additionally, research specifically involving preschool children, their development and food preferences, along with parenting practices related to children's eating will be covered. Finally, an overview of Social Cognitive Theory (SCT) will give insight into the factors (constructs) important to address when assessing individuals, or in this study, preschool children.

Mediators and Determinants of Fruit and Vegetable Consumption

Nutritional choices are influenced by multiple individual and environmental factors that can act as barriers or mediators to good nutrition. A rigorous analysis of mediation by Reynolds et al. (2002), that enlisted 4th graders and parents as participants, required four conclusions to be satisfied. The intervention had to cause the outcome; the intervention had to cause the potential mediator; when controlling for intervention effects, the mediator caused the outcome; and finally, statistical significance was necessary from the effect of the mediator. These conclusions were worded specifically for the study but were developed from the conclusions formulated by Baron and Kenny (1986). Only positive outcome expectancies (e.g. eating vegetables will make

you stronger and healthier) satisfied all four of these requirements. Knowledge, self-efficacy, and parent consumption, also were strong potential mediators, but were not statistically significant and therefore not true mediators (Reynolds et al., 2002).

Mediation from positive outcome expectancies has been demonstrated in research involving obesity, cancer, and fruit and vegetable consumption (Baranowski et al., 2000; Reynolds et al., 2002). Additionally, knowledge, self-efficacy, parent consumption, food preference, socio-economic status, parental behaviors (modeling), availability/accessibility (exposure) of foods, media, peers, policies, and the built environment have been cited as mediators or determinants of fruit and vegetable consumption (Cerin et al., 2009; Dwyer et al., 2008; Krolner et al., 2011; Pérez-Escamilla, et al., 2008; Phometsi et al., 2006; Rasmussen et al., 2006). Age may play a role in what determinants are most significant. Parent modeling, particularly maternal fruit and vegetable consumption, has been shown to be a strong determinant of preschool children's fruit and vegetable intake (Haire-Joshu et al., 2008; O'Connor, Hughes, et al., 2010).

Despite this large scope of influential mediators/determinants, 90% of interventions targeting school children focused solely on knowledge (Contento et al., 2002). Interventions would benefit from multiple mediators being utilized (Thomas, 2006). Communication is one example of a mediator that needs to be researched further (Reynolds et al., 2002). Verbal prompts and cues have shown promise in pilot studies with elementary age school children (Schwartz, 2007).

Intervention Design Considerations

Health interventions have been affected by shortcomings related to methodology, program design and implementation (Birch & Ventura, 2009; Thomas, 2006). Failure to report

recruitment protocol (selection bias) and study limitations related to small sample sizes make it difficult to determine whether some studies have the power to detect small effect sizes between groups. Randomizing groups at the school level then failing to use cluster analysis or analyzing by individual student have made interventions vulnerable to confounders due to school differences (Summerbell, et al., 2005; Thomas, 2006). Other errors include failing to analyze data based on gender (male or female) and failing to control for variables such as culture and SES. Failing to account for SES in the intervention may put stress upon low SES families unable to provide healthy food due to costs or time. It is therefore ideal to do qualitative data collection working with each group to help better tailor the intervention for all groups (Thomas, 2006). Additionally, failing to utilize theory for guidance makes it difficult to know where an intervention failed (Summerbell et al., 2005). At a minimum, interventions should utilize a theoretical framework (Bluford et al., 2007) accounting for economics and socio-cultural environment spanning macro to micro level factors (Thomas, 2006).

Inconsistencies with the delivery and overall exposure dose of an intervention affect outcomes. The extent of parent involvement varies substantially between studies giving no clear consensus on the ideal dose (intensity, duration, and type of involvement) of an intervention necessary to affect change (Thomas, 2006). Parent involvement needs to be assessed further in interventions specific to obesity prevention (Bluford et al., 2007). Additionally, who delivers the intervention will have an impact on the quality. Those with expertise in nutrition will likely give better delivery than teachers trained to give the same intervention (Thomas, 2006). When parents have been involved in multi-component obesity interventions, the type of training has not been related to the delivery of the intervention (American Dietetic Association, 2006). Multi-component family interventions include diet, physical activity, behavior, and family counseling.

Parent training done within a multi-component intervention focused on parenting skills to help parents become better role models and provide encouragement. Evidence has demonstrated that training parents to be part of multi-component intervention involving children under 13 is favorable. However, adequate evidence is unavailable warranting the training of parents in lieu of such an intervention. Alternately, family based interventions, where a parent accompanies the child in the intervention, have demonstrated adequate success. No studies involving children under the age of five were included in this analysis (ADA, 2006).

Intervention Duration

Many interventions that look at a specific determinants or mediators such as knowledge or self-efficacy are short term. Studies like this failed to report if the behavior change was maintained over the long term due to a deficiency in follow-up testing (Contento et al., 2002; Pérez-Escamilla et al., 2008). Short term interventions have produced positive outcomes using curricula like 5-a-day (Basch, Zybert, & Shea, 1994) and Pizza Please (Powers, Struempler, Guarino, & Parmer, 2005). Other short interventions have targeted specific determinants like media (Hindin, Contento, & Gussow, 2004; Hitchings & Moynihan, 1998), self-efficacy (Geller, Dzewaltowski, Rosenkranz, & Karteroliotis, 2009) or framed messaging (Bannon & Schwartz, 2006) also with positive results, but only for the short term. No evidence is provided to show if these determinants are sustained in a longitudinal analysis. In a Cochrane library review, Summerbell et al. (2005) found no obesity prevention studies related to dietary intervention versus control that met their inclusion criteria of being a minimum duration of three months and a maximum of one year. Only physical activity related studies met these inclusion criteria. This three month to one year definition was considered to be short term.

Intervention Dose

Improvements made by many health behavior interventions, while significant, tend to be modest. The amount of change required for an intervention to be labeled as clinically important needs to be addressed. Debate exists as to the dose required to obtain significant results in intervention programs targeting youth (Thomas, 2006). Positive outcomes have been achieved by many studies consisting of a wide range of intervention dose (frequency, duration, and intensity). A review of 51 school based obesity interventions found 40 obtaining significant results related to reducing obesity in children aged 7-19. Ten studies were less than 12 weeks with eight (80%) achieving significant results. Eighteen studies ranged from 12 weeks to one year with 12 (67%) studies producing significant results. Twenty studies lasted more than one year of which 14 (70%) were significant (Shaya, Flores, Gbarayor, & Wang, 2008). A review of seven preschool obesity interventions revealed only four (57%) with significant results. Studies with interventions or follow-ups of 3 months or greater were included (Bluford et al., 2007).

Some examples of such interventions include the 5-a-Day Power Play intervention which is an eight session fruit and vegetable program published in California for 5th graders. Administered over a school year with follow-up at one year, significant increases in fruit and vegetable consumption were achieved. The 5-a-Day Power Plus consists of 40-45 minute classes given twice a week over eight weeks also affected significant increases in fruit and vegetable consumption (Knai, Pomerleau, Lock, & McKee, 2006). Eat Well Keep Moving (EWKM) is a complex interdisciplinary curriculum covering all aspects of nutrition and physical activity. It is integrated into all subjects at the upper elementary school level. Evaluated longitudinally over two years EWKM produced significant changes in children's diet with increases in fruit and

vegetable consumption and vitamin C intake and decreases in saturated fat intake (Gortmaker et al., 1999).

Intervention dose varies across individual studies. A minimal amount of intervention in the form of a mailed information brochure and two tailored telephone calls led to 1.2 more servings of fruit and vegetables per day achieving significance. After baseline survey data collection, calls were done within one month with the first call lasting 20 minutes and follow-up calls five minutes long. Change was maintained after eight months when follow-up was administered (Wolf, Lepore, Vandergrift, Basch, & Yaroch, 2009). Messages mailed at intervals of one week, two months, and three months after baseline showed positive outcomes at a four month follow-up (Latimer et al., 2008). Knowledge and choosing healthy foods increased with a 45 minute/day, four day/week intervention lasting three weeks (Kandiah & Jones, 2002) and in a separate intervention of eight lessons (Fahlman, Dake, McCaughtry, & J. Martin, 2008). A sixty second video with either a positive outcome or negative outcome message shown to children aged five produced positive changes in eating behavior. Children in either group chose an apple over animal crackers compared to controls (Bannon & Schwartz, 2006). To test the effectiveness of simple prompts, children at an intervention school were prompted with the choice of fruit or juice. They chose and consumed fruit or juice significantly more than the control school during a two day intervention involving cafeteria staff prompting children in lunch line (Schwartz, 2007). No follow-up was done to see if children continued to do so without the prompting. The USDA provides curriculum packages for each grade level 1-2, 3-4, 5-6 at MyPyramid.gov. Each curriculum set contains four lessons.

Interventions Involving Preschool Aged Children

Interventions that include both the parent and child are limited and most are Women Infant and Children (WIC) or Head Start programs (O'Connor, Hughes, et al., 2010). These programs are essential as influencing parent behavior can encourage a parent to promote healthy behaviors among their children. For maximum effectiveness and sustainability an intervention should have sensitivity to ethnicity, inclusion of staff and teachers administering the intervention as stakeholders, and routine follow up with parents (McGarvey et al., 2004; McGarvey et al., 2006). The communication between parent and child is a strong resource in the effort to promote healthy behaviors. Multiple components of information from influential sources like television advertising can increase confusion (Bannon & Schwartz, 2006) and decrease knowledge and reasoning in children (Harrison, 2005). Hence parents must be able to obtain correct information, perceive it correctly and convey this consistently to their children (Graham, Gibbons, Marraffa, & Sultana, 2000; Murnan, Price, Telljohann, Dake, & Boardley, 2006; Wardle, Carnell, & Cooke, 2005). Failing to do this has been shown to result in low levels of agreement between child and parent perceptions (Tak, te Velde, de Vries, & Brug, 2006).

Availability, parent modeling and parent knowledge act as mediators for preschool aged children's fruit and vegetable consumption (Haire-Joshu et al., 2008; O'Connor, Hughes, et al., 2010; Reynolds et al., 2002) as does repeated exposure to foods (Birch & Ventura, 2009). Additionally, not seen in the research involving school aged children, are parenting practices and style. Using an emic approach to survey development, O'Connor, Hughes, et al (2010) worked with parents to identify five categories of parenting practices (teachable moments, practical methods, firm discipline, restriction of junk food, and availability/accessibility) used to encourage healthy eating. Only practices that were collapsed into the practical methods category

were found to be correlated with an increase in fruit and vegetable consumption (O'Connor, Hughes, et al., 2010). However, all categories were inter-correlated demonstrating a combination of parenting practices to be best rather than individual practices used alone. In the same study, non-directive parenting style was correlated with an increase in fruit and vegetable consumption; however, when modeling was included, the significance of parenting style was lost. The most likely scenario being consumption is related to availability. Alternately, parents self-reported their consumption and the child's which may have resulted in common reporting bias (O'Connor, Hughes, et al., 2010).

Coercive feeding practices and restrictive feeding will decrease a child's intake of healthy foods (Birch and Ventura 2009; Haire Joshu et al 2008; O'Conner, Hughes, et al 2010). The Parents as Teachers program is modeled on a message of non-coercive parenting. High 5 for Kids utilizes this same model in feeding practices. However, parents in a High 5 study resorted to using more coercion to achieve an increase in fruit and vegetable consumption providing evidence that utilizing non-coercive methods and having parents change their style may be too much to ask of a parent (Haire-Joshu et al., 2008).

Two pilot studies have shown positive outcomes using simple communication. Kindergarten children aged 5 were shown a 60 second video containing a positive outcome message, negative outcome message, or a control message. Each message was followed by a corresponding clip of a child performing an activity positively due to eating an apple or negatively due to not eating an apple. The positive outcome message showed no significant difference in fruit and vegetable consumption over the negative outcome message. However, together they showed significant increase over the control group (Bannon & Schwartz, 2006).

Verbal encouragement does not necessarily include a positive or negative outcome message. Cafeteria workers of an elementary school gave verbal prompts to students as they bought lunch. Students were asked if they would like fruit or juice. Observers recorded whether the child took the fruit or juice and then consumed either partially or fully. Students were approximately four times more likely to take fruit and 3.5 times more likely to eat the fruit than the control school students. Once the fruit or juice was on the student's tray it was more likely to be consumed by the intervention school students than the control, 87% of fruit and 88% of juice compared to 65% of fruit and 62% of juice (Schwartz, 2007).

Parenting Styles

Parenting style is the environment a child is exposed to while around their parents. It is dependent on parent characteristics practiced consistently over long periods of time. Four styles of parenting have been identified: authoritative, authoritarian, permissive (indulgent), and neglectful (uninvolved) (Baumrind, 2005; Berge, Wall, Neumark-Sztainer, Larson, & Story, 2010; Hughes, Power, Orlet-Fisher, Mueller, & Nicklas, 2005; O'Connor, Hughes, et al., 2010). Each style can be quantified by determining a parent's responsiveness to a child, and demandingness of a child. Responsiveness is the level a parent encourages autonomy for a child by being aware of and empathetic to their child's needs and individual wishes. Demandingness is defined as the rules, expectations, supervision and consequences a parent employs to teach a child responsibility. Various validated parenting style inventories (Greenberger & Goldberg, 1989; Slater & Power 1987) have been recently utilized to determine a parent's responsiveness and demandingness in various situations (Berge et al., 2010; Kremers, Brug, de Vries, & Engels, 2003). Scores on these inventories were then interpreted to one of the four parenting styles. Authoritative parenting style consists of high levels of the two dimensions. Parents are open and

understanding of their child's opinions, however preserve a high level of expectations. Authoritarian parenting consists of a high level of demandingness paired with low responsiveness. An authoritarian parent expects a child to follow strict rules and high expectations. However, the authoritarian parent shows less regard for a child's feelings and autonomy. The permissive parenting style consists of high responsiveness, but low demandingness. The permissive parent is empathetic, but does not pair this with necessary discipline. Last is the neglectful style where a parent does not listen to a child's thoughts or feelings and neglects to impose any structure through rules or expectations (Baumrind, 2005; Berge et al., 2010; O'Connor, Hughes, et al., 2010).

Efforts to reduce childhood obesity may also find links in parenting style. In a study by Rhee, Lumeng, Appugliese, Kaciroti, and Bradley (2006) involving 1,364 families with children five years of age, authoritarian parenting was found to be associated with a higher risk of obesity when compared to the other three parenting styles. Using authoritative style as a reference group, the odds of children being overweight were 4.88 times greater for children with authoritarian parents, 2.84 times greater with permissive and 2.67 times greater with neglectful parents.

Parenting styles will be indicative of feeding styles parents utilize to encourage children to eat various foods (Birch et al., 2001; Patrick, Nicklas, Hughes, & Morales, 2005). Like parenting style, feeding style is the way a parent interacts with their child in order to influence behavior. However, with feeding styles, the interaction is focused on eating (Patrick et al., 2005; Ventura, Gromis, & Lohse, 2010). Authoritative feeding style has been found to be positively associated with fruit and vegetable availability among parents of children four and five years of age, unlike authoritarian style which is negatively associated (Patrick et al., 2005). Additionally,

an authoritative feeding style led to better results when parents attempted to feed dairy, fruit and vegetables to their children, and resulted in more consumption of dairy and vegetables. The authoritarian feeding style was negatively associated with vegetable intake. These results were consistently significant across ethnicity and education level along with the gender and BMI of the child. The caregiver's feeding style questionnaire (CFSQ) was used to assess parent feeding styles of 231 caregivers to preschool aged children (Patrick et al., 2005).

Restrictive and pressuring feeding practices have been found to have opposite effects to conventional thinking (Hill, 2002). In a study involving children three to five years of age, Fisher and Birch (1999) reported that restriction actually increased children's attention to the restricted food and desire to have and eat the food. Behavior of children manifested into positive comments about the restricted food ("I like") and/or gestures (clapping) for the food. In a reverse context, children ate more of a targeted food when not pressured to eat. Pressure was in the form of the phrase, "Finish your soup, please," and was purposefully applied in the mildest manner using a normal voice every minute for a total of four intervals. Negative comments made by the children were higher (157) when pressured, compared to only 30 when not pressured (Galloway et al., 2006). However, it has been demonstrated that gender and cultural differences exist suggesting a more individual approach to feeding practices is necessary to achieve effectiveness. For example, parents who used more controlling feeding practices had boys with lower BMI compared to boys who had parents who were less controlling (Brann & Skinner, 2005). Additionally, Asian parents had more child focused practices while Black/African American had more parent focused practices (Ventura et al., 2010)

Cognitive Ability of Preschool Aged Children

In Jean Piaget's Theory of Cognitive Development a child progresses through a series of four stages: sensorimotor, preoperational, concrete operational and formal operational (Payne & Issacs, 2005; Piaget, 1962). As the child progresses through the stages, adaptation allows for the development of the child's cognitive abilities. The process of adaptation occurs as children adjust to their environment by means of assimilation and accommodation. Assimilation occurs when a child applies a cognitive skill, learned from tasks performed in the past, to a new task never before attempted. The cognitive process used to grab a small toy with only one hand is still applied to grabbing a larger toy too big for a one handed grasp. One hand is used because it is the only current thinking the child has for grabbing objects. Accommodation occurs when the child incorporates the second hand in order to grab the new larger toy with both hands. The environment changed so the child accommodated for the new experience. Assimilation and accommodation occur together and never separately. This adaptation process is central to Piaget's theory of cognitive development and highlights the important role the environment plays (Payne & Issacs, 2005).

Children aged two to seven demonstrate characteristic of the pre-operational phase of child development as described by Piaget (Piaget, 1962). This stage is divided into two sub-stages known as pre-conceptual, or symbolic function, and intuitive thought. Typically, a child aged two to four is in the symbolic function stage and is able to use pictures, drawings, and words to identify objects. They can also create pictures of objects using their recall and imagination (Piaget, 1962). The use of symbols and words such as "Dad" to identify a person is important in their ability to recall experiences using pretend play. In the pre-conceptual stage, the child is egocentric in the sense they can only see things from their own viewpoint. Piaget

demonstrated this with the use of a model of a mountain. Piaget sat opposite a child with the model between them. Next, the child was asked to look at four pictures of the model and choose which one Piaget saw. Young children always chose the picture representing their own vantage point of the model. Finally, children in the symbolic function sub-stage can only focus on one aspect of a problem at a time (Payne & Issacs, 2005). For example, they might say "I don't live in Georgia, I live in Statesboro." The child is unable to connect that they live in Statesboro which is located in Georgia. Another characteristic in the pre-conceptual sub-stage is animism in which a child believes an inanimate object like a roadside curb can have human qualities. A child may say the curb was mad because it tripped her (Payne & Issacs, 2005).

In both the pre-conceptual and intuitive sub-stages the child lacks the ability to understand conservation. This characteristic relates to seeing objects that have the same mass and volume but are different shapes (Piaget, 1962). A child will identify one object as bigger. This can be demonstrated by taking two equal size balls of Play-doe and flattening one. The flat ball of Play-doe appears to take up more space; the child will say it has more. Additionally, two equal amounts of water poured into a short fat glass and a tall skinny glass will not be seen by the child as equal. This perception persists even when the child witnesses the water from the short fat glass being poured into the tall skinny glass. The child will see the higher level of liquid in the tall glass as more than the short glass and not account for the width of the short glass (Payne & Issacs, 2005). Interestingly, this error in liquid portion size has been demonstrated in adults and skilled bartenders who consistently over-poured drinks in short fat glasses (Wansink & Ittersum, 2005).

As the child progresses to the intuitive sub-stage, egocentrism decreases and use of symbols and words increases. The thought process is more stable and reasoning is possible such

that children can distinguish between fantasy and reality. However, completing a mental task such as solving operations is still not possible (Payne & Issacs, 2005).

Food Preference of Preschool Aged Children

Food preference is a developmental process involving genetic and environmental factors. Prior to social influence and exposure, infants will smile after eating sweet tastes, give negative expressions for bitter and sours tastes, and show neutral expressions for salt (Birch, 1999). Similarly, preschool aged (three to five years old) children are predisposed to prefer sweet and salty tastes and energy-dense foods, but have an aversion to bitter and sour tastes due to familiarity (Birch & Fisher, 1998; Hill, 2002). When repeatedly given tofu plain, salted, or sweetened, preschool children preferred what was given to them (Sullivan & Birch, 1990). Appearance and texture were also tested determinants that predicted a child's preference for a food (Zeinstra et al., 2007). However, as children age from birth to preschool and up, they will develop food preferences based on exposure and parent modeling (Birch, 1992), especially the mother (Skinner, Carruth, Bounds, & Ziegler, 2002). Modeling and exposure are considered determinants to fruit and vegetable consumption, however if a mother does not eat a food, a child will not be exposed (Skinner et al., 2002). Wardle, Guthrie, Sanderson, Birch, and Plomin (2001) reported the preference for high fat food and aversion to vegetables was compounded for children who lived in an obese family. High fat foods are cheap, readily available and usually have large amounts of sugar or salt (Birch 1992).

Social Cognitive Theory as a Theoretical Framework

Social Cognitive Theory (SCT) is a theory based on the principle that individuals learn by watching what others do (Bandura, 1977). SCT has undergone multiple revisions and additions since its inception (Baranowski et al., 2002). The current form of SCT consists of 11 constructs

that can be used to explain a person's current behavior and inform interventions in the modification of behavior. The constructs include environment, situation, behavior capability, outcome expectations, outcome expectancies, self-control, observational learning, reinforcements, self-efficacy, emotional coping/management, and reciprocal determinism (Baranowski et al., 2002).

The environment refers to the all physically external features or stimuli with which the person interacts. These stimuli can affect a person's behavior and range from the temperature and lighting in a building to the people around the person (Baranowski et al., 2002). Situation is how the person perceives of the environment. A person sees the environment and creates a mental interpretation. One person may perceive it to be too hot outside, while another person perceives the temperature as just right.

Behavior capability requires the individual to know what the correct behavior is and then having the skill to be able to accomplish the behavior (Baranowski et al., 2002). If a person does not know to eat five servings of fruit and vegetables every day, then the skill cannot be accomplished.

Outcome expectations are outcomes the individual expects to happen if the behavior is performed. An expectation of eating fruits and vegetables is that they will make you strong and healthy. Expectations about a behavior are developed from past experience, observation, being told about the outcome, and from physiological arousal (Baranowski et al., 2002).

Outcome expectancies are how a person values the expected outcome. A person may know what the outcome is (outcome expectations), but unless a person places a high value on this outcome, it is unlikely the behavior will be performed. The behavior must be viewed as beneficial to maximize a positive or minimize a negative outcome. Children may eat fruits and

vegetables not just because they make them stronger, but that being stronger will increase their ability to play (Baranowski et al., 2002).

Self-control is comprised of a person monitoring their own behavior, comparing personal behavior to self-made standards or goals, and self-efficacy (Bandura, 1977). Monitoring requires the individual to have knowledge of the behavior and know what needs to be monitored. This process involves self-regulation of one's own thinking, emotions, reinforcements, goals and behavior (Bandura, 2004; Bandura, 2005). Comparing behavior to specific standards includes setting personal goals (Baranowski et al., 2002). These goals can be developed based on past performance or through comparison with other standards, or can be simple rewards a person may treat themselves. The goal determination is dependent on a person's self-efficacy (belief they can perform the skill and obtain the goal) (Baranowski et al., 2002).

Observational learning is the process of learning a behavior by watching other persons doing it and then having the behavior reinforced (Bandura 1977). Unlike operant conditioning where a repetitive practice approach is used to learn a complex skill, in observational learning the person merely observes others (Bandura 1977; Baranowski et al., 2002). When others perform a behavior it is typically reinforced with rules and rewards which the observer learns. If a sibling eats their vegetables and is reinforced with praise by a parent, an observing child may also eat their vegetables if they consider praise from the parents as rewarding. Conversely, if a child sees a friend being accepted by others for not eating vegetables, the reward becomes friendship and the behavior is not eating vegetables.

Reinforcement is the response of others to an individual's behavior. An individual will navigate their behavior based on outcomes they have witnessed or have personally created. The regulation of behavior based on a response to reinforcement can be external, vicarious, and self-

produced (Bandura, 1977). External reinforcement can come in many forms. For example a teacher who gives attention to a non-social child by encouraging interaction with others will see the child continue their seclusion. The teacher reinforced the seclusion with attention. Had the teacher waited until the child joined other students and then approached the child, there would be a decrease in seclusion (Bandura, 1977). An example of vicarious reinforcement is a child observing another child receiving reinforcement. When a teacher rewards a child for a specific behavior, an observing child modifies their own behavior to achieve the same reward. Additionally, behavior that is unpunished will increase similar behavior among observing children. However, as discussed in self-control, a person will also self-reinforce based on their own standards of behavior (Bandrua, 1977). Reinforcement can also be defined as positive and negative reinforcement. Positive reinforcement is the likelihood of a behavior increasing due to a specific response given by another person. A friend telling a peer he is cool for eating apples will increase the likelihood he will eat more apples in the future (Baranowski et al., 2002). A negative reinforcement is the taking away of an averse stimulus to increase the likelihood of increasing the behavior. Releasing a child confined to her room and unable to play with friends once she eats her vegetables is considered a negative reinforcement. The aversive stimulus of being confined to a room is taken away (seen as a negative in an equation). Conventional thinking might view giving candy or praise (reward) as positive reinforcement and spanking or pinching (negative acts) as negative enforcement. However, both are positive reinforcements because they are added stimuli with the intent of increasing a behavior. Only when a stimulus is taken away, does it become a negative reinforcement. In the case of spanking or pinching a child, if these are added to the equation as "threats," then the removal of the threat is a negative reinforcement. Additional confusion arises when the term punishment is utilized to describe

spanking or pinching. Punishment is a term that is reserved for reducing the likelihood of a behavior continuing. If the intent is to increase behavior, the term reinforcement must still be used.

Self-efficacy is the belief a person has in themselves to accomplish a behavior and negotiate any obstacles impeding their ability to perform the behavior (Bandura 1977). Self-efficacy is an essential component for changing behavior as it determines the amount of effort a person commits to changing their behavior. In recent works (Bandura, 2004; Bandura, 2005; Bandura, 2007) the importance of self-efficacy is evident and the construct on which behavior change is most dependent. Success builds self-efficacy which is why simple steps and goals are set incrementally leading to a larger over-reaching goal (Baranowski et al., 2002). If a parent would like to see a child eat more servings of vegetables, they may have to start as small as eating a single green bean to lead up to more green beans. Later, different types of vegetables can be introduced and then finally five servings of fruit and vegetables a day.

Managing emotional arousal is necessary to achieve optimal learning and performance (Bandura, 1977). Stress, fear, anxiety are emotions manifested by the person's reaction to stimuli. A person can employ various strategies to deal with emotional arousal that are both healthy and unhealthy. Denial or repressing feelings is an example of an unhealthy behavior while meditation and exercise are healthy behaviors, but temporary solutions. Identifying the specific problem, generating feasible solutions, and then implementing them is seen as a more permanent method (Baranowski et al., 2002).

Reciprocal determinism explains that the way a person thinks is the result of personal, behavioral, and environmental determinants constantly interacting (Bandura, 1977). More importantly, the interaction occurs both ways, or reciprocates. If any determinant changes, the

person's perspective (situation) will also change causing a re-evaluation of their behavior. This explains why individuals gravitate to similar people for friendships. If a person loves fast food and eating out on a regular basis, their friends will expect this behavior. However, the death of family member as a result of poor diet may spark the person to stop eating out. The persons' friends may apply pressure to get the person to eat out with them more often. In an effort to avoid this pressure the person may try to find new friends who are healthy eaters (Baranowski et al., 2002).

Summary

There are various mediators and determinants affecting fruit and vegetable consumption in children (Cerin et al., 2009; Dwyer et al., 2008; Krolner et al., 2011; Pérez-Escamilla, et al., 2008; Phometsi et al., 2006; Rasmussen et al., 2006) . Positive outcome expectancies, modeling, and accessibility and availability are the most prominent (Krolner et al., 2011; Rasmussen et al., 2006; Reynolds et al., 2002). Researchers must consider these key determinants, the way participants are assessed, and how participants are expected to participate if the intervention is to be successful (Rasmussen et al., 2006). Additionally, the dose of the intervention must be considered as it can depend heavily on a participant's time and financial constraints (Thomas, 2006). In the literature reviewed, no standard dose for health interventions has been agreed upon. Studies that lasted as long as one year or as short as two days have produced significant effects. Additionally, the frequency and intensity of the intervention in studies demonstrating significant results ranged from two contacts with participants, up to 12 lessons, or an entire year-long curriculum. The inconsistency in duration and frequency directs the spotlight on design and how well studies assess and address mediators utilizing constructs of theory. Influential factors on behavior will be different for each participant making it difficult to have a one size fits all

intervention (Thomas, 2006). Assessing children is particularly challenging; however, the most insightful studies assessed both the parent and the child who is heavily reliant on the parent. While children have an early preference for sweet foods, parent's feeding and parenting styles have an important impact on how a child will eat in the future (Birch, 1999). For example, restrictive and authoritarian feeding practices have been shown to increase children's desire for the restricted food and decrease consumption of the food a parent wants the child to eat (Hill 2002; Patrick et al., 2005; Rhee et al., 2006). Many of these factors influencing behavior can be assessed prior to an intervention so that researchers can custom fit the intervention to the target population. Hence, a theory like SCT (Bandura, 1977) provides a framework with multiple constructs of influence on a person's behavior. This allows a researcher to take these factors into consideration prior to assessing and developing an intervention.

CHAPTER 3

METHODS

Purpose of the Study

Children receive and process a variety of messages pertaining to why they should eat fruits and vegetables. Reynolds et al. (2002) reported the strength of positive outcome messages on 4th graders consumption of fruit and vegetables. There are no studies identified that have worked with preschool children in this capacity. Using Social Cognitive Theory (SCT) as the theoretical framework, the purpose of this study was to gain insight into the perceptions pre-school aged children (4 years old) have about fruit and vegetable messages. The following research questions were devised to guide the study.

Research Question #1

What are rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages?

Research Question #2

What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and their consumption of fruit and vegetables at school?

Research Question #3

What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and their knowledge of different kinds of fruits and vegetables?

Research Question # 4

What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and their preference for specific kinds of fruits and vegetables?

Research Question #5

What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and the parenting practices (messages or actions) reported?

Research Question #6

What, similarities or differences in exist between parent and child preference responses?

Study Design

This was a cross-sectional study with concurrent transformative strategy (Creswell, 2009). Qualitative and quantitative data were collected for the purpose of supplementing each other in an effort to answer specific research questions. In this study, qualitative data collected from children were transformed into quantitative data so parent and child responses could be more easily compared and triangulated (Creswell, 2009). Data were collected in three phases. Phase I comprised a quantitative survey of parents, phase 2, a quantitative tray waste analysis of preschool children's fruit and vegetable consumption, and phase 3, a multi-method interview with children consisting of symbol recognition and open-ended questions. The collection of data from these three phases was done in an effort to triangulate qualitative and quantitative data and strengthen the validity of the study as recommended by Creswell (2009). The main purpose of the study was to assess children's perceptions of fruit and vegetable messages, however, the inclusion of a parent quantitative assessment was deemed necessary for this study for two reasons. First, research has reported the strength of variables (mediators/determinants) to fruit and vegetable consumption (Baranowski et al., 2000; Cerin et al., 2009; Krolner et al., 2011; Rasmussen et al., 2006; Reynolds et al., 2002; Reynolds et al., 2004). These variables include accessibility, parent modeling, and knowledge, and were seen as potential overriding variables of messages as a determinant of fruit and vegetable consumption. Collecting information from

parents on these variables was done to control for confounding and add validity to the present study. Second, the parent quantitative portion was ideal in supplementing and comparing children's messages obtained during qualitative child interviews. Qualitative methods were selected for use with children since quantitative surveys and yes/no questioning are not appropriate for preschool aged children (Dickenson, Poole & Laimon, 2005). Parents, especially mothers, were the natural choice for the quantitative portion, as they are accurate reporters of what their children like and eat (Burrows, Martin, & Collins, 2010). Additionally, children are influenced by adult role models and typically convey information that has been experienced at home (Piaget, 1962).

Theoretical Framework

SCT has been successfully used in large fruit and vegetable studies to determine mediating variables and determinants affecting consumption (Baranowski et al., 2000; Reynolds et al., 2002; Reynolds et al., 2004). This study utilized constructs of SCT for four reasons. First, SCT has been previously used to explain determinants of fruit and vegetable consumption in (Baranowski et al., 2000; Reynolds et al., 2002; Reynolds et al., 2004). Second, the parent survey instrument (Reynolds et al., 2004) utilized in this study was constructed on the principles of SCT. Third, the SCT construct "outcome expectancies" has already laid a foundation for further investigation into messages communicated (Reynolds et al., 2002). Fourth, SCT aided in the recognition and categorization of messages children conveyed in interviews (see Table 3.1). With the potential of hundreds of different messages, phrases, and words, it was necessary to have a mechanism to group messages into fewer distinct categories that also explained the target behavior. Qualitative child data was transformed into quantitative data in the form of SCT constructs. Using the constructs of SCT allowed for quick organization of a diverse range of

messages. Parent and child responses were then more easily compared providing additional insight into messages children receive and how they influence consumption.

Table 3.1

Use of SCT Constructs and Measurement Methods

Variable	Use of Construct	Method
Environment	F&V availability at home	Parent survey
	F&V availability at school	School menus
	Messages parents are giving	Parent survey
Situation	Child's perception of F&V messages.	Child interviews
Behavioral capability	Parent Knowledge	Parent survey – Question 1
	Child knowledge	Picture card name game
Expectations	Positive or negative outcome from consuming F&V	Parents survey and child interviews
Expectancies	Why outcome is valued (positive or negative)	Child interviews
Self-Control	Child rationale (perceptions) for eating or not eating F&V	Child interviews
Observational learning	Parent modeling	Parent survey
	Child consumption	Child interviews
Reinforcements	Parent messages used to increase behavior of F&V consumption	Parent survey and child interviews
Self-efficacy	Child belief of being able to eat a fruit or vegetable or ask for more.	Child interviews
Reciprocal determinism	Dynamic conversation of interaction played out by child with investigator (e.g., If a child asks for F&V parents will give more.	Parent survey and child interviews

Note: adapted from (Baranowski et al., 2002)

Study Population and Sample

Parents 18 years of age and older with children attending a rural preschool facility in southeast Georgia were eligible for participation in this study along with their child. Preschool participants were chosen as it is an age where habits are forming and messages are solidifying (Anzman et al., 2010). The participating preschool is lottery funded and is under the umbrella of the county school district. The preschool is located in a town in the center of the county and serves 220 students from the entire county except for the most eastern portion where one other facility serves 40 students. Children are bused in from communities north, south, and west of the preschool location ranging from 10 miles to 20 miles away. Students who did not get into the most easterly facility were also bused in to the central center. The county is 681 square miles and had a population of 22,598 in 2010. The median household income is $27,346 compared to the state median of $47,589 (United States Census Bureau, n.d.). Sample characteristics are reported in the results section.

Recruitment of Preschool Center Support

In March 2011, a key informant initiated introductions between the principal researcher and the coordinator of the participating preschool center. An initial meeting was scheduled where the study was described in detail. The preschool was toured and the coordinator explained logistics regarding classroom and lunchtime routines that influenced the development of the study methodology. A letter of support was obtained from the preschool coordinator after approval was received from the school board superintendent.

On August 2nd, 2011 prior to the start of classes, a meeting was held with all teachers. The study was explained and teachers were assured that additional workload would not exceed the collection of consent forms and questionnaires from parents. Teachers were given the

opportunity to provide input regarding the most effective ways to conduct various aspects of the study. This was done to promote a participatory approach since the teachers knew the community best. As a result, teacher interest in the study increased and they provided support throughout the process.

Recruitment of Participants

The preschool held an opening orientation session on August 3rd, 2011. At this meeting, the study and informed consent documents were explained to parents using a scripted speech. A summary of the parent survey, activities the children would be participating in, and how the study would inform and benefit the school were described. Maintenance of parent and child confidentiality along with data security was emphasized. Finally, participation was described as voluntary and no penalties would be incurred for non-participation or withdrawing at any time. Following the opening meeting, parents visited their child's classroom and met the teachers. Based on teacher input and following IRB protocol, each parent received an envelope containing the informed consent and parent survey (see Appendix B). Parents were asked to complete the survey, sign an agreement to participate for their child then return the sealed envelope containing the documents to the teacher. Each classroom teacher received one packet per child for a total of 22 packets per class. Packets were collected by teachers from August 3rd to August 29th. Teachers used class rosters to keep track of who returned packets. The school director also provided rosters to the primary investigator which consisted of the child's name and the child's school ID number. Each child is assigned an identification number by the school for tracking breakfast and lunch consumption. As returned packets were assessed for completion, rosters were used to keep track of which parents completed the survey and which parents signed informed consent for their children. A completed survey represented parent recruitment.

Informed consent was detached from the survey and the child's ID number was written on the survey. A total of 84% (n =181) of parents returned a survey with 80% (n = 172) fully completing the survey. A signed informed consent represented a recruited child for the lunch fruit and vegetable consumption inventory, but only a potential participant for the child interviews. Consent was received for 91.4% (n = 201) children to participate in phases two and three. Inclusion eligibility for Phase two, the F&V consumption inventory, required children to eat the school provided lunch at least once. During the week of the lunchtime F&V inventory, four children brought their own lunch every day and did not meet the criteria for inclusion in the F&V consumption phase. However, fruits and vegetables consumed by these children were recorded.

In phase three, children were recruited individually throughout the months of September, October and November to participate in the qualitative interview. Only children with informed consent (n=201) were asked to participate. While in class, children were asked if they would like to play the fruit and vegetable picture card game. In compliance with IRB, the word "help" was never used during the request for assent in order to avoid pressuring the child with the socially taught norm of helping or doing as an adult requests. All children providing assent and a willingness to participate were recruited. During phase three, seven children did not want to participate or did not talk during the interview and two children withdrew from the preschool reducing the sample to 87% (n = 192) of the population participating. This equated to 96% of children participating from the list of children with consent to participate.

Phase I - Parent Assessment

The parent questionnaire (Appendix B) was comprised of a combination a demographics section and two instruments previously developed and utilized by researchers in the field of fruit

and vegetable consumption. Part one, was developed by Block, Hartman, and Naughton (1990) and utilized by Reynolds et al. (2004). This section measured parent self-reported fruit and vegetable consumption with seven, 10 point Likert-type questions followed by a check list to measure parent self-reported availability and preference of fruits and vegetables. Part two was a list of 33 parenting practices developed by O'Conner, Hughes, et al., (2010) using an emic approach with parent input. In the current study, a single qualitative question was added to allow parents to add any other practices/messages they use not listed on the original assessment. This qualitative portion was done to account for the unique cultural and SES characteristics of the region (O,Conner, Hughes, et al., 2010; Summerbell et al., 2005; Thomas, 2006). Additionally for the current study, the 33 parenting practices were operationalized into the constructs of SCT (see Table 3.2) under the assumption that the parent utilizes the practices to foster an increase in the behavior of consuming fruits and vegetables.

Face validity.

Prior to administering the parent survey, it was reviewed by three experts in the fields of nutrition and psychology. The survey was then pretested with 12 parents who were not part of the study population. This sample of parents was chosen to emulate the diversity of the target population. Ages ranged from 19-45, races represented White (n=7), Black (n=4) and Hispanic (n=1), income ranged from $10,000 to $65,000, and education levels included high school through doctoral. Participants were asked to complete the survey initially as a participant and time themselves. They were also asked to go back and mark with an asterisk any areas they had to read twice to understand. Once completed, participants provided feedback on the readability of the survey, the ease of understanding the instructions, and possible areas of concern. All participants were able to complete the survey as requested without need for clarification.

Table 3.2

Parenting Practices Categorized by SCT Construct

SCT Construct	Question	Parent Practice
Environment	1	I play a game with my child to get them to eat F&V
	2	I schedule meals that include F&V at the same times every day
	5	I limit non-F&V snacking between meals
	6	I place F&V where my child can easily reach them
	7	I add something to make F&V taste better
	9	I tell my child that their favorite cartoon characters eat F&V
	15	I mix F&V with other foods my child likes
	16	I offer F&V without forcing my child to eat them
	17	I set limits on the amount of sweet drinks my child can have
	18	I speak to my child with love so that they will eat F&V
	19	I make F&V fun with shapes
	20	I ask others to not go against me by giving my child candy or sweets
	22	I tell my child they have to try at least a couple of bites but don't have to eat it all
	23	I use F&V for snacks instead of things like cookies and chips
	24	I include some form of fruit, vegetables or juice in most meals
	27	I keep junk foods out of the house
	28	We sit at the table and eat F&V together as a family
	29	I cut back on how often my child eats fast food
	31	I buy fruit or vegetables instead of junk foods
	32	I make sure that fruit or vegetables are available around our house
Behavioral Capability	10	I use mealtimes to teach my child about healthy eating
	13	I ask my child to help me with food preparation
Positive Outcome Expectations(cies)	4	I tell my child that eating F&V will make them strong and healthy
Negative Outcome Expectations (cies)	30	I tell my child what will happen to them if they eat too many bad foods
Self-control	33	I decide what F&V will be served and then let my child decide which of those they would eat
Observational Learning		I show my child that I enjoy eating F&V
Positive Reinforcements	8	I praise my child when I see them eat F&V
	12	I reward my child with sweets if they eat their fruit or vegetables
Negative Reinforcements	11	I make my child feel guilty when they don't eat vegetables
	14	I insist that my child sits at the table until they eat their F&V
	21	I keep my child from going to play if they don't eat their fruit or vegetables
	26	I keep my child from having sweets if they don't eat their fruit or vegetables
Reciprocal Determinism	25	I give my child the specific fruit or vegetable they like

Note: Adapted from O'Conner, Hughes, et al., (2010)

Data collection.

Completed parent surveys were returned to teachers who maintained inventory with class rosters. Surveys were checked for completion and information was entered into SPSS 19 using the child's school ID number.

Phase II - Child Fruit and Vegetable Consumption Inventory

Data collection.

The fruit and vegetable inventory was conducted during lunch over five days during the fourth week of school August 29th to September 2nd. The purpose was to determine how much the children consumed and gain more insight into child preference. The time frame of data collection provided student's adequate days (15) to adapt to the cafeteria logistics as requested by teachers. It was also deemed that an early date would have minimal influence on child taste preference as it requires 10-15 exposures to acquire a taste for new foods (Birch, 1999). Since foods were offered on a four week rotation, children would see new foods less than 10 times. A slightly later start (mid-September) would have been preferable; however, numerous event conflicts prohibited this option. A much later start was not an option as other school functions would continue to produce conflicts through the month of September and into October. Waiting until October raised concerns about the amount of influence the school lunches and teachers would have over children's food preference.

Lunch was observed and teachers were consulted for three weeks before data collection to ensure the least disruptive and most efficient method of collecting trays and capturing images of trays was employed. This continued presence also allowed children to get to know and become comfortable interacting with the principal investigator. The week before data collection, a practice run was conducted without students present to ensure logistic efficiency. Two long

tables were erected in front of the tray drop-off window to the kitchen. On the table closest to the window a rectangular area was marked out and wood pieces secured to the table to create a standard zone for trays to be placed. Additionally, an 8 inch x 10 inch paper template of the tray orientation was taped to the table in the standard zone to ensure all pictures were identical. A Canon HD Vixia HG21 camera with remote shutter control was used to take pictures. Resolution was full high-definition (HD) at 1920 x 1080 pixels. The camera was secured to a stand and leveled with a leveling tool. The lens was set at 21.5 inches from the surface of the table pointed straight down at the standardized area for trays. No zoom was used. A screen was made from PVC piping and construction paper to hide the camera from the view of the children.

Fruit and vegetable weights were assessed with an Ohaus® – Scout® Pro 4001 (SP4001) portable scale. The scale was calibrated with a known weight each day prior to data collection. All measurements were weighed in grams. Thirty minutes prior to lunch a tray of food the children would be receiving was obtained from the kitchen. The fruit and vegetable for the day were weighed separately. A separate weighing plate was used for the fruit and one for the vegetable due to time constraints for cleaning and preventing contamination. The plate was placed on the scale, the scale reset to zero, and then the food put on the plate. The total weight for each fruit and each vegetable was recorded on a food weight recording sheet (see Appendix C) and 10% increments were then calculated from 100% to 10%. For example, with 82 grams equaling the full 100% serving size, multiplied by 10%, obtained the 10% increment of 8.2g. Each increment thereafter was 16.4, 24.6 and so on. All children received the same food and serving sizes, which were based on USDA guidelines, making this methodology feasible.

Next, an 8 inch x 10 inch sheet of paper with the day and date (Figure 3.1) was placed under the camera and a picture was taken. This aided in organizing picture data at the end of

each day. After the picture of the start date, a picture was taken with 100% of the food on the tray. The tray was then brought back to the weighing station and 10% of the fruit and 10% of the vegetable were removed. A picture was then taken of what was 90% of the fruits and vegetables remaining. This process was continued for each 10% increment until the last picture of 10% of fruits and vegetables remaining were taken. Figure 3.2 illustrates the standard pictures with 10 % increments of fruits and vegetables remaining. Starting in the upper left corner and moving across to the right one row at a time the first row shows 100%, 90%, and 80% of fruits and vegetables remaining. Row two is 70%, 60%, and 50%, row three is 40%, 30%, and 20%, and row four is 10% of fruits and vegetables remaining.

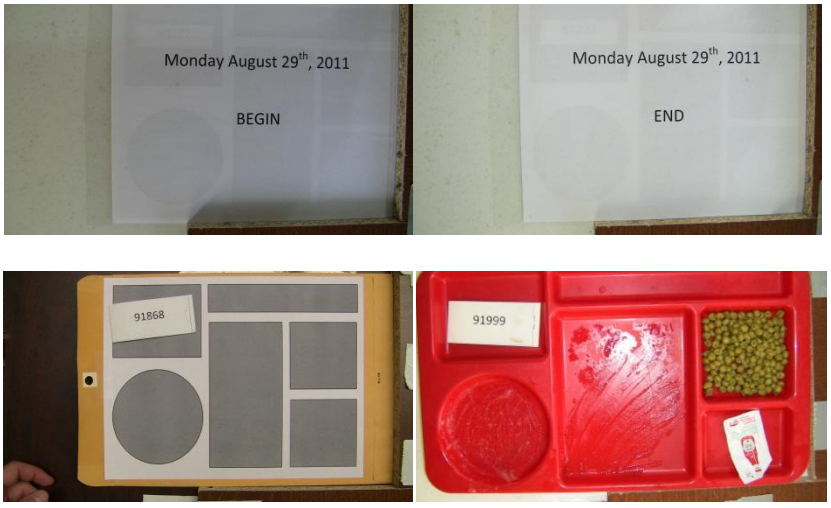

Figure 3.1. Organizational tools for tracking and organizing pictures.

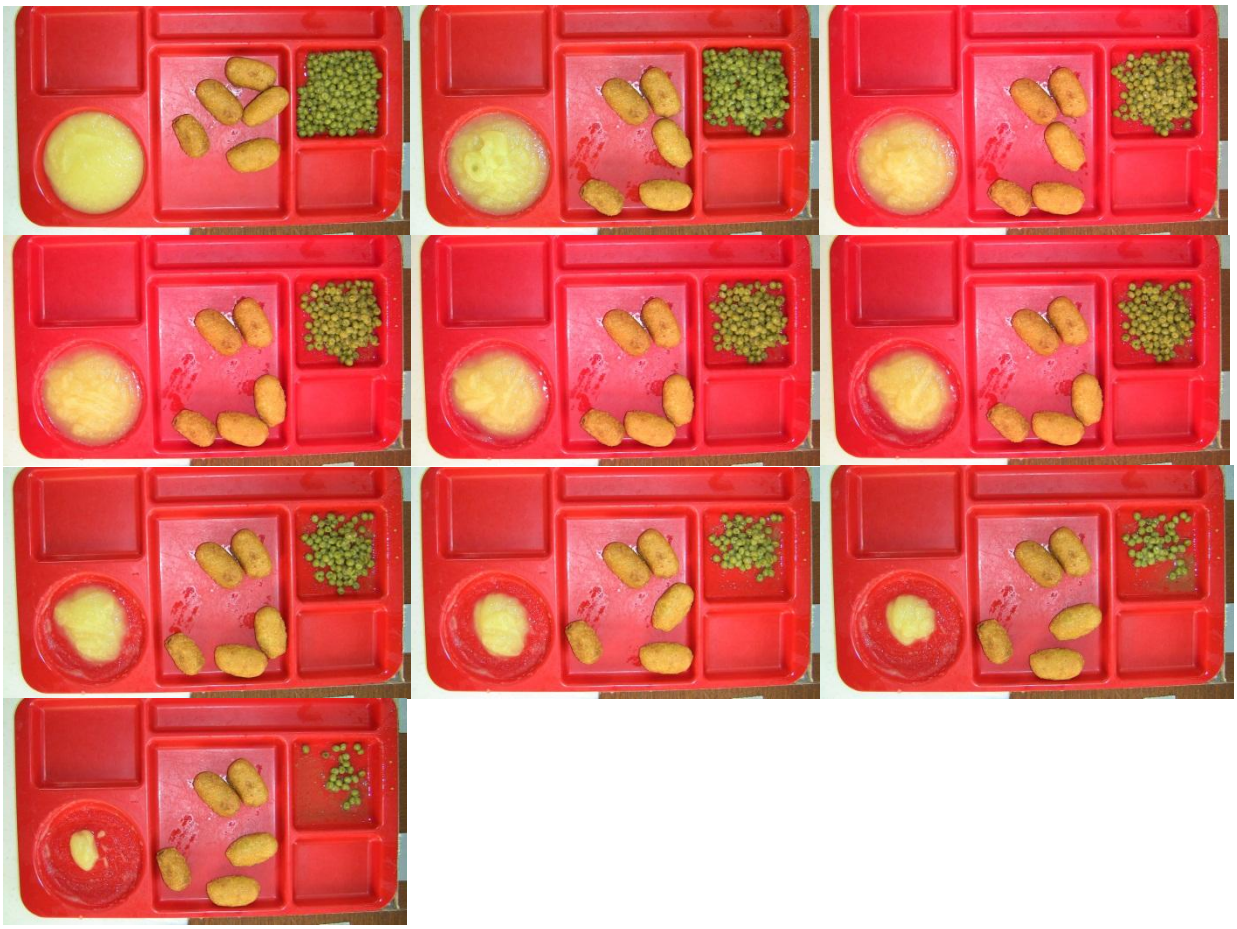

Figure 3.2. Standardized reference pictures.

In order to identify trays, labels were made (see Figure 3.2.) with the child's name on one side and ID number on the other then grouped by class. Classes were on a standard schedule for when they entered and left the cafeteria. Labels for the first class scheduled to enter and leave were arranged on the table in alphabetical order for easy reference. When children of this first class finished their lunch, they brought their trays to the receiving tables and handed it to the researcher. Silverware was collected, and each tray was inspected. Excess trash (napkins and milk cartons) were discarded and food was adjusted to ensure remaining fruits and vegetables were clearly visible. Teachers called out names of students so that labels could be placed on the

tray. Labels were placed in the top left hand corner of the tray with ID number up and name facing down. This label system allowed for the most efficient matching of tray, child, and ID number. The tray was then placed in the standard picture zone and a picture was taken. The Canon Vixia HG21 is equipped with a display widow that provided verification of image capture within 1.5 seconds. Remote shutter control was used so the camera was never handled and moved out of position. Trays were then passed on to the kitchen staff for cleaning. Once this class was through, ID labels for the next class were arranged on the table alphabetically and the process was repeated for the next five classes. Teachers of the remaining four classes instructed children to leave their trays at the tables. Teachers removed child ID tags from the children's back and placed them on the tray. Researchers then went to the tables and collected trays and brought them to the receiving tables on carts. Child name tags were removed and replaced with labels as used with the previous six classes. Child name tags were not used in the pictures since the name and ID number were on the same side. The process was repeated the same way for all five days.

The initial sample eligible for participation in phase two was 91% (n = 201) of children who received parental consent. The sample of participants varied each day depending on whether a child was actually present at school that day, ate the school lunch provided, or brought their own lunch. The number of children who ate lunch provided by the school each day are reported in the results. However, it is prudent to note the numbers of children who were absent (A) or brought a lunch (BL) on one or more days but still met inclusion criteria were as follows. Monday: (A) n=16 and (BL) n=1; Tuesday: (A) n=14 and (BL) n=2; Wednesday: (A) n=15 and (BL) n=2; Thursday: (A) n=12 and (BL) n=3; Friday: (A) n=14 and (BL) n=6. Children (n=4) who brought lunch every day did not meet inclusion criteria.

Data preparation.

The total number of photos (N=950) taken of participant trays (n=900) and standard trays (n=50) were downloaded from the digital camera and saved in full HD 1920 x 1080 JPEG format, to a secure file on a password protected computer. Pictures were organized into folders by day and then by class. The 10 standard photos of the food served for the day were organized by day. Before evaluating participant tray waste photos, the standard pictures were viewed and evaluated to achieve a visual mental image of what 10% increments look liked. The standard photos allowed for a visual and consistent comparison for what was consumed at each increment. Similar techniques were employed by (Baranowski et al., 2011) using computer images of food servings. Next, the first of ten class files was opened. Starting with the first participant tray waste photo for the class, only one vegetable served that day was evaluated. This process continued for all participant tray wasted photos within the class. Returning to the first participant tray waste photo, the second vegetable or fruit of the day was evaluated. Focusing on one vegetable or fruit at a time allowed for more efficient and consistent evaluation of participant pictures when compared to the 10 standard pictures. To evaluate the amount of each fruit or vegetable consumed, the participant tray waste photo was positioned beside the standard photo. No zoom was used in the initial analysis. The standard photos were scrolled through until a visual match was made with the amount left on participant tray waste photo. When two strata (e.g. 50% and 60%) of standard photos looked to match the participant photo, zoom was used to count the remaining food on the plate to get the closest match possible of the amount left. The amount left was subtracted from 100% to obtain the amount consumed. This percent consumed was manually recorded in spreadsheets. This process was used for all ten classes and all five days.

Next, a research assistant was trained in the process of evaluating trays to perform a second round of analysis. As done in the first round, the 10 standard pictures were first shown to orient the assistant to the percent increments and how they represented the amount of food left on the tray. Cues were provided to the assistant to assist in the comparison of a child tray to the standard tray. When items were of continuous volume, like mashed potatoes or applesauce, cues included 1) the tray surface area covered by the item, 2) the transparency/opaqueness of the item and how much of the tray surface could be seen through the item, 3) visualizing what was left if pulled into a single pile. When items were interval in nature such as beans, peas, pineapple, and fruit cocktail, techniques used by the principal investigator in the first round analysis as explained above were used with the addition of counting what was left if necessary. Ten trays were then reviewed together as part of the training. Next, a random sample of 10% of students from each class was drawn from a hat so that all classes were represented equally. These photos were then analyzed by the research assistant using the same process and evaluation methods as the principal investigator as described above. Next, discrepancies on how percent consumed was determined were discussed. It was realized that what constituted a single bean or piece of fruit cocktail needed to be determined to increase inter-rater reliability. Additionally, for oranges, tater tots, and wedge fries, a specific percent was assigned to each. Each orange wedge was 33% with three equaling 100%. Each tater tot was approximately 17% with six equaling 100%. The standard wedge fry picture was three pieces and one was considered 50% while the other two were 25%. Using the 10 standard pictures was not as practical for these three items. The items were divided (cut) for the standard pictures, but this was not consistent with how children left them. Hence, looking solely at the 100% picture became more conducive for comparison and led to an alternative standardization method by creating a matrix (see Appendix G). This matrix

was developed through the assessment of the 10 standard pictures by both evaluators who assigned a numerical quantity of food left based on a visual count. This count included standardizing what constituted one green bean or piece of fruit cocktail and determining what numerical range of pieces left would represent a specific percent (see Appendix G). With a consensus on how to determine a numerical quantity, all pictures were reassessed by the principal investigator to ensure accuracy. Another 10% sample was then evaluated by the research assistant. Cohen's Kappa statistic was used to measure inter-rater reliability (Wing, Leekam, Libby, Gould, & Larcombe, 2002). Kappa scores ranged from .802 to .929 with a mean of .879 (see Table 3.3). Data were then entered into SPSS and each case and each value checked for accuracy.

Table 3.3

Cohen's Kappa Scores for Fruit and Vegetable Consumption Assessment

Fruits and Vegetables	Cohen's Kappa score
Green beans	.883
Mashed potatoes	.802
Green Peas	.873
Apple sauce	.818
Orange wedges	.938
Wedge fries	.929
Salad	.879
Fruit salad	.941
Tater tots	.807
Pineapple chunks	.917

Phase III - Child Assessment

The child assessment (picture card game to assess knowledge and preference) was developed by the primary investigator. It served as an evaluation tool for a nutrition intervention in a previous study. Additionally, the parent assessment of the current study was used to inform the child assessment. The current study used similar protocol to Zeinstra et al. (2007) and Matheson et al. (2002) for the open-ended portion of the child assessment described later in this section.

Validity and reliability of child qualitative data.

Prior to data collection, two experts in the field of child development reviewed the qualitative questioning script. During the months (June-August) prior to child interviews, the interview protocol was piloted with children not attending the preschool. The pilot sample of 12 children ranged in age from 3-5 years of age. Race representation included White (n=7), Hispanic (n=3) and Black (n=2). Family income ranged from $10,000 to $100,000.

During data collection, methods suggested by Creswell (2009) regarding adequate documentation with audio recordings, notes, and codebooks were employed to strengthen validity and reliability. A structured prompting script was used to ensure consistency with each participant. Transcripts were assessed for large discrepancies, a codebook using SCT definitions was used for consistency of interpretation and notes on the coding process were maintained. Finally, multiple coders reviewed and coded data to prevent drifting interpretations by one coder and achieve consensus on results.

Data collection.

Before beginning the child assessment, the primary investigator visited each classroom to assist teachers and attended lunch for 11 days over the first four weeks of school. This consistent

presence allowed children to become familiar with the primary investigator and develop trust. Similar procedures were employed by (Matheson et al., 2002). Teachers were reminded a week prior to their class being visited and asked if any special activities were occurring in class that the interviews might conflict with. Teachers were encouraged to only introduce the primary investigator and child in an effort to reduce the perception of coercion by the teacher. With the input of teachers and the school director, the library/resource room adjacent to the main office was used for interviews. This was ideal for reducing distractions, but also provided a comfortable setting for the child as teachers and staff were always in view. Obtaining teacher cooperation was essential in this study and every effort was made to assure the most ideal setting for the assessment.

During class time, children were asked individually if they would like to play a picture card game. The game was set up on the "group-time" rug in the library. Both the child and researcher sat on the floor facing each other. In some rare instances (n=4) children wanted to play the game but were very shy. In these cases, the lead or support teacher accompanied the child and sat with the child and researcher during the interview. All interviews were digitally audio-recorded. The principal investigator conducted all interviews and recorded responses as they were made. A structured question guide was used to increase consistency of each interview (see Appendix D). The guide comprised of a check sheet with instructions for the picture card game along with a question set and probe questions with the purpose of eliciting responses regarding messages the child hears about fruits and vegetables. The check sheet was used to record fruits and vegetables the child liked or disliked. Space was provided for recording comments children made about each fruit or vegetable.

The picture card game consisted of pictures of 11 different fruits and 13 different vegetables for a total of 24 pictures. Based on Piaget's theory of cognitive development, children in the pre-operational stage are capable of linking words and symbols to people or objects. Additionally, children use objects such as toys (objects) or pictures (symbols) during play to communicate their past experiences (Piaget, 1962). Other fruit and vegetable consumption studies involving pre-school children and play to assess children's perceptions of food have used pictures (Zeinstra et al., 2007) or models and toys (Matheson et al., 2002) to elicit children's identification and categorization of foods. Studies involving preschool aged children as witnesses in court cases have demonstrated children can recall past experiences with minimal error with the use of open-ended questions and non-suggestive prompting (Dickenson et al., 2005). The current study used pictures and open ended questions to help elicit children's perceptions of fruits and vegetables. A concern with pictures is the experience of the child with different forms of a fruit or vegetable. An example is a child who always eats sliced canned peaches and is shown a picture of a whole fresh peach. The child may only see a round fruit and call it an apple if that is the only whole round fruit the child has ever eaten. This problem was successfully controlled for in a pilot study the investigator conducted with Head Start children aged five. Multiple forms of the fruit or vegetable were shown to help prevent this confounding issue. In the current study, pictures with multiple forms of the fruit or vegetable were used to increase the chances the child would recall at least one form of the fruit or vegetable they ate.

When the child sat down on the rug, the first thing they saw was a picture of a smiley face and one of a frown/yuck face. They were asked to sit on a house design on the rug facing the face cards. The child was offered a sticker for coming to play and chose one while the researcher started the audio recorder. Then the picture card game was explained. The object of

the game was to name the fruit or vegetable (knowledge) they saw and describe what thought about it (preference). It was stressed that there were no wrong answers. Children were then taught to say "I don't know" if they did not recognize the fruit or vegetable. This was tested by showing the child two pictures. The first picture was of a car, something all the children could recognize. They were asked "what the picture was of," then after correctly identifying the picture as a car, the child was asked if they liked or didn't like cars. If they liked cars, they were asked put the picture beside the smiley face picture. If they did not like cars they were asked to put the picture beside the frowning face, and if they did not know they were asked to put it in the middle. Next, the child was shown a picture of people they had never seen before. They were asked "what the picture was of." When the child correctly said "people" or "children" or "family," they were asked if they knew the names of the people. If the child said they did not know, they were congratulated and it was explained that it was good to say they didn't know since they had never met the people in the picture. If the child tried to guess the names of the people in the picture, they were asked if they had ever met the people. After this, it was explained that it was good to say they didn't know since they had never met the people in the picture. Children were encouraged to do the same when they came across a fruit or vegetable they had never seen or tried.

After the practice session a reinforcement of the instructions was done with the first fruit. The interviewer turned over the first fruit picture and asked the child "What is this?" Questions during the picture card game were simple and direct children have the cognitive ability to tag names to objects (Piaget, 1962). If the child asked to hold the cards and turn them over they were allowed. Erickson's theory of personality development explains that children at this age are experiencing initiative and guilt (Weinstein & Rosen, 2003). In this study, children who

showed initiative to play the game were encouraged. This helped promote autonomy and possibly encouraged comfort and the child's desire to play more. The child was never stopped when showing initiative to turn over the cards themselves. Stopping could have promoted guilt and shame, possibly reducing the child's willingness to play and participate in the entire interview process (Weinstein & Rosen, 2003). If the child could not identify the fruit or vegetable, they were asked if they needed help naming the fruit or vegetable. Once the picture was named by the research or correctly identified by the child, they were asked if they had every tried it before. If they said no, then it was put in the middle. If they said yes they were asked to place the picture in the like or dislike pile. Responses were recorded on the check sheet.

Beginning with the basic knowledge and preference assessment was a good lead in (Creswell, 2009) to the qualitative portion as some children shared their perspectives during the fruit and vegetable picture game prior to even reaching the open-ended question segment. Interviewing young children is challenging and raised concerns about the validity of responses. As mentioned earlier, play through familiar objects such as toys encourages children to act our past experiences. However, without the use of play (Dickenson et al., 2005) reported that in studies involving preschool children who were asked to recall past events, both pleasant and unpleasant, children gave highly accurate responses with low error. As suggested by Dickenson et al. (2005), open-ended questions with repeated non-suggestive prompting were used in the current study to elicit an optimal response rate.

With the picture cards still in view, the structured set of open-ended questions with probes was started (see Appendix D). Having a structure to questioning was done to help maintain consistency between each interview and increase validity of the protocol (Creswell, 2009). It also served as a reminder to protect the children. For example, the first question asked

the child "who makes up their family?" This was done to avoid upsetting a child by asking questions about their mother or father, when the child may have only had one parent or was cared for by grandparents. The interview sequence began with broad question s and funneled down to easier more narrow questions while still maintaining a non-leading format. Child responses were very short, usually one to five word answers. This made it possible for the principal investigator to record responses on the structured question guide without assistance. In cases where a child spoke for a long time, a word or phrase could not be heard, or other reason that words were missed, the form was starred and "listen to audio" was recorded. Once the interview was over, the child was thanked for playing the game and offered a sticker of their choice. The interview recording form was inserted into a manila envelope labeled according to which class the child was in. The child was escorted back to class and the next child on the list was called and asked to participate.

Instances occurred during the interviews when children lost focus and turned their interest to something else in the room. In these cases, children were reminded of school rules and expectations related to playing with "off-limit" items. It was important to act as the teachers did and maintain the same level of expectations. Consistency in the area of behavior expectations clearly conveyed that the interview was not free or silly time, rather an extension of the classroom. Children were then refocused back to the picture card game by trying to relate their immediate interest to activities in the interview. Additionally, positive reinforcement techniques were used. For example, children were reminded that if they completed the game they would receive a sticker of their choice. However, they had to at least try to answer the questions. In other cases the child started playing with the cards in their own imaginative way. In these cases, the interview continued by adjusting to which card the child was focused on at the

time. It was important to listen to their story or game then tie it back into the interview. Showing genuine interest in the child and what they had to say helped encourage them to respond to questions. Other children who were bending cards or reaching for stickers when not offered were immediately reminded of general social expectations which the teachers of the preschool uphold. Children were reminded that the cards were not theirs and needed to be used by many other children. Also, the stickers were not theirs and it was polite to ask rather than taking without asking. In most cases, experience working with children as a teacher, coach, and parent paid great dividends in refocusing children and staying on task.

Interviewer fatigue mitigation strategies.

Teachers will attest to the mental fatigue that accumulates over the course of a day when working with children. Keeping children on task and adhering to appropriate behavior, constant reinforcement of pro-social behavior and overall classroom management of 22 children can be a drain on the patience of an adult and distracts from the desire of the teacher to deliver the desired cognitive material. In an effort to combat mental fatigue during phase 3, child interviews, numerous strategies were employed. 1) A rough schedule was created to realistically conceptualize how long the interview process would take. Based on pilot testing, it was determined that each interview would last about 15 minutes. Realistic goals were set for how many children would be interviewed per day based on the school daily schedule and time per interview. Ten or twelve interviews were always the goal, however, eight was considered a good day. In the end, averages of 11 children per day were interviewed. The good days when 15 were interviewed made up for the slow days when only 6-8 were interviewed. This scheduling took the pressure off and provided incremental achievement milestones. 2) Interviews were conducted for a maximum of three days per week and sometimes only occurred two days per

week. Having specific days off broke up the time spent at the school and the travel time to get to the school. This was purposefully set up as a two month marathon as opposed to a 3-4 week sprint which would have been unsustainable. 3) Interviews were staggered throughout the day allowing for multiple breaks. Classes were on a staggered schedule since the cafeteria could not hold all students at once. While one class was eating breakfast, another would be on the playground, and then another would be back in the classroom. This schedule required three to five children from three different classes to be interviewed each day starting at 8:30-9:00 a.m. until 2:30 p.m. Typically, 6-8 children were evaluated in the morning when the principal investigator was fresh and with higher energy levels. During lunch time, there was 30-40 minute window when all children were unavailable to interview. This allowed for a complete break from children and teachers in the middle of the day to eat and regroup. Nap time was immediately after lunch; however, 2-3 children who stayed up during nap were interviewed. This was welcomed by teachers as these children were disruptive to others trying to sleep. There were some days when no children were interviewed during nap time if they fell asleep quickly. After nap, 1-3 students who were on a late buses or being picked up by parents could be interviewed. 4) Days in which fatigue was high due to work or other stressors; interviewing was purposely stopped to regain steam. Walking around, talking with the director or doing other work helped as a distraction. These days were rare since the drive was 50 miles and motivation was high to maximize the day and interview as many children as possible. Ironically, rain days were welcomed as it meant children were indoors more and therefore more children could be interviewed in one day. Overall, these strategies aided in preventing interviewer fatigue. However, due to the project duration and frequency of interviews, only so much could be done before some fatigue occurred.

Data Preparation.

SCT construct definitions were used to develop the *a priori* codebook (see Appendix E) used to operationalize child messages into SCT constructs. Updates to the codebook became an iterative process as some messages required a consensus from evaluators to determine which definition they fit best. Data were recognized as a message if it could be categorized as a request involving, a thought, feeling, or behavior related to fruit and vegetable consumption. This included, but was not limited to statements, questions, or descriptions the child used during the play conversation. Based on this criteria and examples reported in the literature (Krolner et al., 2011, Reynolds et al. 2002) the following are examples of how constructs were utilized (see Table 3.4). Environment and Situation were considered synonymous as previously defined by Baranowski et al. (2002) The following notation and criteria were used for coding: Environment/Situation (SP): These types of messages were imperative statements where a child was told to do something (e.g., "Eat it!" or "Eat your carrots" or "you have to try at least one bite"). These statements are also referred to as "prompts" (Birch, & Ventura, 2009; Galloway et al., 2006). Behavior Capability (BC): A message that clearly had the intent to increase a child's knowledge or abilities in relation to fruit and vegetable consumption or preparation. (e.g., "Tells me how to cook" "They have vitamins in them"). Positive Outcome Expectations/Expectancies (PO): The outcome had to be solely the result of engaging in the desired behavior, eating fruits and vegetables (e.g., "They are good for you" "They make you strong and healthy"). Similar outcomes have been documented by Krolner et al. (2011) and Reynolds et al. (2004). If the outcome was controlled by someone, it was considered positive reinforcement. Additionally, outcome expectancies require the child to value the outcome. Therefore after every positive outcome stated, the child was asked what they liked about the outcome (e.g., Interviewer: "What

do you like about being strong?" Child: "so I can be like pa and lift things"). Negative Outcome Expectations/Expectancies (NO): The outcome had to be solely the result of not engaging in the desired behavior, and therefore not eating fruits and vegetables. (e.g., "You will get sick"). If the outcome was controlled by someone, it was considered a negative reinforcement.

Both positive and negative reinforcements increase a desired behavior (Baranowski, 2002; Skinner, 1974). This study did not observe whether a child engaged in the behavior after a reinforcement (or stimulus) from parents. Therefore, the assumption was made that parents conveyed reinforcement messages with the intent of increasing fruit and vegetable consumption behavior. In addition, reinforcement adds a desirable stimulus or removes an undesirable stimulus (Skinner, 1974). Positive reinforcements (PR): The message had to clearly indicate the addition of a desirable stimulus such as a reward or praise. (e.g., "you can watch a movie after you eat them" or "Good job!"). Negative reinforcements (NR): This required the removal of an undesirable stimulus or outcome.

In the case of this study, messages manifested as both an immediate negative stimulus (e.g., the child could not leave the table until finished) and a threat of a future negative outcome. A threat came in the form of taking away movie watching privileges, dessert or the potential of other punishment. It was necessary to make the assumption that the intention of parents was to increase fruit and vegetable consumption behavior through the threat. The threat was the negative stimulus and removing it the reinforcement. It was also important to understand the definition of punishment. None of the negative outcomes conveyed by messages in this study could be considered punishment. To be considered punishment the intent must be to decrease a behavior (Skinner, 1974). This was not the case for this study which assumed the intent was to increase fruit and vegetable consumption. Reciprocal determinism (RD): required a message to

Table 3.4

Example Messages Stated by Children

SCT Construct		Original Child Message
Prompts	Positive	I love it! / Can you eat them with me?
	Command	At least try a bite/Taste em'
		Eat em' now/Eat it/You better eat it
		You have to eat it/You're supposed to
Positive Outcome Expectancy		If you try it, it might be good
		You bet big/We grow
		We can poop
		Get healthy
		Good for my body
		They are good
		Body can run fast
		Have bigger muscles
Negative Outcome Expectations		You're wasting them
Negative Outcome Expectancies		We don't grow
		We get sick
		Have to see the doctor
		We get hungry
		We will not get strong
Positive Reinforcement		You get a cookie/candy/drink
		You can have something to drink
		You can watch a movie
		Get to play with iPod
		Can buy something at the store
		Good job
		Good, you ate it all
Negative Reinforcement		You'll get in trouble/Get a spank
		Don't get to go play
		Must stay at the table until finished
		Don't get snack/drink/ice cream/Scooby snack
Reciprocal Determinism		I ask for a _____ and mama bought for me
Behavioral Capability		You can eat them like this
		Eat when you are hungry
		Tells me how to cook
		Don't have to eat em' if your belly is full

indicate a parent response or behavior that was clearly a result of a child's request or behavior (e.g. "Daddy eats, so I ask for one, Mommy buys more" and "Mommy buys the F&V's I like"). Prior to coding, all individual participant forms were reviewed to gain an understanding of what the children self-reported and assess the trustworthiness of the data (Creswell, 2009). Audio recordings were also reviewed for forms marked with "listen to audio," and information missed during the interview was adding to the form. Child interview recording forms were reviewed three times before codes were finalized. The first round was done solely by the principal investigator. The second round was done by the PI and an assistant. The third was done by the PI, the same assistant, and a professor with a PhD in Social Psychology.

In the initial round done by the principal investigator, each individual participant form within a class was reviewed and coded before proceeding to the next class. As each participant form was coded the actual statement was recorded on a tabulation form to consolidate messages into one place (see Appendix F). A separate form was created for each class. This consolidation form allowed for quick reference of all messages stated by each individual child in the class. It aided in consistency of coding when similar messages occurred or uncertainty arose as to how a message should be coded. A previously coded message that could be referenced made it easy to code a subsequent message. Alternately, a subsequent message that brought into question how a message was coded earlier could be clarified. In either case, messages could be compared easily and coded or re-coded accordingly.

The second round of coding done by the PI and assistant was similar to the first round. The assistant was briefed on the SCT construct definitions and context of what they meant. The interview form was reviewed and the context of questions was stressed along with the answers to expect. In other words, responses on the interview form would be that of the child, but it was to

be treated as what the parent said to the child and the child was the restating what they remembered. Example messages previously stated were provided for comparison during coding. The assistant and principal investigator practiced with 10 examples to help the assistant feel comfortable in recognizing and coding a message. Each participant form was reassessed by the PI then handed to the assistant to review. If the assistant was in agreement with the coding the process continued. When a disagreement occurred, the PI and assistant discussed the message and presented each other's case until consensus was reached and a code was finalized. Audio recordings were reviewed in cases where the context of the message needed to be clarified. Consolidation forms were updated iteratively as new messages were added or deleted. Messages that persisted in eluding consensus or meaning were recorded on a special case form to be reassessed

The third round of coding involved the PI, the assistant and the expert in social psychology. The expert was briefed on the SCT definitions and how the coding process occurred. A practice coding session was done with the first class to achieve initial consensus on coding. Before moving on to other classes, messages on the special case form were reviewed to come to final consensus. Consolidation forms also aided in cases where messages appeared to be unique but could be interpreted as conveying the same concept. Consensus was reached for a variety of special cases. For example, messages like: "they good," "they is good," "it's good," or "it will be good," were all considered positive outcome messages related to taste. When these messages were seen multiple times on the same participant form, they were only counted as one positive outcome message. Similarly, messages related to health such as: "they healthy," "it's healthy," " healthy for you," and "good for you," were coded as a positive outcome once when seen multiple times on the same participant form. Other messages that were categorized as

having the same meaning included those relate to growing (e.g., "they make you big," "you grow," and "get tall"). However, a message that specified "you get big muscles" was considered unique when paired with tall. "Strong" was always coded as a unique outcome from "big."

Once consensus was reached on special cases, all participant forms that contained a special case were coded or recoded accordingly. Next, a ten percent sample of participant forms were reviewed by all three coders achieving full consensus on codes.

Once all participant forms were coded, the data were entered into SPSS. Codes were totaled and treated as continuous variables representing a total number of messages reported for each construct. For example, if a participant form contained two positive outcomes and one negative reinforcement message, a value of "2" was entered in the positive outcome variable and a value of 1 for the negative reinforcement variable. During the data entry process, participant forms were reviewed a fourth time for errors by the primary investigator. The consolidation forms for each class and the special cases form were used to ensure phrases and codes were matched correctly or not missed.

Specific cases arose in which the message did not fit any definition and therefore was not included in any construct. This occurred when a child was asked; "what happens when we eat fruits and vegetables?" The child responded: "make tummy hurt" or "they make you sick" or "get fat." These responses are negative outcomes; however, they did not fit the definition as a negative outcome requires that the behavior not be performed. In the case of these responses, the question referenced engaging in the behavior. It could be implied that many children were conveying knowledge of self-control related to eating too much makes you sick. Not enough information could be gathered to make these conclusions. As a result, these messages fell out of the theory and the study reporting. Similarly, some children gave information related to the

home food environment that could not be utilized in this study. Instead of conveying a message parents or others stated, the child described the dinner routine. For example, a child may have said "Mama eat, then I eat" or "Mama doesn't like vegetables". In both instances, the child was describing actions about how the parent modeled or did not model the behavior. Hence, this was not considered a message. In another case, a child stated "we eat together" which is an example of the home environment and is a recommended practice by most nutrition professionals. This information can be explained by SCT, however, in the context (focus on messages) in which the current study was using SCT, such information was not a message and could not be utilized.

Analysis

IBM SPSS Statistics 19 was used to analyze the data. Sample sizes varied throughout all variables and are reported with respective categories. Stratification by income was done as this is a strong determinant of fruit and vegetable consumption. The study sample median income of $20,000 was used as the marker to categorized participants as < $20,000 or >$20,000. Additionally the poverty threshold for a family of three in 2011 was $18,530 and $22,350 for a family of four (USDHHS, 2012). Data were collected for seven income tiers of $10,000 increments. However, stratifying all increments was not practical as 42% of participants were in the < $10,000 range and another 22% in the $10,000 to $19,999. Sample sizes in the higher income tiers were too low to be stratified separately. Hence higher level analysis like an ANOVA was not done due to low sample sizes and low statistical power.

Sample characteristics.

Frequencies were generated to report the proportions for race and gender for both parent and child. Additional proportions were generated for parents responses related to education level, annual household income, marital status, and participant relationship to the child.

Descriptive statistics were performed to generate means and standard deviations for continuous (scale) data which included parent and child age.

Parent survey responses.

Descriptive statistics were performed to generate a mean and standard deviation for parent knowledge of the number of recommended daily servings of fruits and vegetables. Proportions and actual number (n) of respondents were reported for categorical (nominal) data availability, parent preferences, and types of parenting practices. The independent samples t-test with $\alpha \leq .05$ was used to assess differences between socioeconomic (SES) levels (<$20,000 or > $20,000) availability and preference. The Bonferroni post hoc test was used to control for type-1 error. Cohen's d was calculated to report effect size.

Analysis by research question.

Research Question 1 - What are rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages?

Descriptive statistics were performed to generate frequencies, means, and standard deviations for each type of message for the entire sample and by gender. The independent samples t-test with $\alpha \leq .05$ was used to assess gender and SES differences. The Bonferroni post hoc test was used to control for Type-1 error. Cohen's d was calculated to report effect size.

Research Question 2 - What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and their consumption of fruit and vegetables at school?

Descriptive statistics were performed to generate means, standard deviations, and range consumption data. The independent samples t-test with $\alpha \leq .05$ was used to assess gender and SES differences. The Bonferroni post hoc test was used to control for Type-1 error. Cohen's d

was calculated to report effect size. Next, the relationship between child perceived messages for each construct and the total amount of fruits and vegetables consumed; the total fruit only consumed; the total vegetable only consumed; the total potato only consumed; and the total fruits and vegetables (not including potatoes) were calculated using Pearson's product-moment correlation test, two-tailed, with $\alpha \leq .05$ used for significance level. Cases were filtered by SES and Pearson's correlation test was repeated. Effect sizes were reported using r^2.

Research Question 3 - What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and their knowledge of different kinds of fruits and vegetables?

Knowledge was represented as the number of correct answers achieved during the picture card game. Three categories were represented 1) the number of fruit correctly named, 2) the number of vegetables correctly named, and 3) the total number of fruits and vegetables correctly named. Descriptive statistics were performed to generate proportions and actual number (n) of participants correctly and incorrectly identifying each fruit and vegetable. Means, standard deviations, and range were calculated for total number of fruits and vegetables correctly identified. The independent samples t-test was used to assess gender and SES differences with $\alpha \leq .05$. The Bonferroni post hoc test was used to control for Type-1 error. Cohen's d was calculated to report effect size. Next, the relationship between children perceived messages in each construct and child knowledge was calculated using Pearson's product-moment correlation test, two-tailed, with $\alpha \leq .05$ used for significance level. Cases were filtered by SES and Pearson's correlation test was repeated. Effect sizes were reported using r^2.

Research Question 4 - What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and their preference of specific kinds of fruits and vegetables?

Preferences were categorized as the total number liked, number disliked and total never tried. Descriptive statistics were performed to generate proportions and actual number (n) of participants responding liked, disliked, and never tried for each fruit and vegetable. Means, standard deviations, and range were calculated for total number liked, disliked, and never tried for fruits only, vegetables only, and fruits and vegetables together. The independent samples t-test with $\alpha \leq .05$ was used to assess gender and SES differences. The Bonferroni post hoc test was used to control for Type-1 error. Cohen's d was calculated to report effect size. The relationship between child perceived messages in each construct and preference was calculated using Pearson's product-moment correlation test, two-tailed, with $\alpha \leq .05$ used for significance level. Effect sizes were reported using r^2.

Research Question 5 - What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and the parenting practices (messages or actions) report using?

Parenting practices were categorized into SCT. Descriptive statistics were performed to generate proportions and actual number (n) of participants responding as the practice is used and the practice works best. Next, the relationship between child perceived messages in each construct and parent self-reported parenting practices was calculated using Pearson's product-moment correlation test, two-tailed, with $\alpha \leq .05$ used for significance level. Effect sizes were reported using r^2.

Research Question 6 – What, similarities or differences exist between parent and child preference responses?

Proportions related to preference were calculated for the total parent sample and child sample. Confidence intervals were then calculated to explore the concordance of preference range between the total parent sample and the total child sample. Next, parent and child responses were matched to analyze responses related to parent self-reported preference, parent reported child preference, and child reported preference. A Chi Square with McNemar test with binomial distribution was conducted to determined statistical significance of non-matching responses. Odds ratios and 95% confidence limits were then calculated to provide further information for interpretation of non-concordant results. Chi Square was also used to determine the actual parent-child concordance related to parent self-reported preference and child self-reported preference.

CHAPTER 4

RESULTS

This section is organized with sample characteristics first, parent survey results next, and then results by research question. Descriptive statistic and correlation tables are matched with research questions.

Sample Characteristics

The population consisted of N = 216 families and N = 220 children. Four families had twins attending the school. The overall parent sample was 81% (n = 175) and based on a fully completed survey. However, this sample varied based on the completion of each component of the survey. Therefore, for convenience, n values are reported in each table. The average age of parent participants was 29.9 years of age (*SD* = 7.358). The majority of parents self-identified as European American/White (non-Hispanic) (48.9%) and African American/Black (non-Hispanic) (40.4%). Income for about two-thirds (64.5%) of families was less than $20,000. Most respondents were mothers (90.4%) and about half (49.7%) were married, while a third (37.3%) were single never married. Almost half (47%) of the respondents had a high school degree or less education. About a third (38%) had some college education and less than a tenth (7%) had a college degree. The complete results for the sample characteristics are reported in Table 4.1.

Consent was received for 91% (n = 201) of children. Two withdrew and seven did not talk during the interviews. A final child sample of 87% (n = 192) or a 96% sample response rate was obtained. The average age of children (n=197) was 4.44 (SD = .2786). There was a near equal number of boys (50.5%) and girls (49.5%) attending the preschool. Most children were European American/White (non-Hispanic) (45.7%) and African American/Black (non-Hispanic) (41.7%). The sample numbers varied less for children with n values also reported in tables.

Table 4.1

Parent, Child, and Family Characteristics as a Percentage of the sample

Characteristic	Parent		Child	
	%	N	%	n
Race		(178)		(199)
African American/Black (non-Hispanic)	40.4		41.7	
European American/White (non-Hispanic)	48.9		45.7	
Hispanic/Latino/a	8.4		9.5	
Bi-racial/Multi-racial	1.1		2.5	
Asian American/Asian	0.6		0.5	
Other	0.1			
Sex				(200)
Female			49.5	
Male			50.5	
Education Level		(172)		
Less than High School	2.3			
Some High School	14.0			
High School/GED	30.8			
Some College	32.0			
2 year College degree	14.0			
4 year University degree	3.5			
Master's degree	2.9			
Professional degree	0.6			
Annual Household Income		(166)		
Less than 10,000	42.2			
10,000 - 19,999	22.3			
20,000 - 29,999	12.7			
30,000 - 39,999	4.8			
40,000 - 49,999	6.6			
50,000 - 59,999	3.0			
60,000 or more	8.4			
Marital Status		(177)		
Single never married	37.3			
Married	49.7			
Separated	6.2			
Divorced	6.8			
Participant relationship to child		(178)		
Mother	90.4			
Father	2.8			
Other	5.1			
Both mother and father	1.7			

Parent Survey Response Results

Parent responses (n=164) to the question, "How many servings of fruits and vegetables combined do you think a person should eat EACH DAY for good health" ranged from 1 – 20 servings with an average of 3.99 (*SD* = 2.243). The USDA recommends five servings of fruits and vegetables each day. This is equivalent to 5 cups for adults or 2.5 to 3.0 cups of vegetables and 2.0 to 2.5 cups of fruit. For children aged 4 to 8 years of age, a total of five ½ cup equivalents or 1.5 cups of vegetables and 1.0 to 1.5 cups of fruits are recommended (USDA, 2010).

Parents were asked about their consumption of juice, salad and potatoes. These items can be considered fruit and vegetable servings, but should be consumed in fewer amounts. Juice for example can be considered a serving of fruit twice a week. Potatoes should be baked, while frying should be limited (USDA, 2010). Almost half, 45.3% (n = 77) of parents reported consuming fried potatoes 1-2 times per week and 48.5% (n = 83) of parents reported consuming baked potatoes 1-2 times per week (see Table 4.2). Juice was also consumed 1-2 times per week or less by more than half of parents while approximately 40% reported consuming juice 3-4 times per week or more. Parents were also asked to report the fruit (not juice) and vegetable (not potato) consumption. Approximately 72% (n = 172) of parents reported consuming vegetables (not potatoes) one time per day or less and 69.4% (n = 172) reported consuming fruit (not juice) once per day or less (see Table 4.3).

Parents reported fruit and vegetable availability in the home the week prior to completing the survey (see Table 4.4). The most popular fruits were bananas with 75.4% (n = 129) of households reporting having them available, 60.6% (n = 103) had apples, 60.2% (n = 103) grapes, and 56.7% (n = 97) watermelon. The top vegetables include greens beans which were

available in 85.9% (n = 146) of household, 80.0% (n = 136) had corn, 79.4% (n = 135) potatoes, and 73.5% (n = 125) lettuce. On average, 5.52 (*SD* = 2.82) different fruits or juice ranging from 0 – 12 were available in homes in the past week. An average of 6.74 (*SD* = 3.138) different vegetables ranging from 0 – 13 were available in homes in the past week. Households with an income above $20,000 (*M* = 7.52, *SD* = 2.89) had a statistically significant greater availability *t*(156) = -.237, *p* = .019, *d* = .4 of total vegetables in the home over the past week than households below $20,000 (*M* = 6.29, *SD* = 3.21). Income explained 40% of this difference.

Parents self-reported liking an average of 15.97 (*SD* = 6.62) different kinds of fruits and vegetables combined. Preference totals ranged from 0 – 31 fruits and vegetables combined (see Table 4.6). The most preferred fruits were apples as 81.8% of parents reported liking them, while 77.7% liked grapes, 76.5% bananas, and 76.5% orange juice. Eighty-four percent of parents liked potatoes, 81.8% liked corn, 81.2% green beans, and 80.6% lettuce (see Table 4.5). There was a statistically significantly difference *t*(156) = 2.031, *p* = .044, *d* = .35 in preference based on SES group as parents with an income above $20,000 (*M* = 8.64, *SD* = 2.938) liked more total vegetables than parents below $20,000 (*M* = 7.5, *SD* = 3.59). In a practical sense, income explained 35% of this difference.

Parents reported that their children liked an average of 8.21 (*SD* = 3.932) fruits and 6.01 (*SD* = 3.378) vegetables (see Table 4.6). Eighty-four percent of parents reported their child liked bananas, 81.1% liked apples, 79.9% grapes, and 75.7% apple juice. Averages for vegetables were lower as 82.8% of parents reported their child liked potatoes, 75.7% corn, 75.1% green beans, and 62.1% liked peas and lettuce (see Table 4.5). Except for dislikes, standard deviations were relatively high for like preferences indicating high variability in preference among parents and children.

Table 4.2

Percent of Parents Self-Reported Juice, Salad, and Potato Consumption

	1		2		3		4		5	
Frequency	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)
Never	9.5	(16)	6.6	(11)	5.4	(9)	2.9	(5)	2.3	(4)
1-3 times per month	27.8	(47)	16.8	(28)	26.8	(45)	27.6	(47)	28.1	(48)
1-2 times per week	21.9	(37)	22.2	(37)	39.9	(67)	45.3	(77)	48.5	(83)
3-4 times per week	13.0	(22)	13.8	(23)	12.5	(21)	13.5	(23)	11.7	(20)
5-6 times per week	7.1	(12)	7.8	(13)	5.9	(10)	5.3	(9)	4.7	(8)
1 time per day	11.8	(20)	16.8	(28)	4.2	(7)	3.5	(6)	3.5	(6)
2 times per day	3.6	(6)	7.2	(12)	1.2	(2)	1.8	(3)	0.6	(1)
3 times per day	4.1	(7)	5.4	(9)	3.0	(5)	-	-	0.6	(1)
4 times per day	1.2	(2)	1.8	(3)	1.2	(2)	-	-	-	-
5 times per day	-	-	1.8	(3)	-	-	-	-	-	-
Total		(169)		(167)		(168)		(170)		(171)

Note: 1 = 100% orange or grapefruit juice; 2 = Other 100% juices, not counting fruit drinks; 3 = Green salad (with or without vegetables); 4 = French fried or fried potatoes; 5 = Baked, broiled or mashed potatoes. Percent values are the proportion of the total sample. (n) = the number of participants from the total sample.

Table 4.3

Parent Self-Reported Fruit and Vegetable Consumption

Frequency	Vegetables (not potatoes)		Fruit (not juices)	
	%	(n)	%	(n)
Never	0.0	(0)	1.7	(3)
1-3 times per month	6.4	(11)	9.9	(17)
1-2 times per week	10.5	(18)	17.4	(30)
3-4 times per week	22.1	(38)	14.0	(24)
5-6 times per week	12.2	(21)	9.3	(16)
1 time per day	20.3	(35)	19.8	(34)
2 times per day	22.1	(38)	16.9	(29)
3 times per day	4.7	(8)	7.0	(12)
4 times per day	1.7	(3)	2.3	(4)
5 times per day	0.0	(0)	1.7	(3)
Total		(172)		(172)

Note. Percent values are the proportion of the total sample. (n) = the number of participants from the total sample.

Table 4.4

Home Fruit and Vegetable Availability

Fruits n =171	Availability %	(n)
Apple	60.6	(103)
Banana	75.4	(129)
Blueberries	12.3	(21)
Cantaloupe	21.1	(36)
Grapes	60.2	(103)
Oranges	38.0	(65)
Peaches	42.1	(72)
Watermelon	56.7	(97)
Fruit Salad	24.0	(41)
Apple Juice	55.6	(95)
Applesauce	44.4	(76)
Orange Juice	59.1	(101)
Vegetables n =170		
Beans (green, string, snap)	85.9	(146)
Broccoli	44.7	(76)
Carrots	42.4	(72)
Celery	18.2	(31)
Corn	80.0	(136)
Greens (mustard, turnip)	46.5	(79)
Lettuce	73.5	(125)
Peas	67.6	(115)
Bell Peppers	35.3	(60)
Potato	79.4	(135)
Squash	30.6	(52)
Tomato	67.1	(114)

Note. Percent values are the proportion of the total sample. (n) = the number of participants from the total sample. Availability included the one week prior to the survey being completed by parent.

Table 4.5

Parent Self-Reported Preference, and Parent Reported Child Preference

	Parent Self-reported Preference n = 170						Parent reported Child Preference n = 169					
Fruit or Vegetable	Like %	(n)	Dislike %	(n)	Not indicated %	(n)	Like %	(n)	Dislike %	(n)	Not indicated %	(n)
Apple	81.8	(139)	3.5	(7)	14.1	(24)	81.1	(137)	0.0	(0)	18.9	(32)
Banana	76.5	(130)	8.8	(15)	14.7	(25)	84.0	(142)	1.8	(3)	14.2	(24)
Blueberries	40.6	(69)	29.4	(50)	30.0	(51)	37.9	(64)	28.4	(48)	33.7	(57)
Cantaloupe	52.9	(90)	18.2	(31)	28.8	(49)	42.6	(72)	26.0	(44)	31.4	(53)
Grapes	77.7	(132)	4.1	(7)	18.2	(31)	79.9	(135)	1.2	(2)	18.9	(32)
Oranges	70.6	(120)	5.3	(9)	24.1	(41)	71.6	(121)	4.1	(7)	24.3	(41)
Peaches	70.0	(119)	5.9	(10)	24.1	(41)	62.7	(106)	8.9	(15)	28.4	(48)
Watermelon	71.2	(121)	8.2	(14)	20.6	(35)	71.6	(121)	7.7	(13)	20.7	(35)
Fruit Salad	54.1	(92)	17.1	(29)	28.8	(49)	53.3	(90)	13.0	(22)	33.7	(57)
Apple Juice	71.8	(122)	5.5	(11)	21.8	(37)	75.7	(128)	3.0	(5)	21.3	(36)
Applesauce	51.2	(87)	18.2	(31)	30.6	(52)	60.9	(103)	10.1	(17)	29.0	(49)
Orange Juice	76.5	(130)	4.7	(8)	18.8	(32)	75.1	(127)	4.1	(7)	20.7	(35)
Beans	81.2	(138)	2.9	(5)	15.9	(27)	75.1	(127)	8.9	(15)	16.0	(27)
Broccoli	61.2	(104)	18.2	(31)	20.6	(35)	40.8	(69)	37.3	(63)	21.9	(37)
Carrots	55.3	(94)	21.8	(37)	22.9	(39)	48.5	(82)	27.2	(46)	24.3	(41)
Celery	29.4	(50)	40.0	(68)	30.6	(52)	18.9	(32)	48.5	(82)	32.5	(55)
Corn	81.8	(139)	2.4	(4)	15.9	(27)	75.7	(128)	7.1	(12)	17.2	(29)
Greens	59.4	(101)	19.4	(33)	21.2	(36)	46.7	(79)	29.0	(49)	24.3	(41)
Lettuce	80.6	(137)	4.1	(7)	15.3	(26)	62.1	(105)	21.9	(37)	16.0	(27)
Peas	73.5	(125)	6.5	(11)	20.0	(34)	62.1	(105)	14.8	(25)	23.1	(39)
Bell Peppers	51.2	(87)	18.2	(31)	30.6	(52)	18.3	(31)	46.2	(78)	35.5	(60)
Potato	84.1	(143)	1.8	(3)	14.1	(24)	82.8	(140)	3.0	(5)	14.2	(24)
Squash	47.1	(80)	26.5	(45)	26.5	(45)	25.4	(43)	45.6	(77)	29.0	(49)
Tomato	67.6	(115)	13.5	(23)	18.8	(32)	46.2	(78)	31.4	(53)	22.5	(38)

Note. Percent values are the proportion of the total sample. (n) = the number of participants from the total sample

Table 4.6

Parent Reported Availability, Preference, and Child Preference

				Range	
Variables	N	M	SD	Min	Max
Availability					
Fruits	171	5.52	2.827	0	12
Vegetables	170	6.74	3.138	0	13
Both	171	12.22	5.267	0	24
Parent self-reported preference					
Fruits (liked)	170	8.23	3.739	0	16
Fruits (disliked)	170	1.33	1.777	0	10
Vegetables (liked)	171	7.78	3.419	0	15
Vegetables (disliked)	171	1.74	1.977	0	10
Total F&V liked	171	15.97	6.620	0	31
Parent reported child preference					
Fruits (liked)	170	8.21	3.932	0	15
Fruits (disliked)	170	1.08	1.535	0	6
Vegetables (liked)	171	6.01	3.378	0	15
Vegetables (disliked)	171	3.20	2.867	0	11
Total F&V liked	171	14.18	6.860	0	30

Results by Research Question

Research Question #1 - ***What are rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages***?

Most (80%) children in the sample stated a minimum of one message that fit a SCT construct definition. There were 40 children, 20% of the sample who did not state any message at all and 20.4% (n = 41) of children stated only one message that fit a SCT construct definition. A total of 436 messages were stated equating to an average of 2.27 (*SD* =1.78) messages stated per child. Number of messages stated by each child ranged from 0 to 12. On average, positive outcome expectancy messages were mentioned most frequently (*M* = .88, *SD* = 1.010, n =172). Command prompts (*M* =.38, *SD* .574, n = 74) and negative outcome expectancies (*M* = .34, *SD* = .616, n = 66) followed respectively (see table 4.7).

The independent samples t-test was used to determine if any statistical differences existed between means for gender and then for income levels. No statistically significant differences in messages stated were observed between males and females. However, a small statistically non-significant difference was seen as males stated negative reinforcements more than females (see Table 4.8). Statistically significant differences in messages stated were found between income groups (see Table 4.9). A statistically significant $t(162) = -1.21$ $p = .05$, $d = .31$ difference existed between children in households with an annual income > $20,000 (*M* = .09, *SD* = .283) who stated behavioral capability messages more than children in households earning less than $20,000 (*M* = .02, *SD* = .140). Income explained 31% of this difference. Positive outcome expectancy messages were stated more, at statistically significant levels $t(162) = -2.81$, $p = .006$, $d = .46$, by children in households earning > $20,000 (*M* = 1.19, *SD* = 1.10) than by children in households earning < $20,000 (*M* = .72, *SD* .929). Income explained 46% of this difference.

Negative outcome expectancies were stated more, at a statistically significant level $t(162) = -2.44$, $p = .016$, $d = .39$, by children living in households earning > $20,000 ($M = .50$, $SD = .707$) than by children in households earning < $20,000 ($M = .26$, $SD = .523$). Overall, children in households with income > $20,000 ($M = 2.85$, $SD = 1.83$) stated more messages than children in < $20,000 household ($M = 1.92$, $SD = 1.932$). This difference was statistically significant, $t(162) = -2.95$, $p = .004$, $d = .49$, with income explaining 49% of this difference.

Table 4.7

Frequency of Messages Stated by Children

				Range	
SCT Construct	N	Mean	SD	Min	Max
Environment/Situation					
Positive prompt	15	0.08	0.288	0	2
Command prompt	74	0.38	0.576	0	3
Negative prompt	0	0.00	0.000	0	0
Behavioral capability	8	0.04	0.200	0	1
Positive outcome expectations	0	0.00	0.000	0	0
Negative outcome expectations	4	0.02	0.143	0	1
Positive outcome expectancy	172	0.90	1.013	0	5
Negative outcome expectancy	66	0.34	0.620	0	3
Positive reinforcement	49	0.26	0.553	0	3
Negative reinforcement	45	0.23	0.524	0	3
Reciprocal determinism	3	0.02	0.124	0	1
Total number of messages	436	2.27	1.898	0	12

Note. n = 155 (80.7%) children provided at least one message with n = 37 (19.3%) of children provided no messages at all.

Table 4.8

Gender Differences in Frequency of Messages Stated by Children

	Males n = 99		Females n = 93		
SCT Construct	Mean	SD	Mean	SD	P
Environment/Situation					
Positive prompt	.07	.258	.09	.318	.714
Command prompt	.39	.550	.38	.606	.833
Negative prompt	-	-	-	-	-
Behavioral capability	.04	.198	.04	.204	.928
Positive outcome expectations	-	-	-	-	-
Negative outcome expectations	.03	.172	.01	.104	.346
Positive outcome expectancy	.93	1.003	.86	1.028	.638
Negative outcome expectancy	.32	.636	.37	.604	.637
Positive reinforcement	.27	.620	.24	.475	.652
Negative reinforcement	.30	.630	.16	.370	.061
Reciprocal determinism	.01	.101	.02	.146	.527
Total number of messages	2.37	1.997	2.16	1.789	.440

Table 4.9

Income Differences in Frequency of Messages Stated by Children

	< $20,000		> $20,000		
SCT Construct	Mean	SD	Mean	SD	P
Environment/Situation					
Positive prompt	.04	.196	.12	.378	.077
Command prompt	.34	.553	.45	.535	.217
Negative prompt	-	-	-	-	-
Behavioral capability	.02	.140	.09	.283	.050*
Positive outcome expectations	-	-	-	-	-
Negative outcome expectations	.03	.171	.02	.131	.632
Positive outcome expectancy	.72	.929	1.19	1.100	.005**
Negative outcome expectancy	.26	.523	.50	.707	.015**
Positive reinforcement	.25	.590	.21	.450	.650
Negative reinforcement	.26	.541	.24	.572	.860
Reciprocal determinism	.01	.100	.03	.184	.276
Total number of messages	1.92	1.932	2.845	1.833	.004**

Note: * $p < .05$, ** $p < .01$

Research Question #2 - ***What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and their consumption of fruit and vegetables at school?***

Percentages were used to report the average proportion of a fruits or vegetables children consumed at lunch. Percent values were then interpreted into an actual amount of a one child serving (1/2 cup) and a cup equivalent (see Table 4.11). Children consumed an average of 52.02% (*SD* = 19.75) of all fruits and vegetables (not including potatoes) served during the data collection week (see Table 4.10). This equated to an approximate average of ¼ serving of fruits and vegetables consumed daily. Since one child serving is equal to ½ cup, children consumed an average of only $1/8^{th}$ of a cup of all fruits and vegetables per day at lunch (see Table 4.11). Peas were the least consumed fruit or vegetable (M = 22.76%, *SD* = 33.62) with an average child serving size consumption of $1/5^{th}$ of a half cup serving or $1/10^{th}$ of a cup serving. Pineapple was consumed the most (*M* = 79.32, *SD* = 27.15) with an average child serving size consumption of ½ of a half cup serving or ¼ of a cup serving (see Table 4.11).

The average amount of vegetables only (not including potatoes) consumed by children was 31.58% (*SD* = 23.04). This equated to an average of $1/5^{th}$ of a daily half cup serving which is equal to $1/10^{th}$ of a cup. The average amount of fruits consumed 67.67% (*SD* = 25.160) by children was over twice vegetables. This equated to an average of ½ of a half cup serving daily or ¼ of a cup serving. Using the Pearson's Product Moment Correlation test for association, a statistically significant $r(190) = .320$, $p < 0.01$, $r^2 = .10$ relationship was found between vegetable consumption and fruit consumption among this population demonstrating a modest correlation. The independent samples t-test was used to determine in any statistical differences existed between consumption means for gender and then for income. No statistically significant

differences in consumption were observed between males and females. However, related to income, children in households with an annual income of < $20,000 ate more apple sauce, oranges, pineapple, average percent of F&V, average percent of F&V (not potatoes), and average percent of fruit at statistically significant levels with all variables attaining p values < .05 (see Table 4.12). Cohen's d was calculated to report effect size related to how income explained the difference. Values ranged from .36 to .53 demonstrating that income accounted for 36% to 53% of the difference in consumption. Children in homes earning > $20,000 consumed more mashed potatoes, wedge fries, and tater tots, but not at statistically significant levels.

Messages stated by children were compared to the amount of fruits and vegetables consumed at lunch. The Pearson's Product Moment Correlation test was used to determine if any association between variables existed. There was a small statistically significant relationship r (185) = -.151; p = .038, r^2 = .02 between command prompts (M = 0.38, SD = 0.576, n = 192) and average percent of potatoes consumed (M = 55.26, SD = 28.25, n = 195) (see Table 4.13) demonstrating a modest negative correlation. A non-significant association r(186) = -.127, p = .082. r^2 = .02 existed between negative outcome expectancies (M = .34, SD =.620, n = 192) and average percent of fruit consumed (M = 67.67, SD = 25.16, n = 196). This association became statistically significant using a one-tailed Pearson r(186) = -.127, p = .041, r^2 = .08 demonstrating a modest negative correlation. However, for children in households earning >$20,000, positive prompts had a statistically significantly relationship to; 1) total F&V consumed r(55) = .309, p = .023, r^2 = .10; 2) total F&V consumed (not potatoes) r(53) = .326, p = .016, r^2 = .11; and 3) total vegetables consumed r(53) = .367, p = .006, r^2 = .13 demonstrating modest positive correlations for all three relationships.

Table 4.10

School Lunchtime Percent Consumption of Fruits and Vegetables

Fruits and vegetables Served	N	Mean	SD	Range Min	Range Max
Monday					
Green beans	180	40.67	37.97	0	100
Mashed potatoes	180	32.89	42.00	0	100
Tuesday					
Peas	181	22.76	33.62	0	100
Apple sauce	181	65.36	44.28	0	100
Wednesday					
Wedge fries	180	70.94	35.76	0	100
Oranges	180	49.83	38.66	0	100
Thursday					
Salad	182	31.65	29.18	0	100
Fruit salad	182	75.60	24.80	20	100
Friday					
Tater tots	177	61.47	39.44	0	100
Pineapple	177	79.32	27.15	10	100
Average % of F&V consumed	196	52.91	17.70	13	93.75
Average % of F&V consumed (not potatoes)	196	52.02	19.75	10	97.14
Average % of potato consumed	195	55.26	28.25	0	100
Average % of fruit consumed	196	67.67	23.04	0	96.67
Average % of vegetables consumed	196	31.58	25.16	13.33	100

Table 4.11

Serving equivalents consumed by children

Fruits and vegetables Served	Grams served =100%	Grams in 1 cup	Cup equiv. served	Mean% consumed	Mean Grams consumed	Cup equivalent consumed	½ cup* Serving equiv.
Monday							
Green beans	36.1	250	.14	40.67	14.7	.06	<1/5
Mashed potatoes	46.0	250	.18	32.89	15.1	.06	<1/5
Tuesday							
Peas	53.5	246	.22	22.76	12.2	.05	<1/5
Apple sauce	82.0	256	.32	65.36	53.5	.22	1/2
Wednesday							
Wedge fries	102.0	250	.41	70.94	72.4	.29	1/2
Oranges (no peel)	78.0	156	.50	49.83	38.8	.25	1/2
Thursday							
Salad	39.6	170	.23	31.65	12.5	.07	<1/5
Fruit salad	82.5	250	.33	75.60	62.4	.25	1/2
Friday							
Tater tots	37.1	250	.14	61.47	22.8	.09	1/5
Pineapple	70.1	256	.27	79.32	55.5	.22	1/2
Average % of F&V consumed	62.3	233	.27	52.91	60.4	.14	1/4
Average % of F&V consumed (not potatoes)	63.1	226	.28	52.02	35.6	.15	1/4
Average % of potato consumed	61.7	250	.25	55.26	37.0	.14	1/4
Average % of fruit consumed	78.2	230	.34	67.67	72.7	.23	1/2
Average % of vegetables consumed	43.1	222	.19	31.58	41.3	.06	<1/5

Note: * USDA recommends ½ cup equivalents as a serving size for children aged 4 and 5. Five ½ cup servings should be achieved daily (USDA, 2011).

Table 4.12

School Lunchtime Consumption of Fruits and Vegetables by Income

Fruits and vegetables served	< $20,000			> $20,000			t(df)	p	Cohen's d
	n	M	SD	n	M	SD			
Monday							t(151)		
Green beans	99	40.50	39.08	54	35.93	36.42	.709	.479	.12
Mashed potatoes	99	32.22	42.37	54	34.81	41.88	-.363	.717	-.06
Tuesday							t(150)		
Peas	98	24.18	35.52	54	17.40	27.35	1.217	.226	.21
Apple sauce	98	73.16	40.50	54	55.93	47.68	2.356	.020*	.39
Wednesday							t(151)		
Wedge fries	101	69.41	36.76	52	76.15	33.44	-1.108	.270	-.19
Oranges	101	57.43	37.06	52	39.42	38.92	2.798	.006*	.47
Thursday							t(152)		
Salad	103	33.88	31.04	51	28.24	28.96	1.086	.279	.19
Fruit salad	103	78.74	23.83	51	71.57	26.49	1.693	.093	.28
Friday							t(149)		
Tater tots	102	60.00	39.48	49	68.98	37.82	-1.326	.187	-.23
Pineapple	102	82.65	26.66	49	72.86	27.99	2.079	.039*	.36
							t(162)		
Average % of F&V consumed	108	55.20	17.10	57	49.67	17.46	1.961	.052*	.32
Average % of F&V consumed (not potatoes)	108	55.56	19.06	57	45.55	18.61	3.234	.001**	.53
Average % of potato consumed	108	54.80	28.88	56	59.38	26.64	-.987	.325	-.16
Average % of fruit consumed	108	72.84	22.68	57	59.97	25.78	3.304	.001**	.53
Average % of vegetables consumed	108	32.44	23.92	57	27.28	22.20	1.349	.179	.22

Note: * $p < .05$, ** $p < .004$

Table 4.13

Inter-correlations for Fruit and Vegetable Consumption and Child Messages

School lunch consumption and SCT Construct	1	2	3	4	5	M	SD
1. Total F&V consumed	-	.890**	.640**	.694**	.738**	52.91	17.70
2. Total F&V consumed (not potato)	.-	-	.227**	.739**	.868**	52.02	19.75
3. Total potato consumed	-	-	-	.242**	.123	55.26	28.25
4. Total vegetable only consumed	-	-	-	-	.320**	31.58	23.04
5. Total fruit only consumed	-	-	-	-	-	67.67	25.16
Environment/Situation							
Positive prompt	.113	.085	.095	.101	.065	0.08	0.286
Command prompt	-.099	-.040	-.151*	.012	-.059	0.38	0.574
Negative prompt	a	A	a	a	a	0.00	0.000
Behavioral capability	-.027	-.019	-.018	.014	-.400	0.04	0.199
Positive outcome Expectations	a	A	a	a	a	0.00	0.000
Negative outcome Expectations	-.065	-.062	-.028	-.085	-.029	0.02	0.142
Positive outcome Expectancy	.007	.031	-.046	.051	.028	0.89	1.012
Negative outcome Expectancy	-.090	-.090	-.047	.025	-.127	0.34	0.617
Positive reinforcement	-.003	-.002	-.008	-.054	.029	0.25	0.551
Negative reinforcement	.012	.051	-.074	.033	.047	0.23	0.522
Reciprocal determinism	.016	.021	-.004	.003	.022	0.02	0.124
Sum total of messages given in all constructs	-.044	-.004	-.100	.043	-.019	2.27	1.898

Note: * $p < .05$; **$p < .01$; a = no data

Research Question #3 - ***What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and their knowledge of different kinds of fruits and vegetables?***

Fruits correctly identified (see Table 4.13) by the most children included apples (95.8%, n=184), bananas (95.8%, n=184), and strawberries (82.8%, n = 159). The most recognized vegetables included corn (79.7%, n = 153), carrots (72.4%, n = 139) and broccoli (50.5%, n = 96). Children correctly identified an average of 6.271 (*SD* = 1.93, n = 192) of the 11 fruits and 4.073 (*SD* = 2.344, n = 192) of the 12 vegetables (see Table 4.17). The independent samples t-test was used to determine if any statistical differences existed between knowledge means for gender and then for income. No statistically significant differences were observed based on gender. However, children in >$20,000 households (*M* = 12.15, *SD* = 3.83) identified more fruits and vegetables than children in <$20,000 households (*M* = 9.82, *SD* = 3.65) at statistically significant levels t(154) = -3.79, *p* = < .01, *d* = .62. Income explained 62% of this difference.

Messages stated by children were compared to the knowledge score children received for correctly identifying fruits and vegetables. Comparison was done using the Pearson's Product Moment Correlation test to determine if any association between the two variables existed. A statistically significant relationship *r*(190) = .152, *p* = .036, r^2 = .02 was found between command prompts (*M* = .38, *SD* = .574) and the total number of fruits and vegetables correctly identified (*M* = 10.34, *SD* =3.927) demonstrating a modest positive correlation (see Table 4.15). This statistically significant relationship r(99) = .210, p = .036, r^2 = .04, was retained when only including children in households earning < $20,000 again demonstrating a modest positive correlation. However, the relationship was statistically non-significant for children in households earning >$20,000.

There was a statistically significant relationship $r(190) = .436$, $p < .01$, $r^2 = .19$ between positive outcome expectancies ($M = .89$, SD 1.012) and the total number of fruits and vegetables correctly identified ($M = 10.34$, SD =3.927) demonstrating a modest positive correlation (see Table 4.15). A statistically significant relationship $r(190) = .341$, $p < .01$, $r^2 = .12$ was found between negative outcome expectancies ($M = .34$, $SD = .617$) and the total number of fruits and vegetables correctly identified ($M = 10.34$, SD =3.927). This also demonstrated a modest positive correlation. Lastly, there was a statistically significant relationship $r(190) = .461$, $p < .01$, $r^2 = .21$ between the total number of messages stated ($M = 2.27$, $SD = 1.89$) and the total number of fruits and vegetables correctly identified ($M = 10.34$, SD =3.927), demonstrating a modest positive correlation. These final three relationships retained statistical significance when SES groups were analyzed separately.

Table 4.14

Child Knowledge

Fruits and Vegetables	Correctly Identified n = 192 %	(n)	Incorrectly Identified n = 192 %	(n)
Apple	95.8	(184)	4.2	(8)
Banana	95.8	(184)	4.2	(8)
Blueberry	50.0	(96)	50.0	(96)
Cantaloupe	6.8	(13)	93.2	(179)
Grapes	79.7	(153)	20.3	(39)
Orange	74.0	(50)	26.0	(142)
Peach	29.2	(56)	70.8	(136)
Pineapple	28.6	(55)	71.4	(137)
Plum	6.8	(13)	89.1	(179)
Strawberry	82.8	(159)	17.2	(33)
Watermelon	77.6	(149)	22.4	(43)
Total				
Beans (green, string, snap)	50.0	(96)	50.0	(96)
Broccoli	50.5	(97)	49.5	(95)
Carrots	72.4	(139)	27.6	(53)
Celery	8.3	(16)	91.7	(176)
Corn	79.7	(153)	20.3	(39)
Greens (collards, mustards)	13.5	(26)	86.5	(166)
Lettuce	15.6	(30)	84.4	(162)
Peas	35.9	(69)	64.1	(123)
Bell peppers	8.9	(17)	91.1	(175)
Potatoes	33.3	(64)	66.7	(128)
Squash	5.8	(11)	94.2	(180)
Tomatoes	33.3	(64)	66.7	(128)

Note: Percent values are the proportion of the total sample. (n) = the number of participants from the total sample. Knowledge was a score based on number of fruits and vegetables correctly identified.

Table 4.15

Inter-correlations for Knowledge, Preference and Child Messages

SCT Construct	1	2	3	M	SD
1. Total number of F&V child correctly identified (knowledge)	-	.027	.038	10.34	3.927
2. Total number of F&V child likes (preference)	.027	-	-.743**	15.76	4.938
3. Total number of F&V child Dislikes (preference)	.038	-.743**	-	3.09	3.076
Environment/Situation					
Positive prompt	.073	.021	-.850	0.08	0.286
Command prompt	.152*	.025	-.025	0.38	0.574
Negative prompt	A	a	a	0.00	0.000
Behavioral capability	.088	.005	-.015	0.04	0.199
Positive outcome expectations	A	a	a	0.00	0.000
Negative outcome expectations	.006	-.111	.210**	0.02	0.142
Positive outcome expectancy	.436**	-.034	.050	0.89	1.012
Negative outcome expectancy	.341**	-.187**	.228**	0.34	0.617
Positive reinforcement	.109	-.025	-.004	0.25	0.551
Negative reinforcement	.037	.064	-.107	0.23	0.522
Reciprocal determinism	.128	.040	.024	0.02	0.124
Sum total of messages given in all constructs	.461**	-.063	.066	2.27	1.898

Note: * p < .05; **p < .01; a = no data

Research Question #4 - ***What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and their preference of specific kinds of fruits and vegetables?***

Proportions displayed as a percent were used to report the fruits and vegetables most preferred by children (see Table 4.16). The most preferred fruits self-reported by children were apples as 93.2% (n = 179) of children reported liking them. The next most popular fruits included grapes (90.6%, n = 174), bananas (89.6%, n = 173), and oranges (86.5%, n = 166). Vegetables of highest preference included corn (85.9%, n = 165), green beans (83.3%, n = 160), peas (79.2%, n = 152), and potatoes (75.0%, n = 144). Children liked an average of 8.49 (*SD* = 2.24, n = 192) of the 11 fruits and 7.27 (*SD* = 3.24, n = 192) of the 12 vegetables (see Table 4.16). The independent samples t-test was used to determine if any statistical differences existed between preference means for gender and then for income. No statistically significant differences were observed between genders, however, statistically significant differences were found between SES groups (see Table 4.18).

Messages stated by children were compared to the total number of fruits and vegetables children self-reported liking or disliking. The Pearson's Product Moment Correlation test was used to determine if any association between variables existed. There was a statistically significant relationship $r(190) = -.187$, $p = .009$, $r^2 = .03$ between negative outcome expectancies ($M = .34$, $SD = .617$) and the total number of fruits and vegetables liked by all children ($M = 15.76$, $SD = 4.938$) demonstrating a modest negative correlation (see Table 4.15). This relationship was statistically non-significant for both income levels when cases were analyzed separately. Conversely, a statistically significant relationship $r(190) = .228$, $p = .001$, $r^2 = .05$ was found between negative outcome expectancies ($M = .34$, $SD = .617$) and the total number of

fruits and vegetables disliked by all children (M = 3.09, SD = 3.07) demonstrating a modest positive correlation. This relationship was retained when including only children in < $20,000 income households, $r(100) = .218$, $p = .028$, $r^2 = .05$. The positive correlation demonstrated was also modest. The relationship was statistically non-significant when including only children in > $20,000 income household.

Negative outcome expectations (M = .02, SD = .142) had a statistically significantly association $r(190) = .210$, $p = .004$, $r^2 = .04$ to the total number of fruits and vegetables disliked by all children (M = 3.09, SD = 3.07) demonstrating a modest positive correlation. This association was retained when children in households earning < $20,000, $r(100) = .240$, $p = .015$, $r^2 = .06$ were analyzed separately demonstrating another modest positive correlation. The relationship was statistically non-significant when including only children in household earning > $20,000.

Negative reinforcements were not associated with any perceived message variable when analyzed for the entire sample. However, when analyzing income groups separately, a statistically significant association $r(57) = .260$, $p = .05$, $r^2 = .07$ was found between negative reinforcements and the total number of fruits and vegetables liked by children in households earning > $20,000 ($M$ = 14.53, SD = 5.38) demonstrating a modest positive correlation.

Table 4.16

Child Self-Reported Preference

	Like n = 192		Dislike n = 192		Never Tried n = 192	
Fruits and Vegetables	%	(n)	%	(n)	%	(n)
Apple	93.2	(179)	6.3	(12)	0.5	(1)
Banana	89.6	(172)	8.3	(16)	2.1	(4)
Blueberry	62.5	(120)	14.6	(28)	22.9	(44)
Cantaloupe	45.8	(88)	5.7	(11)	48.4	(93)
Grapes	90.6	(174)	4.2	(8)	5.2	(10)
Orange	86.5	(166)	9.9	(19)	3.6	(7)
Peach	85.4	(164)	6.8	(13)	7.8	(15)
Pineapple	74.5	(143)	14.1	(27)	11.5	(22)
Plum	55.2	(106)	4.7	(9)	40.1	(77)
Strawberry	83.3	(160)	11.5	(22)	5.2	(10)
Watermelon	82.8	(159)	14.1	(27)	3.1	(6)
Beans (green, string, snap)	83.3	(160)	12.0	(23)	4.7	(9)
Broccoli	50.0	(96)	35.9	(69)	14.1	(27)
Carrots	68.8	(132)	22.9	(44)	8.3	(16)
Celery	43.2	(83)	13.5	(26)	43.2	(83)
Corn	85.9	(165)	9.9	(19)	4.2	(8)
Greens (collards, mustards)	50.5	(97)	16.7	(32)	32.8	(63)
Lettuce	67.7	(130)	20.8	(40)	11.5	(22)
Peas	79.2	(152)	13.0	(25)	7.8	(15)
Bell peppers	31.3	(60)	12.5	(24)	56.3	(108)
Potatoes	75.0	(144)	17.7	(34)	7.3	(14)
Squash	41.9	(80)	7.3	(14)	50.8	(97)
Tomatoes	50.0	(96)	26.6	(51)	23.4	(45)

Note. Percent values are the proportion of the total sample. (n) = the number of participants from the total sample

Table 4.17

Summary of Knowledge and Preference for All Children

Knowledge/Preference variable	n	Mean	SD	Range	
				Min	Max
Fruits correctly identified	192	6.27	1.93	1	11
Vegetables correctly identified	192	4.07	2.34	0	10
Total F&V correctly identified	192	10.34	3.93	1	19
Fruits liked	192	8.49	2.24	1	11
Fruits disliked	192	1.00	1.38	0	9
Fruits never tried	192	1.51	1.60	0	10
Vegetables liked	192	7.27	3.24	0	12
Vegetables disliked	192	2.09	2.27	0	12
Vegetables never tried	192	2.64	2.18	0	11
Total F&V liked	192	15.76	4.93	2	23
Total F&V disliked	192	3.09	3.07	0	16
Total F&V never tried	192	4.15	3.36	0	21

Table 4.18

Differences in Child Knowledge and Preference by SES

	< $20,000 n = 100		> $20,000 n = 57		
Knowledge/Preference variable	Mean	SD	Mean	SD	p
Fruits correctly identified	6.06	1.81	7.02	1.18	.002**
Vegetables correctly identified	3.76	2.24	5.14	2.36	.000**
Total F&V correctly identified	9.82	3.65	12.16	3.83	.000**
Fruits liked	8.93	1.84	7.91	2.52	.004**
Fruits disliked	.85	1.33	1.23	1.48	.102
Fruits never tried	1.22	1.27	1.86	1.81	.010**
Vegetables liked	7.48	3.16	6.61	3.78	.109
Vegetables disliked	2.00	2.39	2.32	2.22	.416
Vegetables never tried	2.52	2.10	3.07	2.29	.128
Total F&V liked	16.41	4.47	14.53	5.38	.020*
Total F&V disliked	2.85	3.05	3.54	3.21	.181
Total F&V never tried	3.74	2.99	4.93	3.62	.028

Note * p < .02, **p <.01

Research Question #5 - ***What is the relationship between rural preschool aged (4 years old) children's perceptions of fruit and vegetable messages and the parenting practices (messages or actions) report using?***

Parenting practices are organized by SCT construct (see Table 4.19). The question number for each parenting practice is provided as it appeared in the parent questionnaire. The proportion of parents using each practice was calculated and is reported as a percent of the sample. Positive outcome expectancies (question #4), "I tell my child that eating F&V will make them strong and healthy," was the most used among all parenting practices (90.6%, n = 156). Environment construct, (question #32), "I make sure that fruits or vegetables are available around our house" was the second most utilized practice with 80.2% of parents using this practice. Observational learning, also considered modeling, (question #3) "I show my child that I enjoy eating F&V," and positive reinforcement (question #8) "I praise my child when I see them eat F&V," were the next most utilized practices with 80.1% of parents using both equally. Parenting practices not utilized much including the second positive reinforcement practice (question #12), "I reward my child with sweets if they eat their fruit or vegetables," was only used by 21.1% (n = 36) parents. The negative reinforcement (Question #11) "I make my child feel guilty when they don't eat vegetables" was the least used parenting practices by 9.9% (n = 17).

Messages stated by children were compared to parenting practices parents reported using. The Pearson's Product Moment Correlation test was used to determine if any association existed between variables. No statistically significant relationships were found between child perceived messages and parenting practices for all children in households of all income levels. However, for households earning < $20, 000, there was a statistically significant relationship $r(97) = .218$,

p = .03, r^2= .05 between child perceived message behavioral capability (M = .02, SD = .14) and parenting practice reciprocal determinism (M = .69, SD = .46) demonstrating a modest positive correlation. Additionally, a statistically significant relationship $r(97)$ = -.268, p = .007, r^2 = .07 existed between child perceived message negative outcome expectations (M = .03, SD = .17) and parenting practice reciprocal determinism (M = .69, SD = .46), also demonstrating a modest negative correlation.

In households earning > $20,000, there was a statistically significant relationship $r(58)$ = -.374, p = .003, r^2 = .14 between child perceived message positive prompts (M = .12, SD = .38) and parenting practice positive reinforcements (M = 1.00, SD = .59) demonstrating a modest negative correlation. There was also a statistically significant association $r(58)$ = -.413, p = .001, r^2 = .17 between child perceived message command prompts (M = .45, SD =.54) and parenting practice positive outcome expectancies (M = .93, SD = .25), also demonstrating a modest negative correlation.

Table 4.19

Parenting Practice Frequencies by SCT Construct

Question #/SCT Construct/Parent practice		Use the practice		Practice works best	
		%	(n)	%	(n)
Environment					
1	I play a game with my child to get them to eat F&V	28.0	(48)	2.3	(4)
2	I schedule meals that include F&V at the same times every day	40.9	(70)	2.9	(5)
5	I limit non-F&V snacking between meals	41.0	(70)	1.2	(2)
6	I place F&V where my child can easily reach them	67.3	(115)	4.7	(8)
7	I add something to make F&V taste better	31.0	(53)	2.3	(4)
9	I tell my child that their favorite cartoon characters eat F&V	41.3	(69)	2.9	(5)
15	I mix F&V with other foods my child likes	45.0	(77)	2.9	(5)
16	I offer F&V without forcing my child to eat them	63.7	(109)	2.9	(5)
17	I set limits on the amount of sweet drinks my child can have	64.3	(110)	4.1	(7)
18	I speak to my child with love so that they will eat F&V	50.9	(87)	1.8	(3)
19	I make F&V fun with shapes	19.3	(33)	0.6	(1)
20	I ask others to not go against me by giving my child candy or sweets	41.5	(71)	2.3	(4)
22	I tell my child they have to try at least a couple of bites but don't have to eat it all	67.8	(116)	6.4	(11)
23	I use F&V for snacks instead of things like cookies and chips	46.8	(80)	0.0	(0)
24	I include some form of fruit, vegetables or juice in most meals	75.2	(132)	2.3	(4)
27	I keep junk foods out of the house	15.8	(27)	0.6	(1)
28	We sit at the table and eat F&V together as a family	64.3	(110)	2.9	(5)
29	I cut back on how often my child eats fast food	59.6	(102)	0.0	(0)
31	I buy fruit or vegetables instead of junk foods	45.1	(77)	1.8	(3)
32	I make sure that fruit or vegetables are available around our house	80.2	(137)	2.3	(4)

Note. Percent values are the proportion of the total sample. (n) = the number of participants from the total sample

Table 4.19 (cont'd)

Parenting Practice Frequencies by SCT Construct

Question # / SCT Construct/Parent practice	Use the practice %	Use the practice (n)	Practice works best %	Practice works best (n)
Behavioral Capability				
10 I use mealtimes to teach my child about healthy eating	40.4	(69)	1.8	(3)
13 I ask my child to help me with food preparation	47.9	(82)	3.5	(6)
Positive Outcome				
4 I tell my child that eating F&V will make them strong and healthy	90.6	(156)	14.0	(24)
Negative Outcome				
30 I tell my child what will happen to them if they eat too many bad foods	54.4	(93)	0.6	(1)
Self-control				
33 I decide what F&V will be served and then let my child decide which of those they would eat	48.5	(83)	2.9	(5)
Observational Learning				
3 I show my child that I enjoy eating F&V	80.1	(137)	7.6	(13)
Positive Reinforcements				
8 I praise my child when I see them eat F&V	80.1	(137)	8.8	(15)
12 I reward my child with sweets if they eat their fruit or vegetables	21.1	(36)	0.0	(0)
Negative Reinforcements				
11 I make my child feel guilty when they don't eat vegetables	9.9	(17)	0.0	(0)
14 I insist that my child sits at the table until they eat their F&V	34.4	(52)	0.6	(1)
21 I keep my child from going to play if they don't eat their fruit or vegetables	14.1	(24)	1.2	(2)
26 I keep my child from having sweets if they don't eat their fruit or vegetables	31.6	(54)	1.2	(2)
Reciprocal Determinism				
25 I give my child the specific fruit or vegetable they like	66.0	(113)	2.3	(4)

Note. Percent values are the proportion of the total sample. (n) = the number of participants from the total sample

Research Question #6 – ***What, if any, differences exist between parent and child preference responses***?

A comparison of parent self-reported preference to parent reported child preference (see Table 4.20) was done using the Chi Square. McNemar test with binomial distribution was done to determined statistical significance of non-matching responses. Odds ratios were then calculated to determine who (parent or child) was more likely to like a certain fruit or vegetable. Results indicated that children liked seven of the fruits more than parents, while parents liked four of the fruits more than their children. Statistically significant differences were observed with three fruits. Parents reported that children were five times more likely to prefer bananas (OR = 5.33, SE = .629), p = .004 and almost four times more likely to prefer applesauce (OR = 3.80, SE = .503) p = .007. Conversely, the odds of a child liking cantaloupe was one third (OR = 0.33, SE = .408) p = .007 that of parents. Parents reported liking nine of the vegetables more than their children. Odds ranged from 40-95% less likely that a child liked vegetables over the parent (see Table 4.19).

Chi Square with McNemar test with binomial distribution was done to determined statistical significance of non-matching responses. Odds ratios and 95% confidence limits were then calculated to provide more information for interpretation of non-concordant results. Chi Square was also used to determine the actual parent-child concordance related to parent self-reported preference and child self-reported preference.

Next to compare parent self-reported preference and child self-reported preference (see Table 4.21) Chi Square with McNemar test was done again followed by odds ratios. Results demonstrated that children were less likely to report liking a fruit or vegetable than the parent. Only for blueberries (OR = 2.07, SE = .325), p = .032 and celery (OR = 4.67, SE = .450), p =

.000 did children report liking more than the parent at a significant level. Significant discrepancy levels existed for seven vegetables for which parents were more likely to report liking.

Chi Square was also used to determine the actual parent-child concordance related to parent self-reported preference and child self-reported preference from two separate vantage points. First, proportions were reported as a percent and confidence intervals were calculated based on all participants in each of the parent and child samples (see Table 4.23). Cantaloupe and watermelon were the only two fruits with overlapping confidence intervals. Conversely, bell peppers and tomatoes were the only vegetables that did not overlap. Second, using parent-child matched pairs only, Chi Square was used to determine the actual parent-child concordance related to parent self-reported preference and child self-reported preference (see Table 4.24). Concordance levels for matched pairs ranged from 46.5% - 90.0% for fruits and 32.4% - 87.1% for vegetables. These percentages show the percent of parent-child matched pairs who both self-reported liking the fruit or vegetable.

Parent reported child preference and child self-reported preference were compared using Chi Square with McNemar test followed by odds ratios for interpretation of non-concordant results. Discrepancies between matched-pairs were found for six fruits and vegetables at significant levels (see Table 4.22). In four instances children were more likely to report liking the fruit or vegetable compared to parent reports. In particular, children were 10 times more likely to report liking celery (OR = 10.00, SE = .606), p = .000 and 15 times more likely for squash (OR = 15, SE = 1.033), p = .001. Parents over-estimated their children like bananas and potatoes. Children were 80% less likely to report liking potatoes and 90% less likely to report liking bananas.

Table 4.20

Parent Self-Reported Preference vs. Parent Reported Child Preference

Fruits and Vegetables	p	OR	SE	95% CI	
				LL	UL
Apple	N/A	N/A	N/A	N/A	N/A
Banana	0.004*	5.333	0.629	1.554	18.304
Blueberries	1.000	0.941	0.348	0.476	1.863
Cantaloupe	0.007*	0.333	0.408	0.150	0.742
Grapes	0.070	7.000	1.069	0.861	56.897
Oranges	0.791	1.333	0.540	0.463	3.843
Peaches	0.454	0.600	0.516	0.218	1.651
Watermelon	1.000	1.000	0.426	0.434	2.307
Fruit Salad	0.383	1.625	0.449	0.674	3.921
Apple Juice	0.070	7.000	1.069	0.861	56.897
Applesauce	0.007*	3.800	0.503	1.419	10.177
Orange Juice	1.000	0.833	0.606	0.254	2.731
Beans	0.013*	0.167	0.764	0.037	0.745
Broccoli	0.000*	0.250	0.354	0.125	0.500
Carrots	0.188	0.609	0.339	0.313	1.183
Celery	0.005*	0.304	0.432	0.131	0.709
Corn	0.077	0.333	0.577	0.108	1.034
Greens	0.007*	0.333	0.408	0.150	0.742
Lettuce	0.000*	0.031	1.016	0.004	0.229
Peas	0.001*	0.167	0.624	0.049	0.566
Bell Peppers	0.000*	0.058	0.594	0.018	0.185
Potato	0.453	0.400	0.837	0.078	2.062
Squash	0.000*	0.125	0.474	0.049	0.317
Tomato	0.000*	0.171	0.442	0.072	0.408

Note: CI = confidence interval; OR = odds ratio; SE = standard error; LL = lower limit; UL = upper limit; * $p < 0.01$

Table 4.21

Parent Self- Reported Preference vs. Child Self-Reported Preference

Fruits and Vegetables	p	OR	SE	95% CI	
				LL	UL
Apple	0.791	0.750	0.540	0.260	2.162
Banana	0.678	1.300	0.421	0.570	2.965
Blueberries	0.032*	2.071	0.325	1.095	3.920
Cantaloupe	0.302	2.000	0.548	0.684	5.851
Grapes	1.000	1.000	0.535	0.351	2.851
Oranges	0.359	0.583	0.476	0.230	1.482
Peaches	1.000	1.000	0.500	0.375	2.664
Watermelon	0.424	0.667	0.408	0.300	1.484
Beans	0.003*	0.176	0.626	0.052	0.602
Broccoli	0.000*	0.325	0.319	0.174	0.608
Carrots	0.766	0.875	0.299	0.487	1.572
Celery	0.000*	4.667	0.450	1.932	11.270
Corn	0.049*	0.308	0.572	0.100	0.944
Greens	0.029*	0.409	0.396	0.188	0.888
Lettuce	0.000*	0.103	0.606	0.032	0.340
Peas	0.263	0.538	0.469	0.215	1.350
Bell Peppers	0.690	0.786	0.403	0.357	1.731
Potato	0.000*	0.125	0.612	0.038	0.415
Squash	0.503	1.500	0.456	0.613	3.670
Tomato	0.003*	0.321	0.383	0.152	0.681

Note: CI = confidence interval; OR = odds ratio; SE = standard error; LL = lower limit; UL = upper limit; * $p < 0.01$

Table 4.22

Parent Reported Child Preference vs. Child Self-Reported Preference

Fruits and Vegetables	p	OR	SE	95% CI LL	95% CI UL
Apple	N/A	N/A	N/A	N/A	N/A
Banana	0.012*	0.100	1.049	0.013	0.781
Blueberries	0.005*	2.800	0.368	1.360	5.764
Cantaloupe	0.770	3.000	0.577	0.968	9.302
Grapes	0.180	0.286	0.802	0.059	1.375
Oranges	0.096	0.385	0.526	0.137	1.079
Peaches	0.424	1.800	0.558	0.603	5.371
Watermelon	0.523	0.692	0.434	0.296	1.620
Beans	0.189	0.500	0.463	0.202	1.239
Broccoli	0.324	1.467	0.335	0.761	2.827
Carrots	0.229	1.615	0.353	0.809	3.226
Celery	0.000*	10.000	0.606	3.052	32.767
Corn	0.791	0.750	0.540	0.260	2.162
Greens	0.362	0.667	0.373	0.321	1.384
Lettuce	0.541	0.714	0.414	0.317	1.608
Peas	0.286	1.750	0.443	0.734	4.172
Bell Peppers	0.019*	3.750	0.563	1.245	11.299
Potato	0.000*	0.174	0.542	0.060	0.503
Squash	0.001*	15.000	1.033	1.981	113.560
Tomato	0.856	1.143	0.366	0.558	2.342

Note: CI = confidence interval; OR = odds ratio; SE = standard error; LL = lower limit; UL = upper limit; * $p < 0.01$

Table 4.23

Parent Self-reported Likes vs. Child Self-reported Likes for All Participants

	Parent Self-reported Likes n = 170				Child Self-reported Likes n = 192			
			95% CI				95% CI	
Fruits and Vegetable	% Liked	n	LL	UL	% Liked	n	LL	UL
Apple	81.8	(139)	74.5	87.1	93.2	(179)	88.5	96.2
Banana	76.5	(130)	69.2	82.5	89.6	(172)	84.2	93.4
Blueberries	40.6	(69)	33.2	48.4	62.5	(120)	55.2	69.3
Cantaloupe	52.9	(90)	45.2	60.6	45.8	(88)	38.7	53.2
Grapes	77.7	(132)	70.5	83.5	90.6	(174)	85.4	94.2
Oranges	70.6	(120)	63.0	77.2	86.5	(166)	80.6	90.8
Peaches	70.0	(119)	62.4	76.7	85.4	(164)	79.4	89.9
Watermelon	71.2	(121)	63.7	77.7	82.8	(159)	76.6	87.7
Beans	81.2	(138)	74.3	86.6	83.3	(160)	77.1	88.2
Broccoli	61.2	(104)	53.4	68.5	50.0	(96)	42.7	57.3
Carrots	55.3	(94)	47.5	62.9	68.8	(132)	61.6	75.1
Celery	29.4	(50)	22.8	37.0	43.2	(83)	36.2	50.6
Corn	81.8	(139)	74.5	87.1	85.9	(165)	80.0	90.4
Greens	59.4	(101)	51.6	66.8	50.5	(97)	43.3	57.8
Lettuce	80.6	(137)	73.7	86.1	67.7	(130)	60.5	74.2
Peas	73.5	(125)	66.1	79.9	79.2	(152)	72.6	84.5
Bell Peppers	51.2	(87)	43.4	58.9	31.3	(60)	24.9	38.4
Potato	84.1	(143)	77.6	89.1	75.0	(144)	68.2	80.8
Squash	47.1	(80)	39.4	54.8	41.9	(80)	34.7	49.0
Tomato	67.6	(115)	60.0	74.5	50.0	(96)	42.7	57.3

Note. Percent values are the proportion of the total sample. (n) = the number of participants from the total sample

Table 4.24

Parent-Child Matched Pairs Self-reported Preference Concordance

Fruits and Vegetables	MP	1		2		3		95% CI	
	n	%	n	%	n	%	n	LL	UL
Apple	140	4.3	(6)	5.7	(8)	90.0	(126)	83.5	94.2
Banana	139	9.4	(13)	7.2	(10)	82.7	(115)	75.2	88.4
Blueberries	86	33.7	(29)	16.3	(14)	46.5	(40)	35.8	57.5
Cantaloupe	57	17.5	(10)	8.8	(5)	73.7	(42)	60.1	84.1
Grapes	128	5.5	(7)	5.5	(7)	89.1	(114)	82.0	93.7
Oranges	120	5.8	(7)	10.0	(12)	84.2	(101)	76.1	90.0
Peaches	116	6.9	(8)	6.9	(8)	86.2	(100)	78.3	91.7
Watermelon	131	7.6	(10)	11.5	(15)	79.4	(104)	71.3	85.8
Beans	129	2.3	(3)	13.2	(17)	84.5	(109)	76.8	90.1
Broccoli	112	11.6	(13)	35.7	(40)	43.8	(49)	34.5	53.4
Carrots	117	17.9	(21)	20.5	(24)	53.8	(63)	44.4	63.0
Celery	68	41.2	(28)	8.8	(6)	32.4	(22)	21.8	44.9
Corn	132	3.0	(4)	9.8	(13)	87.1	(115)	79.9	92.1
Greens	85	10.6	(9)	25.9	(22)	61.2	(52)	50.0	71.4
Lettuce	122	2.5	(3)	23.8	(29)	73.0	(89)	64.0	80.4
Peas	121	5.8	(7)	10.7	(13)	82.6	(100)	74.5	88.7
Bell Peppers	49	22.4	(11)	28.6	(14)	42.9	(21)	29.1	57.7
Potato	130	2.3	(3)	18.5	(24)	79.2	(103)	71.1	85.6
Squash	53	22.6	(12)	15.1	(8)	60.4	(32)	46.0	73.2
Tomato	101	8.9	(9)	27.7	(28)	54.5	(55)	44.3	64.3

Note: MP = total number of matched pairs; 1 = child likes, but parent dislikes; 2 = parent likes, but child dislikes; 3 = full concordance with both parent and child liking; CI = confidence interval; LL = lower limit; UL = upper limit; Confidence interval calculated for full concordance (3).

CHAPTER 5

DISCUSSION

Consumption of Fruits and Vegetables

Parent consumption (modeling) of fruits and vegetables is a determinant of consumption in children. Parent self-reported consumption of fruits and vegetables was slightly lower than national reports. Nationally, 32.5% of adults aged 18-65 ate fruit two or more times a day (USDA, 2007). In the current study the rate was only 16.9%. Adults who consumed the recommended number of vegetables servings was 26.3% nationally (USDA, 2007), but only 22.1% in this study. Based on these statistics it is conceivable that the current sample of children is at risk compared to national norms due to the lack of parent modeling. Further investigation is warranted to understand reasons for the lower consumption.

Fruit and vegetable consumption was only recorded in the school environment which limits knowledge of the children's total daily consumption. Recording consumption in one environment could be viewed as inadequate. Parent reports are widely used to obtain child consumption data (Burrows et al., 2010). The current study attempted to minimize burden on parents and focused more on parent reports for child preference and parenting practices. Relating school consumption to parenting practices and child messages was done to understand if messages are retained and valued outside the home. This decision was based on the amount of time children spend at school. Children in this study received breakfast, lunch and afternoon snack at the preschool accounting for three of their major meals.

The week in which consumption data were collected, fruit (not juice) and vegetables were served at lunch all five days in accordance with USDA guidelines (USDA, 2010). Juice was served at breakfast three days and a fruit cup two days. Logistically it was not possible to record

morning consumption; hence only the lunch sample was taken. However, if the lunch data are treated like a sample, the current sample of children are not meeting their daily needs. On average, only half of two servings of fruits and vegetables were consumed by children at lunch (see table 4.11). Daily recommendations are for five half cup servings of fruits and vegetables daily (USDA, 2010). If this behavior is consistent throughout the day, many children are eating 2.5 servings or less of the 5 recommend servings of fruits and vegetables daily. Based on national rates for vegetable consumption reported by the USDA on the 2-5 year old population, the current sample fits with the lower 30% for consumption. Nationally, 35% of boys and 36% of girls consumed less than one serving of vegetables (USDA, 2010). On three days during the current study, a baked form of potato was served. This presents a challenge for these children to achieve the USDA recommendation for fruits (not juice) and vegetables (not including potatoes) per day.

Analyzed on a daily basis, vegetable (not including potato) consumption was an average of 31.58% (SD = 23.04) consumed. Fruit consumption was twice as high (67.67%, SD = 25.160) as vegetables. This is expected as children prefer sweet tastes, which fruit provides, over bitter tastes found in vegetables (Birch, 1999). Interestingly, green beans and peas were reported as liked by 85% and 79% of children respectively, but only an average of 40% of green beans and 20% of peas were consumed when served at the school. This could be the result of how they were prepared, or the type of product (canned vs. fresh).

Lastly, SES is a determinant of fruit and vegetable consumption with lower SES populations having less access and consuming less (Rasmussen et al., 2006). In the current study, this was not the case for child consumption at school. On average, children in households earning <$20,000 consumed more apple sauce, oranges, pineapple, overall more total fruit,

overall more total fruits and vegetables (not potatoes) combined, and overall more fruits and vegetables in total than children in households earning > $20,000. When looking at the latter three which are combined totals that have been averaged, income explains 53% of the difference for total fruit and total fruits and vegetables (not potatoes), and 32% of the difference for all fruits and vegetables total. Green beans, peas, salad, fruit salad, and total vegetables were also consumed more by children in households earning < $20,000, but not at statistically significant levels. Only potatoes were consumed more by children in household earning >$20,000. It is tempting to say that preference is the reason. However, reported preference in this study does not seem to match up with the notably overall low consumption of green beans and peas. Both vegetables were consumed more by < $20,000 income children, but not at a statistically significant level. A common complaint regarding cafeterias is the quality of the food being served, particularly canned vegetables. If households buy or grow fresh vegetables, this could account for the low consumption.

The pattern of higher consumption among the < $20,000 income household children is a good indicator of the importance of school lunches if food is scarce at home. Availability data did indicate a lower number of fruits and vegetables in households earning < $20,000. More research is needed to understand if this can be concluded. Any intervention done at this school would be misguided to focus more on the lowest SES population since the > $20,000 household income children consumed fewer fruits and vegetables. Economics play a large part in food choice, sometimes greater than preference (Evans, Sinclair, Fusimalohi, & Liava'a, 2001). Hence a school that only buys food that caters to the taste preferences of those who weigh economics over taste and quality, is creating an unintended disparity where children in > $20,000 households may be less likely to consume fruits and vegetables at school. As a result, parents

relying on a certain amount of fruit and vegetables to be consumed by their child at school may find their child falling short of goals. Children may not like the fruit or vegetable being served, or they may like the item but not in the specific form it is served or the way it is prepared at school. Schools would be better served by obtaining this type of preference information from parents to help increase acceptance of foods served at school. Communication with parents regarding what their child ate could allow parents to make modifications if ensuring their child consumes five servings of fruit and vegetables a day is a goal. Parents can compensate at home, or supply their child with the desired amount of fruits and vegetables.

The methodology used in the current study to assess consumption values was efficient and accurate. It provided the ability, at a low cost, to determine within +/- 5% how much a child had consumed. Baranowski et al, (2011) reported that more reference pictures increased the accuracy of estimating the amount of food consumed. There is likely a limit on this number of pictures. They used eight reference pictures; however, the current study utilized 10 pictures supporting this conclusion. Multiple pictures allowed for quick detail referencing and increased confidence in knowing the precise amount consumed.

Knowledge and Preference of Fruits and Vegetables

Knowledge and preference have been reported as determinants of fruit and vegetable consumption (Cerin et al., 2009; Dwyer et al., 2008; Krolner et al., 2011; Pérez-Escamilla, et al., 2008; Phometsi et al., 2006; Rasmussen et al., 2006). In the current study, children were asked to name the fruit or vegetable to achieve a correct answer. If a child could not name the fruit or vegetable, they were told what the item was followed by asking their preference. There were no statistically significant correlations between knowledge and preference implying a child needs only to recognize, but not name a fruit or vegetable in order to like it. Knowledge was associated

more often with messages stated by children at statistically significant levels when compared to preference or consumption.

It is likely that children who named more fruits and vegetables had been exposed to more and therefore received more information which could be conveyed. Children in households earning > $20,000 named more fruits and vegetables at statistically significant levels than children in households earning < $20,000. In addition, availability of fruits and vegetables was higher, to a statistically significant level, in households earning >$20,000 supporting the theory that increased exposure results in increased knowledge. However, in terms of preference for fruits and vegetables, children in < $20,000 households liked more. This is a difficult paradox to explain since preference develops from experience (Birch, 1999). If children in the lower income households have high preference, it is logical to think they have been exposed to all the foods they stated liking. This exposure or experience should in turn add to their knowledge base as it is easy for children to identify symbols (fruit and vegetable pictures) when at this developmental stage (Piaget, 1962). Multiple scenarios exist that could explain this paradox. First, the pictures were of low quality and children were unable to recognize the fruits or vegetables. This scenario is the least likely as the number of correct answers for fruits ranged from 1-11 out of 11 with at least 13 children identifying plums and 13 naming cantaloupe both of which were the least identified. Vegetable identification ranged from 0-10 out of 12 with 11 children identifying the least common vegetable (squash). The range for the total number of fruits and vegetables correctly indentified was 1-19. It is more likely that children had not seen the fruit or vegetable in the form shown in the picture or had never been exposed to it at all.

A second scenario is children's ability to name (recall) the fruit or vegetable may have been difficult. The name of the fruit or vegetable may not have been retained cognitively yet

resulting in lower knowledge scores. Recall is more difficult than recognition (Cabeza et al., 1997). Prior to beginning the interview phase, children were observed in the classroom. During naming activities, many children had difficultly naming shapes. This suggests a lack of exposure to such learning or an unwillingness to speak in social settings. During the interviews, many instances occurred when children recognized a fruit or vegetable and stated their preference before even naming the item. Some eventually named it, while others realized immediately when the item was named for them. Hearing the name of the item immediately sparked their recall. In these cases, the child would report liking, but may not have always correctly identified the fruit or vegetable. Hence, the child did not receive a correct score. Similar instances occurred where children knew the item and recognized it, but named the fruit or vegetable with a generic or kid friendly term. For example, lettuce was commonly named salad, and broccoli was named trees. The child did not receive a correct score for using these names. However, if they liked the fruit or vegetables, the preference score would immediately increase over the knowledge score.

A third possible explanation is that some fruits or vegetables look alike to a child or person who has not been exposed to different types frequently. Plums and fresh peaches were commonly named apples. However, peaches were shown in both the fresh and canned form making it easier for children to identify these as canned peaches over apples. Plums were so poorly recognized that a small experiment was conducted over two days with approximately 15 children. After an interview, children who could not name a plum were shown a real plum. However, all 15 children were still unable to name the plum or called it a small apple. This misidentification or misclassification occurred after the interview during which the picture had been named. This highlights two theories. One, the recall ability of the child is limited and

restricts their ability to name the plum even though it had been named in the interview. Second, children aged 2-7 classify objects based on similar characteristics (Piaget 1962). For example, children tend to group red items together regardless of shape, or conversely, group similar shaped items of different colors together. In addition, when exposure to similar looking items is low, the child may be unable to recognize distinguishing characteristics. When shown a plum, regardless of seeing a picture in the interview, the plum looks like a small apple and this is all the child recognizes. The apple is the prototype that all other similar looking items are named (Rosch, 1999). A similar phenomenon occurred with blueberries which were called grapes, bell peppers which were called hot peppers and collard greens which were called spinach.

Fourth, the methodology of the picture card game and sequencing of questions may have influenced responses. Once a fruit or vegetable was named, children were asked about their preference. The order of questions was always: "have you tried this?" If the answer was no, it would go in the never tried pile. If the answer was yes the next question was "which pile should it go in?" This question needed to be neutral. Asking a child "do you like it?" could easily fall victim to a yes prone child and inflate the "like" preference responses. Of course even before the interviewer speaks, a fruit or vegetable can also make the yes list if it looks good. Pictures of attractive looking food and full of color are more likely to be liked (Zampollo, Kniffin, Wansink, & Shimizu, 2012).

Fifth, a child's personality disposition may have been one that is innately shy and the child has yet to blossom into their full social capabilities. Hence on a knowledge task that cannot be faked, the child may lack the ability and confidence to provide an answer. When moving to the preference task, responses can potentially be given as they are subjective. This type of personality trait can be both genetic and environmental.

Finally, the environment in which the children live will play a part in how they interact outside the home. SCT explains behavior as a product of the environment as we learn from observation (Bandura, 1977). Self-esteem and behavior capability, both required for dynamic interaction in social settings, are highly influenced by the environmental stimuli the child receives. A population sample holds the potential to reflect a diverse range of family structure. Parenting styles ranging from the highly involved to negligent along with monetary availability, structure (single parent, traditional etc.), job status, and general social determinants. For example, children may live in an environment that is authoritarian where engagement with a parent is not reciprocal and involves a child being told to "sit and be quiet," "do not talk," "eat your food or you'll get a whopping." During interviews, many children reported receiving spankings for not eating dinner or fruits and vegetables. In these households, the expectation may be to eat whatever food is served with no rationale or conversation being fostered. In such environments, "yes" may be a natural response of children to avoid displeasing the adult and/or receiving punishment. If the child's tendency to say yes carries over to other environments, this could easily be a factor in interviews and further inflate the preference score. Alternately children in a neglectful household would lack any engagement whatsoever with the parent and are left to fend for themselves. In either of these environments, the lack of positive cognitive stimulus may incline children to be quiet during the interviews. Knowledge could never be faked; however, preference responses could have be a product of providing answers the child believed the adult interviewer wanted to hear. Conversely, higher income households have more options and resources to provide their children. These children may have received more cognitive stimulation from a stay at home parent or spent time in a childcare facility that fosters cognitive abilities. Children raised in low income households or with single parents would have

fewer opportunities such as childcare or stay at home parents. Only those with grandparents to care for them would possibly have better outcomes.

It is important to recognize that descriptions provided of less desirable home environments are both theory and reality, but do not encompass the entire sample of the current study. As stated throughout this dissertation, more information would be needed to fully understand each home environment and the social determinants to which each child is exposed.

Child Perceived Messages

Consistent with the literature (Bannon & Schwartz, 2006; Reynolds et al., 2002; Reynolds et al., 2004), positive outcome expectancies were the most commonly mentioned message by all children. This is consistent with parent responses as 90% of parents reported using positive outcome expectancies as a parenting practice. Positive outcome expectancies have been identified as a correlate to fruit and vegetable consumption that is strong enough to act as a mediator among 4th grade children (Reynolds et al 2002). Studies have not been identified that have used SCT and specifically target preschool children to assess fruit and vegetable messages and their relationship to fruit and vegetable consumption. While statistically significant associations were not achieved in the current study, the direction is clear that positive outcome expectancies were used most as a parenting practice and stated most by the children. This shows promise for the use of these types of messages among preschool children, and warrants experimental trials which control more for other influential variables. Additional messages mentioned by children included prompts and reinforcements which were only mentioned half as much as positive outcome expectancies but should also be researched.

Children in households earning > $20,000 stated more total messages about fruits and vegetables than children in households earning < $20,000. Specifically, behavioral capability

and positive and negative outcome expectancies were stated more at statistically significant levels. In a practical significance, income explained 49% of the difference for total messages, 31% for behavioral capability, 39% for negative outcomes, and 46% for positive outcomes. This provides evidence that researchers should consider income prior to implementing interventions related to communication. Previous research has not been identified that has looked at the differences between SES groups regarding types of messages children convey. Research has evaluated parenting styles and SES group differences concluding that coercive or authoritarian styles are less effective than authoritative (Patrick et al., 2005). It has also been reported that parents of low SES used more demanding language (Haire-Joshu et al., 2008). Hence, it is possible that the current study is consistent with the literature and households earning > $20,000 use more types of messages. Additionally, fruits and vegetables were more available in >$20,000 households providing an environment for more exposure, recognition, and discussion. An emic style of study may be necessary to determine message differences between the SES groups. Additionally, as discussed in the preference and knowledge section, understanding the child's home environment would give great insight into the child's perceived norms and potential social and personality disposition.

Messages and consumption.

Prompting is not recommended for increasing fruit and vegetable consumption, nor is restrictive styles of negative reinforcement (Birch and Ventura 2009; Galloway et al., 2006; Haire Joshu et al 2008; O'Conner, Hughes, et al 2010). Command prompts were negatively associated with potato consumption demonstrating some consistency with the literature regarding prompts being counterproductive. However, in this current study, positive prompts were positively associated with total fruit and vegetable consumption, total fruit and vegetable (not

potatoes) consumption, and total vegetable only consumption for children in > $20,000 households at statistically significant levels. Messages were categorized as positive prompts only if they were free from commands or directions and involved choice and autonomy for the child. Positive prompts also seemed to accompany action or modeling of fruit and vegetable consumption by the parent. Leading by example is a more positive and effective form of encouragement. Positive prompt messages included feelings "I love it" or choice "Would you like to eat them with me" or statements that provided more autonomy to a child and could arguably be a fostering of self-control (e.g. "don't have to eat if you are full"). A statement like "eat your broccoli please" can be said positively, but would be considered a command and has fallen into the counterproductive category of prompting that should be avoided (Galloway et al., 2006).

The definition of prompting can be defined differently based on the researcher and theory used. In some cases, as mentioned, a prompt may conceivably be a cue accompanied by parent modeling. It is prudent that the definition of prompt be revisited and clearer definitions created. Only with further research in which different types of cues are used along with modeling, could this hypothesis be supported or rejected. If appropriate, standard categorization criteria should then be created to allow researchers to be consistent with message categorization and best practices can be well informed. Caution should be taken when interpreting these associations as correlations between positive prompt messages and consumption were modest at best. Additionally, the variability in positive prompts shared with the three consumption variables discussed was not higher than 13%.

Messages and knowledge.

A statistically significant association existed between children's knowledge and the message variables positive outcome expectancies, negative outcome expectancies, and the total number of messages stated. Children who knew more also stated more messages implying four possible factors. These children were 1) cognitively more capable, 2) were more social and more likely to talk in the interviews, 3) had more exposure to fruits and vegetables accompanied by parents discussing more about them, or 4) a combination of any or all of the above.

Command prompts were positively related to knowledge for all children at statistically significant levels. When data were filtered by SES groups, the relationship was only maintained for children in households earning < $20,000. This relationship between low SES, knowledge and prompting, could be an indication of varying parenting styles and what parents believe works best or what is culturally and traditionally used. Research has reported that parents of low SES used more demanding language (Haire-Joshu et al., 2008).

Children in households earning > $20,000 exceeded children in < $20,000 households in knowledge scores at statistically significant levels. Cohen's d was used to understand the extent that income could explain this difference. Results demonstrated that income explained 62% of the difference in knowledge scores between < $20,000 household and > $20,000 households. Unlike consumption and preference in which an intervention should focus on children in >$20,000 households, a majority of intervention attention should be directed at knowledge for children in < $20,000 households. Similar to the discussion for knowledge vs. preference scores, it is conceivable that the home environment plays an important part in these income differences. While differences were clear based on income for the single variable knowledge, making conclusions about the association between messages and knowledge must be done with

care. The actual correlation demonstrated was modest at .41. Additionally, the amount of variability shared by all messages with knowledge was only 21%.

Messages and preference.

Interestingly, negative outcome expectations were positively associated to total fruits and vegetables disliked for all children at statistically significant levels, but with only a modest correlation. This association was also statistically significant for children in households earning < $20,000 but not for children in > $20,000 households. Negative outcome expectations were always a message involving wasting food. It was not possible to determine if children put value on the outcome "wasting" and hence the message was not coded as expectancy. More about wasting is discussed in the next section. Negative outcome expectancies were also positively associated to total fruits and vegetables disliked at statistically significant levels, but only for low SES when separated. In both cases, correlations were modest. The same statistically significant inverse relationship pattern held for negative outcome expectancies which were negatively associated to total fruits and vegetables liked for all children, but only for < $20,000 households when income groups were analyzed separately.

In a few interviews, children mentioned that fruits or vegetables they disliked also "made you sick." According to these children, only the fruits and vegetables they liked had positive outcomes. This possibly says something about their understanding of the reality that consumption equates to positive outcomes and non-consumption to negative outcomes. Instead, preference appears to be a deciding factor to what the outcome the fruit or vegetable had for the child. Children will dislike something they are not familiar with (Birch & Fisher, 1998; Hill, 2002). A hypothesis could be that this is an indicator of cognitive ability at this developmental stage. The interpretation is that since the child dislikes the item, it must be bad and therefore has

bad characteristics. However, this pattern held true only for children in households earning <$20,000, which indicates a possible difference in parenting practices based on SES. Future research should focus on parent perceptions of fruits and vegetables in relation to preference and income level. What the parents say about fruits and vegetables related to their likes and dislikes may provide insight into how they are valued. These perceptions could then be matched with child perceptions. Although relationships were statistically significant, correlations were modest and shared variability between variables never exceeded 5%. Hence, interpretation of these correlations should be done conservatively.

Messages and parenting practices.

About 90% of parents reported the use of positive outcome expectancies ahead of parenting practices like availability, modeling, and positive reinforcement to increase their child's fruit and vegetable consumption. O'Conner, Hughes, et al. (2010) reported that positive outcomes were one of the most used (94% of parents) parenting practices reported. However, four other practices related to modeling and availability (environment) were used equally or more. In the current study, the next two closest parenting practices (modeling and praise) were used by only 80% of parents. There are no mechanisms to determine why these differences exist between parents samples of the two different studies. It could be hypothesized that determinants such as culture or geography play a part, which a comparison study may reveal.

When all children were analyzed together, no statistically significant relationships were found, however, the pattern of SES group differences continued. For children in <$20,000 households, negative outcome expectations were negatively associated to parenting practices positive reinforcement and reciprocal determinism at statistically significant levels. All negative outcome expectation messages were related to wasting food. Determining if the children valued

"not wasting" could not be done, hence, could not be coded as negative outcome expectancy. Both behavioral capability and reciprocal determinism are gain based mechanisms. Knowledge and autonomy is gained with behavior capability while increased positive interaction between parent and child is gained with reciprocal determinism. The negative outcome expectation message "you're wasting" is directed specifically at the child. Like telling a child "you bad", the message could possibly insight guilt. In contrast to provide a message "we don't want to waste" or "that is wasteful" is more general and knowledge based and not directed at the child rather focus is on the behavior of wasting. In the case of telling a child they are bad or wasteful represents a different style of parenting communication when compared to behavior capability or reciprocal determinism which both attempt to build confidence and self-efficacy in a child.

Statistically significant negative relationships existed between positive prompts and parenting practice positive reinforcements and between command prompts and parenting practice positive outcome expectancies for children in households >$20,000. These negative relationships could indicate a pattern of authoritative parenting practices resulting in fewer counterproductive prompts or negative statements stated by children. Additionally, positive prompts (possibly associated with modeling) occur before and during the behavior whereas positive reinforcements are either a praise or reward and occur after the behavior. Hence there is a timing and context difference. In the case of command prompts, these types of messages stress the action, whereas positive outcome expectancies stress the why a behavior should be done. In both cases, they represent very different parenting practice philosophies making it plausible for them to be negatively associated. Alternatively, these messages may be the only ones a child recalls. All correlations observed were modest making it impractical to assert any decisive conclusions.

Concordance Issues for Evaluations

A unique component of the current study was the ability to match parent and child responses. Concordance of preference reporting was high among popular and liked fruit and vegetable items including bananas, apples, grapes, apple and orange juice. These items ranked high in like preference concordance in another study (Skinner et al., 1998). However, blueberries, cantaloupe, celery, squash, and bell peppers were fruits and vegetables readily available in local stores, but not popular among this population. Analysis revealed low concordance of reporting among these items, indicating a divergence of agreement with non-popular food items. This is consistent with Skinner et al. (1998) who reported high concordance with liked items and low concordance with disliked items.

Parents, especially mothers have been shown to be accurate reporters of what their children like and eat (Burrows et al., 2010). Unpopular fruits and vegetables may have produced a low agreement for various reasons. Parents who do not offer a fruit or vegetable to their child and have not seen them consume the item may be unsure of their child's preference. In these situations the parent may have guessed the child's preference or responded with their own personal preference causing a reporting bias. Additionally, children's tastes fluctuate at this age (Skinner et al., 1998) making it difficult for concordance assessments. Children may like an item one day and not the next. Evaluators of interventions should proceed with care when analyzing parent and child reports or with fruit and vegetables choices used in interventions.

Preschool and Researcher Relationship

Role of school teachers and staff.

The director of the school played an important part in this research project. Like any relationship, there was an initial tentativeness as trust and understanding needed to be developed.

By presenting a good idea and obtaining the director's support, she became an advocate for the project. The most important aspects of the initial presentation to the director were the relevance of the project to the children and the minimal amount of assistance teachers would need to provide. The director expressed concerns about extra work placed on teachers already experiencing staff cuts, wage freezes, and increased student numbers in classes. It was imperative to provide assurance that no additional work would be brought upon the teachers. This concern could only be alleviated as the project progressed, but more importantly the support of the teachers would be instrumental in alleviating the director's concerns.

Obtaining buy-in from the teachers at the first orientation meeting was paramount to the success of the current study. Once the project was presented, the relevance of the study played dividends in inspiring teacher interest. Next, a clear statement of project goals and required procedures that needed to be adhered to for IRB purposes was explained. This allowed teachers to provide specific solutions based on their experience and gave them an aspect of control in the process. No set procedure for collecting parent surveys was stated, only guidelines that needed to be adhered to for participant protection. Teachers were quick to offer ideas and also volunteered to collect surveys and informed consent forms from parents when collecting other school paperwork. Without this buy-in and method of survey collection, parent response rate could very well have been lower.

The experience of the teachers regarding the logistics of the preschool daily schedule and their knowledge of each other's tendencies were invaluable for developing the best method for phase 2, the tray waste collection. Each day lunches were observed, teachers were asked what would be disruptive and what would be feasible. The consistent communication of ideas allowed teachers to understand the requirements of the study and provide ideal suggestions based on their

schedules and child management preferences. Once again this allowed teachers to gain some ownership of the study.

Teacher experience with school timetables, schedules, and logistics was also helpful for phase 3, the child interviews. Initially, all students in a class were going to be interviewed prior to moving on to the next class. However, the classes were on staggered schedules putting different classes on the playground, in the classroom, in the lunchroom, or on a field trip at one time. After discussions with teachers, the method of staggering interviews with the classes became the most efficient method. Only 2-3 students from a class were interviewed before moving to the next class. This allowed for the maximum number of interviews to be done daily.

As children were asked to participate in interviews, teachers always demonstrated enthusiasm in front of the children which helped sell the project. Teachers were very careful not to use coercive language with children like "help", but helped children who were innately shy feel comfortable during interviews. Teacher comfort with the project and confidence in the principal investigator (PI) actual gave the PI a sense of comfort with children. The greatest fear was to be in a difficult situation with a child. This never happened as the PI was always seen as a fellow teacher. Teachers were always open to class visitations and assistance with teaching. The extra hands and set of eyes were welcomed. Teachers acceptance of the PI as a peer, gave comfort to the students which was essential during the child interview phase. Other small details that teachers were helpful with were flexibility with schedules to help the interview process. In addition, treating the PI like a teacher gave students confidence to participate in interviews.

Importance of participating in school activities.

Teachers were helpful and open to the principal investigator for numerous reasons. It helped to have public school teaching experience and an understanding of the demands of

teaching. Also, having respect for teachers by not asking them to commit more of their time to something that was not part of the curriculum and may distract them from students. However, it was most important to show a genuine concern for the children by helping them with tasks, taking the time to talk with them when they asked questions, and interacting with them like a teacher would. Other methods of showing concern were volunteering around the school by fixing playground equipment, cleaning up in the lunch room, and helping during big events like Grandparents day and Thanksgiving lunch. Providing an extra set of hands like a teacher or visiting parent would, demonstrated usefulness and respect rather than being in the way. All of these qualities were recognized by teachers who saw a quality human being conducting the research and not just a researcher taking information away. Since ending data collection in November 2011, involvement and communication continued through spring 2012. Attending the preschool Christmas concert in December, presenting results of the study in March 2012, helping with Family Fun-day in April 2012 demonstrated continued respect for the school and the teachers and students who work and learn there. This show of respect and commitment resulted in numerous invitations, including one to the end-of-year teacher brunch, a continuation of this research for school years to come, and an open invitation from the director, "you are always welcome."

Importance of results to preschool.

A full report of the results from this dissertation was presented to the preschool. The quantitative data related to child lunchtime fruit and vegetable consumption in the cafeteria was the most informative to the school. These data can potentially help the school lobby for different styles of food (i.e., fresh/frozen vs. canned) and possibly a revaluation of preparation. For example, the average consumption of peas and green beans was the lowest of all fruits and

vegetables served during the week of data collection. Now that the school is armed with concrete quantitative evidence, moving away from canned varieties of vegetables may be a more convincing argument. Motivation to try a new style is potentially higher. Conversely, foods that were highly consumed should stay on the menu. If this evidence is not convincing enough, it warrants a study to determine what styles or fruits and vegetables are most frequently used by the population. It is possible that children in this study are used to garden grown vegetables, since the area is a farming community. As a result, their taste preference may not be for canned varieties. Alternately, there may be a proportion of children who eat out frequently, which could also be addressed. Understanding child preference could undoubtedly assist the school in saving money from wasted food. Caution must be taken in this process to encourager new food introduction while catering to preference. Otherwise children will continue to have a limited range of taste preferences. These suggestions are more about determining what style of a vegetable a child will eat. If the children like peas, which the parent surveys and interviews indicated, but they are not eating them at school, determining what the disconnect is should be the priority. Ultimately, the information could be used to lobby the school board to look at changes to the menu.

Parent surveys included parent consumption of fruits and vegetables, home availability, parent preference, parenting practices, and parent knowledge of how many servings of fruits and vegetables are needed for good health. All of this information provides the preschool with knowledge of the food environment in which children are exposed. Education can be tailored to meet the needs of both children and parents. Children do many projects at school that can and already integrate nutrition information. These projects can be a means of involving and educating parents. Additionally, if teachers know parents do not eat fruits and vegetables, there

need not be any surprise to a child's eating habits at school. However, this helps teachers address the situation accordingly and encourage children appropriately.

The child interview data gives insight into the understanding children have about outcomes of a behavior. Knowing that children value specific outcomes related to consuming fruits and vegetables provides teachers with the knowledge that there is potential to change or foster a child's eating habits. Teachers can frame fruit and vegetable messages in varying ways to target specific valued outcomes. This ensures the full spectrum of what individual children value are reached during a lesson about eating apples. For example, some children may eat apples to avoid cavities or going to the doctor. Others may not care about those outcomes and like how apples make them strong or their hair pretty. Addressing multiple values allows teachers to develop lessons with more effective behavioral outcomes.

Conclusions

This study sought to explore how child perceived messages related to child fruit and vegetable consumption, preference and knowledge. Overall, some statistically significant associations existed, however, only modest correlations were demonstrated and effect sizes were very small. Behavior is complex and reasons why children consume fruits and vegetables are multifaceted as many known determinants of fruit and vegetable consumption exist. When attempting to measure variables as specific as messages, experimental trials may be the only way to determine how strong an association can be attained by a message and ultimately achieving a desired behavior outcome. With so many message types, as demonstrated with SCT, attaining the necessary frequency of a specific message needed to promote a desired behavioral outcome does not appear possible with a cross-sectional study involving a sample of less than 200 participants. As described throughout the discussion, making any definitive conclusions

regarding the correlations observed cannot be done as correlations and effect sizes are modest and small. Explanations provided in the discussion section are theories based on observed trends and may help build foundations for more controlled studies.

Children conveyed many messages about fruits and vegetables; however, this did not translate into statistically significant associations to fruit and vegetable consumption. This was particularly true when looking at income differences as those who said the most messages, children in > $20,000 households, did not consume the most fruit and vegetables. Variables like preference may have been stronger determining factors. As mentioned in the discussion this could be a product of the type of food and the style of the food served.

Differences observed between SES groups where apparent when variables were assessed separately. Differences extended to the actual messages stated by children, consumption, knowledge, preference and to parenting practices used by parents. To determine if there is true interaction between these variables, an intensive qualitative study that allows parents to provide input related to specific messages they give their children is recommended. As mentioned previously in the discussion, gaining an understanding of the parent perception of fruits and vegetables and what they value from consuming them would provide rich insight into the child's perspective. This qualitative study could be accomplished using similar methodology to how O'Conner, Hughes et al. (2010) generated the parenting practices list used in this study. The purpose would be to create a message list that focuses on what is said by parents not what is done. Care must always be taken to ensure a proportional sample representing all income levels. Since many parents may not be willing to share all messages they say, methods that allow for confidential or anonymous responses should be provided. Lastly, to determine if a mechanism exists that mediates fruit and vegetable consumption, what the child consumes at home should be

monitored along with school consumption. This will account for any differences between the school and home environment.

In sum, some differences observed between SES groups were statistically significant and in some cases income explained 50 – 60% of the difference. There is a plethora of personality diversity among individuals and families. Even within a school environment where curriculums are standardized, teacher expectations can vary. The concept of an inexpensive school-based intervention involving framed messages about fruits and vegetables could provide a consistent foundation from which to build. Ascending from this foundation must be an environment that includes school-board policies that require providing and funding fresh fruits and vegetables more often than canned and processed. Impacting the home environment is a great challenge due to the variability in family environments as outlined in the discussion section. In some cases, environments have become a cyclical norm requiring a more systemic look at society. In reality, interventions may not reach all families or those who truly need the interventions. In the case of the current study, parents and grandparents of children at the participating preschool demonstrated high levels of involvement. However, many may not have the knowledge or monetary capacity to implement a comprehensive fruit and vegetable intervention. Hence, future research methodology should make considerations for differences seen at various income levels including within the lowest levels, within the highest levels and between low, medium and high income levels.

Study Strengths

- Multiple known determinants of fruit and vegetable consumption were measured and used to inform the current study. As a result, a wealth of information pertinent to understanding the fruit and vegetable environment of the child was obtained. Clear

conclusions can be made about what determinants of fruit and vegetable consumption were being nurtured or neglected. Additionally, potential determinants were observed paving the way for future research.

- The use of theory provided a solid framework from which methods could be developed. SCT allowed for the operationalization of child perceived messages and parenting practices into eleven constructs of behavior explanation. Methodology was more efficient and reliable as SCT has been utilized successfully in previous fruit and vegetable consumption research. Additionally, using SCT constructs to essentially standardize messages into fewer variables provided the ability, while limited, to assess concordance of behavioral constructs.
- The food environment was evaluated from both the parent and child perspective providing the ability to see gaps in information such as those found with preference, and understand what is valued by children compared to parents.
- The total sample sizes of children, parents, and matched parent-child pairs. Since the preschool facility served the entire county, results from this sample are generalizable to the county.
- Actual consumption of fruits and vegetables was measured using previously validated methodology. Assessing consumption in this manner minimized over or underestimations that may occur from recall and self-repots. Tray-waste analysis was accurate enough to assess consumption within +/- 5% and the conversion to an actual gram weight and USDA serving size equivalent. Additionally, multiple raters assessed pictures achieving a mean inter-rater reliability score of .879. Servings were all

standardized based on USDA serving size recommendations. All children received the same food making this type of tray waste analysis feasible.

- Methodology of interview data collection and coding. Interviews were guided by scripted notes and used pictures with multiple forms of fruits and vegetables to increase chances of recognition. Data collection had redundancy with notes and audio being used to ensure minimal information was missed during interviews. Message coding was done with three raters increasing the reliability of coding.
- Principal investigator participated in school events and helped in classes for eleven days prior to conducting child interviews. This visibility built trust with both teachers and children aiding in comfort level during interviews. The principal investigator also had previous teaching experience with this age group of children.
- Teacher buy-in and assistance with methodology, survey collection, and trust building with children. Teachers recognized the time commitment and genuine concern given to the children by the principal investigator. They valued the research being done seeing it as beneficial to the children and offered support in any manner necessary.

Study Limitations

- Total sample size was good and total number of child perceived messages was high, however, the number of messages stated per SCT construct was low. Parent sample sizes also varied based on parent responses for each question on the parent survey. Ultimately, as choices for response variables increased sample sizes were reduced. Similarly, when stratified by income, sample sizes in many income levels were low. All of these factors limit the type of analysis that can be done and the amount of information that can be interpreted with confidence. Without larger samples, larger power was not achieved.

Readers should interpret these findings with caution and pay close attention to correlation coefficients (r values) and effect sizes (r^2 values for Pearson's Correlations and Cohen's d values for Independent t-tests). Overall Pearson's Correlations are small with no correlations stronger than .5 being observed. Additionally, the r^2 values ranged from .02 to .21 limiting explanation of shared variability. Cohen's d values were better, ranging from .3 to .6 arguably making some specific results strengths of the current study.

- The parent survey included items related more to parenting practices rather than focusing on types of messages conveyed. Actual messages were not gathered from parents, only the child. As a result, assessing parent-child concordance in this area was difficult. Parenting practices that operationalized into a SCT construct may not be fully relevant to the messages conveyed by the child in the matching SCT construct.
- Serving sizes, while standardized, could have varied slightly when dished out under rushed conditions. Additionally, it was difficult to ensure children did not share food, play with food or remove food from the plate until after pictures were taken. This was controlled for well as teachers aided greatly in this process, however, some exceptions could have occurred.
- Context in which SCT was utilized to interpret data. Only messages (things said specifically about fruits and vegetables) were operationalized into SCT. This potentially missed information about the food environment the child may have described. For example, providing a description of dinner time was not considered a message.
- Concordance analysis was difficult and limited to preference in this study. Using the same instrument and line of questioning on both parent and child sample was not possible

with preschool children due to limited cognitive abilities of young children. Additionally, not all fruits used in the child assessment were listed in the parent survey.

- In the availability and preference inventory for parents, the option to add items was not utilized fully. Only 15 parents actually wrote in other fruits and vegetables. Listing more would be better than having parents add additional ones.
- Limited cognitive capabilities of preschool children. Traditional pen and paper, or inventory type questioning is impractical. Children require non-leading open-ended type questioning (Dickenson, Poole, & Limon, 2005) to elicit true self-reported responses. Unfortunately some of these responses were not understandable and others did not fit into the SCT constructs. The context in which the child was conveying a message could not always be clarified. In addition to actual cognitive capabilities, a child's desire or ability to convey their knowledge may have been limited by their social capabilities. An authoritarian home environment or lack of socialization may have left some children feeling uncomfortable or unsure how to communicate with adults particularly one that is not a primary care giver. Conversely, the ability to practice self-control in social settings is not mastered by children at this age predisposing them to an inability to sit still for long periods of time.
- Home consumption of fruits and vegetables was not gathered limiting knowledge of the children's full day fruit and vegetable consumption.
- Reliant on honesty of respondents.
- Interviewer fatigue as discussed in the methods chapter. While strategies were used to mitigate fatigue, it must be conceded that not every interview was executed at equal energy levels and cognitive awareness.

Implications

- Working with preschool children is feasible and can be done as part of a comprehensive evaluation. Methodology used in the current study allowed for quick, efficient, and accurate data collection despite the challenges involved when working with children.
- Possible concordance issues were revealed and require attention during assessments.
- Provides insight for schools regarding considerations for menu improvements.
- Pictures are an inexpensive way of assessing knowledge
- This study supports the notion that predictors of fruit and vegetable consumption vary with age. Positive outcome expectancies did not reach significant levels as reported with 4^{th} graders in other studies. It is possible preschool children have yet to truly value the outcomes. This may imply that a strong parent-child bond is more important for preschoolers who are just coming into a sense of independence.
- The definition of prompting should be revisited particularly when modeling of fruit and vegetable consumption accompanies verbal communication.

Public Health Implications

- The nutritional behavior of young children can provide insight to foster healthy adults. Eighty percent of the children who were obese from ages 10-15 were obese at age 25 (Centers for Disease Control and Prevention, n.d). Impacting nutritional practices early in life can influence health outcomes such as: 1) delaying the onset of obesity related disease precursors such as, hypertension, atherosclerosis, and blood lipid and insulin disorders, (Cole, Bellizzi, Flegal, & Dietz, 2000), 2) reducing direct and indirect costs related to obesity and poor diet, and 3) deaths relating to chronic diseases such as diabetes, stroke, and heart disease (CDC, 2008).

- A comprehensive assessment of a sample population should involve both parent and child prior to beginning an intervention.
- The current study demonstrates that young preschool children can and should be involved. Preschool age is a time when parents are traditionally relied upon for information instead of the child. However, the preschool developmental stage in life is much different from infant, toddler, or school age. Taste preferences are changing and independence both cognitively and physically is rising. Public health need not miss the opportunity to have an impact early in the lifespan.

Future Research

- Increase sample sizes of participants in every income bracket and from other geographical areas.
- Inclusion of anthropometric and health status data (biomarkers).
- Develop and validate a list of child perceived messages derived from SCT.
- Conduct an emic study to explore parent messages exclusive from other parenting practices.
- Experimental trials to explore the effectiveness of specific kinds of messages
- Explore the difference in SES groups, specifically why higher income populations stated more messages and why lower income consumes more fruits and vegetables at school.
- Interventions that allow parents and children to prepare foods together.
- Comparison of fruit and vegetable consumption in both school and home environment

- As the need for improving a child's diet grows and the realization that the best time to do so is with younger ages, more research needs to focus on how to work with a young, cognitively limited, but very cognitively aware population.

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APPENDIX A

IRB APPOVAL LETTER

Georgia Southern University
Office of Research Services & Sponsored Programs

Institutional Review Board (IRB)

Phone: 912-478-0843
Fax: 912-478-0719
IRB@GeorgiaSouthern.edu
Veazey Hall 2021
P.O. Box 8005
Statesboro, GA 30460

To:	Andrew Hansen Moya Alfonso Health and Kinesiology
CC:	Charles E. Patterson Vice President for Research and Dean of the Graduate College
From:	Office of Research Services and Sponsored Programs Administrative Support Office for Research Oversight Committees (IACUC/IBC/IRB)
Initial Approval Date:	July 7, 2011
Expiration Date:	July 7, 2012
Subject:	Status of Application for Approval to Utilize Human Subjects in Research

After a review of your proposed research project numbered **H11447** and titled **"Pre-School Children's Perceptions of Fruit and Vegetable Messages and Their Relationship to Parenting Practices, and Child Knowledge, Preference, and Consumption,"** it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable. You are authorized to enroll up to a maximum of **220** subjects.

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research.

If at the end of this approval period there have been no changes to the research protocol; you may request an extension of the approval period. Total project approval on this application may not exceed 36 months. If additional time is required, a new application may be submitted for continuing work. In the interim, please provide the IRB with any information concerning any significant adverse event, **whether or not it is believed to be related to the study**, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator **prior** to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a *Research Study Termination* form to notify the IRB Coordinator, so your file may be closed.

Sincerely,

Eleanor Haynes

Eleanor Haynes
Compliance Officer

APPENDIX B

PARENT PACKET

Cover Page

Informed Consent

Parent Survey

Preschool Fruit and Vegetable Project Cover Page

Informed Consent

and

Parent Survey

Thank you for agreeing to complete this survey. This survey is a method of gathering more information about children's fruit and vegetable preferences and what parents do to encourage children to eat fruits and vegetables. We hope to use this information to inform your school and other schools on how to better promote nutrition to children. All of your responses will be kept confidential. No names will be associated with an ID number or survey. Only the collective information of all participants will be shared. Questions: call Andrew Hansen at 912-478-0261 or 912-531-4960.

Completing the Informed Consent and Survey:

1) After reading the informed consent (explained in orientation), sign the agreement to participate sheet.

2) Completing the survey will take about 10 minutes.

3) Be sure your child's school ID number gets filled in on the first page of the survey. If you do not know your child's ID number, print their name on the agreement to participate form and the envelope (see below).

Returning the Survey:

1) When you have completed the survey keep this cover page and the parental informed consent form with my contact information.

2) Be sure to put the signed agreement to participate form and the completed survey in the envelope. (The researcher will separate these forms and keep them separate for confidentiality).

3) Seal the envelope.

4) Print your child's name on the envelope. (The envelope will be separated from the survey after your child's ID number is printed on the survey).

5) Return the envelope containing completed survey and consent form to your child's teacher.

JIANN-PING HSU COLLEGE OF PUBLIC HEALH

DEPARTMENT OF COMMUNITY HEALTH EDUCATION AND BEHAVIOR

PARENTAL INFORMED CONSENT FORM

Pre-school Children's Perceptions of Fruit and Vegetable Messages and Their Relationship to Parenting Practices, and Child Knowledge, Preference and Consumption.

Dear Parent or Guardian:

My name is Andrew Hansen and I am a doctoral student and instructor at Georgia Southern University. I am the primary investigator conducting this research to help complete my degree, and because of my interest in educating children about health and physical education. Teaching in the school systems and coaching has helped me understand the importance of parent and child input for me to be a better teacher.

The purpose of this research is to understand what preschool children think and know about fruits and vegetables and how this compares to what fruits and vegetables they eat at school. Additionally, we hope to understand better what parents do to encourage their children to eat fruits and vegetables and if these parent practices extend to the school lunchroom.

If you agree to participate in this study, you will be asked to complete a survey. You will be asked to answer questions about yourself, what fruits and vegetables you eat, and what parenting practices you use to encourage your child to eat fruits and vegetables. The survey will take approximately 10 minutes to complete. This study has been reviewed by Georgia Southern University Office of Research and Sponsored Programs and is categorized as minimal risk. It is possible you will have some discomfort answering questions, however, no more than if your doctor or pediatrician were asking the questions.

If you give permission for your child to participate, she/he will have the opportunity to participate in two activities. (If you have more than one child to participate, please contact the primary investigator).

1) What fruit and vegetables your child eats at lunch will be recorded for one week. After your child returns their lunch tray to the kitchen, a digital picture of the tray will be taken. No pictures of your child will be taken, only the tray. Digital images of the trays will be assessed to determine the amount of fruits and vegetables consumed.
2) Your child will be asked to play a fruit and vegetable picture card game. He/she will name some fruits and vegetables and sort them based on likes and dislikes. Your child will then get a chance to share what they think and know about fruits and vegetables and why they eat or don't eat them. Your child's responses will be audio recorded to ensure information is not missed by the researcher. The interview will be done in your child's regular classroom so your child will be in a familiar and safe environment. It will be done to one side of the classroom so as not to interrupt the teacher or other class activities, but also so other children can't see or hear your child's responses. This picture card game will last about 10-15 minutes.

The risks to your child from participating in this study are no more than would be encountered in everyday life or in a regular school day in the classroom or lunchroom. They may experience some shyness and discomfort similar to being asked questions by their teacher in class.

There are no direct benefits this study can offer to you or your child. However, when all data is combined; there are indirect benefits to you and society. The study may determine the most effective messages that encourage children to eat fruits and vegetables.

To protect the confidentiality of you and your child, a unique ID number supplied by the school will be used to record your information. Your name and your child's name will not be associated with this ID number or the information collected. The researcher will not have access to any of the school information related to your child's ID number. All information collected for this study will be kept in a locked filing cabinet at Georgia Southern University. Only the researchers on this study will have direct access. Following the procedures of the Georgia Southern University Institutional Review Board, data must be stored in locked cabinets for a minimum of 3 years after this study has ended before being destroyed. Once all individual information has been gathered and entered into a data file, it will be analyzed as combined data. Therefore, no individual data will be identifiable. The results will show the collective responses of all who participated. Only this collective information will be shared with the school and published in public health journals. Data may also be used in combination with future research.

To ensure accurate collection of information, audio recordings will be taken during child interviews and digital images will be taken of food trays. All audio recordings and digital images will be kept in password protected files on a flash drive in a separate locked cabinet in an office at Georgia Southern University. All audio data will be destroyed after being transcribed into a Microsoft Word document. Digital data of lunch trays will be maintained for a minimum of 3 years before being destroyed.

Your participation in this study is voluntary. You may refuse to answer any question. You may refuse to participate, withdraw at any time without penalty, or submit a blank survey. Your decision will not result in the loss of any benefits you and your child are otherwise entitled to from this preschool center.

Your child will also be told that he or she may stop participating at any time without any penalty. Your child may choose to not answer any question(s) he/she does not wish to for any reason. Your child may refuse to participate even if you agree to her/his participation. Your child's decision will not result in the loss of any benefits you and your child are otherwise entitled to from this preschool center.

You must be 18 years of age or older to consent to participate in this research study and to provide consent for your child to participate. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date. I am also asking your permission for your child to participate in this study. Your child will be asked verbally to give their personal approval "assent" before enrolling them in this study.

We encourage and you have the right to ask any questions about this study at any time. To contact the Office of Research Services and Sponsored Programs for answers to questions about the rights of research participants please email IRB@georgiasouthern.edu or call (912) 478-0843. **This research has been reviewed and approved by the GSU IRB under the protocol: H11447.**

Thank you very much for your time.

Andrew Hansen *(Primary Researcher)*
Community Health Education and Behavior - Major
Health and Kinesiology - Instructor
ahansen@georgiasouthern.edu
912-478-0261

Dr. Moya Alfonso *(Advisor)*
Public Health - Professor of Community
Health Education and Behavior
malfonso@georgiasouthern.edu
912-478-0966

AGREEMENT TO PARTICIPATE

You are voluntarily making a decision whether or not to participate in this research study. **Your initial signature** certifies that the consent form has been fully explained to you and that you have decided to participate**.**

Your second signature certifies that you give permission for your child/children to participate**.** Your signature also certifies that you have had all of your questions answered to your satisfaction. If you think of any questions during the course of the study, please contact the investigators.

You will be given a copy of this consent form to keep.

Print your name: _____

Print your child's name: _____

1) Your signature here means that **you agree** to participate in this project.

_____ _____

Signature of Participant **Date**

2) Your signature here means that **you agree to allow your child to participate** in this project. In addition, you are agreeing that you understand that you cannot force your child to participate in this study. (If you have more than one child to participate, please contact a member of the research team).

_____ _____

Signature of Participant **Date**

_____ _____

Signature of Witness **Date**

Parent Survey

Child's school ID# _____

1. What is your relationship to the child you have enrolled in this Pre-School Center?
   _____Mother
   _____Father
   _____Other (please specify) _____

2. Does the child live with you? ____Yes _____No

3. Do you live in the City of Swainsboro? _____Yes _____No

4. If no, what is the name of the town or city_____

5. Approximately how many miles from Swainsboro is this?
   _____Less than 10 miles
   _____10-19.99 miles
   _____20-29.99 miles
   _____More than 30 miles

6. What is your marital status?
   _____Single never married
   _____Married
   _____Separated
   _____Divorced
   _____Widowed

7. What is your age? _____

8. Please place an "X" beside the race you identify with.
   _____Asian American / Asian
   _____African American / Black (non-Hispanic)
   _____Hispanic / Latino/a
   _____American Indian / Alaska Native
   _____European American / White (non-Hispanic)
   _____Bi-racial / Multi-racial (please specify) _____
   _____Other (please specify) _____

9. What is your total household income?
   _____ Less than $10,000
   _____$10,000 to 19,999
   _____$20,000 to 29,999
   _____$30,000 to 39,999
   _____$40,000 to 49,999
   _____$50,000 to 59,999
   _____$60,000 or more

10. What is the highest level of education you have completed?
    _____Less than High school
    _____Some High school
    _____High school/GED
    _____Some College
    _____2 year college degree
    _____4 year university degree
    _____Master's degree
    _____Doctoral degree
    _____Professional degree

The following questions are related to your personal fruit and vegetable consumption.

1. How many servings of fruits and vegetables combined do you think a person should eat EACH DAY for good health? _____ # of servings

2. About how often did you eat or drink the following foods in the past month? (Please circle one option for each question).

1. 100% orange juice or grapefruit juice									
Never	Once to three times per month	Once to two times per week	Three to four times per week	Five to six times per week	Once per day	Two times per day	Three times per day	Four times per day	Five times per day
2. Other 100% fruit juices, not counting fruit drinks									
Never	Once to three times per month	Once to two times per week	Three to four times per week	Five to six times per week	Once per day	Two times per day	Three times per day	Four times per day	Five times per day
3. Green salad (with or without other vegetables)									
Never	Once to three times per month	Once to two times per week	Three to four times per week	Five to six times per week	Once per day	Two times per day	Three times per day	Four times per day	Five times per day

4. French fried or fried potatoes									
Never	Once to three times per month	Once to two times per week	Three to four times per week	Five to six times per week	Once per day	Two times per day	Three times per day	Four times per day	Five times per day
5. Baked, broiled or mashed potatoes									
Never	Once to three times per month	Once to two times per week	Three to four times per week	Five to six times per week	Once per day	Two times per day	Three times per day	Four times per day	Five times per day

3. About how many servings of the following foods did you eat in the past month? (Please circle one option for each question)

1. About how many servings of vegetables did you eat, NOT counting salad or potatoes?									
Never	Once to three times per month	Once to two times per week	Three to four times per week	Five to six times per week	Once per day	Two times per day	Three times per day	Four times per day	Five times per day
2. About how many servings of fruit did you eat, NOT counting juices?									
Never	Once to three times per month	Once to two times per week	Three to four times per week	Five to six times per week	Once per day	Two times per day	Three times per day	Four times per day	Five times per day

4. The following questions ask if you had some specific fruits and vegetables in your home in the last week and what you and your child like.
    a. In column "A" please place an **check mark** "√" by EACH specific food item you had in your home in the last week, whether you actually ate these foods or not.

    b. Please place a **check mark** "√" by EACH food you like (column B) or dislike (column C). Do the same for your child in column D and E.

	A	B	C	D	E
Fruits	In my home in the last week	I like	I dislike	My child likes	My child dislikes
1. Apples					
2. Apple juice					
3. Applesauce					
4. Bananas					
5. Blueberries					
6. Cantaloupe					
7. Grapes					
8. Oranges					
9. Orange juice					
10. Peaches					
11. Watermelon					
12. Mixed fruit salad					
13. Other fruits (please list)					
Vegetables					
1. Beans (green, string, snap)					
2. Broccoli					
3. Carrots					
4. Celery					
5. Corn					
6. Greens (collards, mustards)					
7. Lettuce					
8. Peas					
9. Bell peppers					
10. Potatoes					
11. Squash					
12. Tomatoes					
13. Other vegetables (please list)					

5. The following is a list of parenting practices that parents have reported using to get their children to eat fruits and vegetables (F&V).

Please place a check mark "√" by EACH practice you use. As you read each practice, think about the ONE practice you do that works the best and CIRCLE that ONE practice.
For example: if you use # 1 and 2 and #1 works the best for you, you would mark it like this:

1. √ I play a game with my child to get them to eat F&V
2. √ I schedule meals that include F&V at the same times every day

1. _____I play a game with my child to get them to eat F&V
2. _____I schedule meals that include F&V at the same times every day
3. _____I show my child that I enjoy eating F&V
4. _____I tell my child that eating F&V will make them strong and healthy
5. _____I limit non-F&V snacking between meals
6. _____I place F&V where my child can easily reach them
7. _____I add something to make F&V taste better
8. _____I praise my child when I see them eat F&V
9. _____I tell my child that their favorite cartoon characters eat F&V
10. _____I use mealtimes to teach my child about healthy eating
11. _____I make my child feel guilty when they don't eat vegetables
12. _____I reward my child with sweets if they eat their fruit or vegetables
13. _____I ask my child to help me with food preparation
14. _____I insist that my child sits at the table until they eat their F&V
15. _____I mix F&V with other foods my child likes
16. _____I offer F&V without forcing my child to eat them
17. _____I set limits on the amount of sweet drinks my child can have
18. _____I speak to my child with love so that they will eat F&V
19. _____I make F&V fun with shapes
20. _____I ask others to not go against me by giving my child candy or sweets
21. _____I keep my child from going to play if they don't eat their fruit or vegetables
22. _____I tell my child they have to try at least a couple of bites but don't have to eat it all
23. _____I use F&V for snacks instead of things like cookies and chips
24. _____I include some form of fruit, vegetables or juice in most meals
25. _____I give my child the specific fruit or vegetable they like
26. _____I keep my child from having sweets if they don't eat their fruit or vegetables
27. _____I keep junk foods out of the house
28. _____We sit at the table and eat F&V together as a family
29. _____I cut back on how often my child eats fast food
30. _____I tell my child what will happen to them if they eat too many bad foods
31. _____I buy fruit or vegetables instead of junk foods
32. _____I make sure that fruit or vegetables are available around our house
33. _____I decide what F&V will be served and then let my child decide which of those they would eat

34. _____If there are practices or messages you use not listed, please "X" this option and list.

APPENDIX C

FRUIT AND VEGETABLE WEIGHT CALCULATIONS FORM

Fruit and Vegetable

Weight Calculations for Standard Ten Pictures

Date:

	Weights		
Percent	Tater Tots	Pineapples	
100	37.1	70.1	
10% increment	3.71	7.01	
20	7.42	14.02	
30	11.13	21.03	
40	14.84	28.04	
50	18.55	35.05	
60	22.26	42.06	
70	25.97	49.07	
80	29.68	56.08	
90	33.39	63.09	

APPENDIX D

CHILD ASSESSMENT

CHILD ASSESSMENT

Instructions

1. Thank the child and explain how to play, by showing the car picture then the people.
2. Start the fruits and show one picture at a time. If the child asks to flip cards, let them.
3. Ask the child:"What is this?" Put a check beside fruit or vegetable child correctly identifies below.
4. Ask the child if they "like" and "dislike" and place by matching face. Circle fruits the child likes and X dislikes, underline those a child hasn't tried or doesn't know if they like or dislike
   Extra space is provided for additional comments child volunteers about the fruit or vegetable.
5. If a child answers all, try some challenge fruits and veges.

Fruits

Apples	Bananas	Blueberries
Cantaloupe	Grapes	Oranges
Peach(es)	Pineapple	Plum
Strawberries	Watermelon	
CHALLENGE		
Kiwi	Mango	Melon
Pear	Nectarines	

Vegetables

Beans (green, string, snap)	Broccoli	Carrots
Celery	Corn	Greens (collards, mustards)
Lettuce	Peas	Potato
Peppers	Squash	Tomato
CHALLENGE		
Cauliflower	Cucumber	Okra
Onion		

Open-ended Question Segment

1. Who makes up your family? (Likely response: Mother, Father, Brother, Sister, Grandparents)
    a. Who do you eat with at home most of the time?

2. Pretend you are at home sitting down to eat. Your (identify primary caregiver) wants you to eat some of these (For the like and dislike pile). What happens?
    Probe:
    a. What does your (identify primary caregiver) tell you about those F&V?

    b. What does your (identify primary caregiver) tell you so you will want to eat them?

    c. What does your (identify primary caregiver) say after you eat them?

    d. What does your (identify primary caregiver) say if you don't eat them?

3. If you wanted a friend to eat these (like or dislike pile), what would you say?
    a. What will happen if I eat them?

    b. What do they do for you?

Probes:

4. What do you like about fruits and vegetables?

5. What don't you like about fruits and vegetables?

6. What happens to us when we eat fruits and vegetables?

7. What happens if we don't eat fruits and vegetables?

8. What do F&V do for our bodies? _____

9. We need to eat our F & V because they _____

10. If we don't eat our F&V we _____

11. I don't eat my F&V's because_____

12. DON'T FORGET - Follow-up with What do you like about being Strong, Healthy, Big

APPENDIX E

SCT PRIORI CODE SHEET

SCT Priori Code List
Construct, Assigned Code, and Description

Construct	*Code*	*Description*
Environment	SP	Physically external features or stimuli with which the person interacts
Situation		how the person perceives of the environment
Behavioral capability	BC	Know what the correct behavior is and then having the skill to accomplish it
Outcome Expectations		What the individual expects to happen if the behavior is performed.
Outcome Expectancies		The amount to which the persons values the give outcome.
Positive	PO	If the behavior is performed, a net gain occurs that is independent of control others
Negative	NO	If the behavior is not performed, a net loss occurs that is independent of the control of others.
Self-Control	SC	Person monitors their own behavior, comparing personal behavior to self-made standards or goals, and self-efficacy
Observational learning	OL	Process of learning a behavior by watching others actions and reinforcements.
Reinforcements		The response of others to an individual's behavior
Positive	PR	The addition of a desirable stimuli that increases the specific behavior
Negative	NR	The removal of an undesirable stimuli that increases the specific behavior
Self-efficacy	SE	The belief or confidence a person has in themselves to accomplish a behavior and negotiate behaviors.
Emotional Coping/Management	Not Measured	Healthy and unhealthy strategies an individual uses to deal with emotional arousal.
Reciprocal Determinism	RD	The constant and reciprocating interaction between the person, behavioral, and environmental determinants

APPENDIX F

MESSAGE CONSOLIDATION FORM

Child Message Consolidation Form

Class #:_____

Positive Outcomes	ID number	Negative Outcomes	ID number
Positive Reinforcements	ID number	Negative Reinforcements	ID number
Environment/Situation Prompts	ID number	Others (BC, SC, OL, SE, RD)	ID number

APPENDIX G

TRAY WASTE ANALYSIS CRITERIA

Criteria for determining percent of fruit or vegetable left on plate.

Fruit or Vegetable	Number of pieces that represent 10% increment									
	10%	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**
Green beans	1	3	6	10	13	16	19	22	25	28
Mashed potatoes	Must base of visual – Consider thickness (opaqueness) of mash and area covered. Visualize how it would look if pulled together into one pile.									
Green peas	22-24	44-46	65-68	84-88	106-110	120-130	140	160	170	190
Applesauce	Must base of visual – Consider thickness (opaqueness) of sauce and area covered. Visualize how it would look if pulled together into one pile.									
Orange wedges	Each wedge is 33.33%. Look at each wedge in thirds. Just juice squeezed no fiber gone is 10% gone.									
Wedge fries	Two little ones are 25% each Big one = 50%									
Salad	Must base of visual – Consider amount of tomato, cucumber, and pepper left. Considered area covered and approx. number of lettuce leaves deep.									
Fruit salad	1-2	4-5	7-8	11-12	15-16	19-20	22-23	25-25	39-30	32-35
Tater Tots	0.5	1	2	2.5	3	3.5	4	5	5.5	6
Pineapple	4	8	14	17	20	24	28	33	36	40

APPENDIX H

DATA MANAGEMENT

Data Management Plan

Data Preparation for Analysis

Child Data

1. Identification numbers and informed consent status for all 220 children were entered into the data set in SPSS.

2. All children (n=19) without informed consent were deleted.
   New child sample size n=201.

3. All children (n=2) who withdrew from the school before being interviewed were assigned a code of 99 for the interview section. They were not deleted as parent and/or consumption data was still available.
   New child sample size n=198

4. All children (n=6) who did not want to participate when asked, did not talk in the interview, or asked to return to class during the interview were assigned a code of 99 for all missing interview variables. They were not deleted as parent and/or consumption data was still available.
   New child sample size n=192

5. All children (n=192) who completed an interview and ate at school at least once during the tray waste data collection period were.

6. Child demographics
   a. MISSING DATA = 99

7. Child knowledge is entered as 0=incorrect and 1=correct.
   a. Total number of fruits correctly named will be calculated.
   b. A total number of vegetables correctly named will be calculated.
   c. A combined total number of fruits and vegetables correctly named will be calculated.
   d. MISSING DATA =99

8. Child preference is entered as 0=dislike, 1=like, and 2=never tried.
   a. Total number of fruits liked will be calculated.
   b. Total number of fruits disliked will be calculated.
   c. Total number of fruits never tried will be calculated.
   d. Same will be done for vegetables.

e. Separate columns representing a combined total of the number of fruits and vegetables, liked, disliked, never tried will be calculated. This will be done using ___ within a case in order to total all
f. MISSING DATA – 99

9. Child consumption is entered as a both a percent of fruits and vegetables consumed and amount in grams.
    a. Total percent of fruits and vegetables consumed (including potatoes) for the week proportional to the number of days present at the school cafeteria will be calculated.
    b. Total percent of fruits and vegetables consumed (not including potatoes)for the week proportional to the number of days present at the school cafeteria will be calculated.
    c. Total percent of potatoes consumed for the week proportional to the number of days present at the school cafeteria will be calculated.
    d. Percentages were determined based on standard photographs used to compare tray waste.
    e. Children who brought their lunch and did not eat cafeteria food supplied by the school did not meet inclusion criteria and received a code for missing data.
    f. MISSING DATA = 999, 888, 777

10. Fruit and vegetable messages:
    a. Child responses were written down on individual interview recording sheets. All responses were short and concise, even with the open-ended nature of the study, audio tape transcribing was not necessary. All responses were written down during the interviews. When a child spoke a lot, words were not herd or understood; "Listen to audio" was recorded on the interview recording sheet. They were then listened to at a later time to ensure all conversation was captured.

    b. Each interview recording sheet was reviewed. Messages the child quoted were given codes based on how they operationalized into Social Cognitive Theory.
        i. SP = Situation prompts (e.g. "Eat it!")
        ii. PO = Positive outcome expectancies (e.g. "They good for you")
        iii. NO = Negative outcome expectancies (e.g. " You will get sick")
        iv. PR = Positive reinforcements (e.g. "Good job" or "You can have a cookie")
        v. NR = Negative reinforcements (e.g. "You don't get a drink")
        vi. SE = Self-efficacy (e.g. "Do you want to help me cook?")
        vii. RD = Reciprocal determinism (e.g. "Daddy eats, so I ask for one, Mommy buys more")

    c. Messages will be totaled by construct and entered accordingly as a continuous variable.

d. Samples of these messages will be collated to provide an example list under each construct.

e. MISSING DATA – There will be none based on 1-5. Children who provide no message or don't know will be coded as a "0"

Parent Data

1. Identification numbers for all 220 children were entered into the data set in preparation to match parent survey to child ID number.

2. All parents (n=19) who did not sign an informed consent for their child and did not fill out a survey were deleted from the data set.
   New parent sample size n= 201
3. All parents (n=38) who signed an informed consent, but did not fill out a survey had no data or codes entered. However, only the student ID is represented in the data set, therefore it was kept in order to house student data
   New parent sample size n= 182

4. Demographics, consumption, availability, preference, or parenting practices:
   a. MISSING DATA = 99 except age = 999

5. F&V availability in the last week is entered as 0=No not in home and 1=Yes in home.
   a. Any F&V added to list by parents will be entered and kept since only totals will be used in correlation analysis.
   b. Total number of fruits available will be calculated.
   c. Total number of vegetables will be calculated.
   d. Total number of F&V combined will be calculated.
   e. MISSING DATA = 99. This will not be used for fruits added by other parents.

6. Parent preference reported for self and child is entered as 0=dislike, 1=like, and 2=not indicated
   a. Total number of fruits liked will be calculated.
   b. Total number of fruits disliked will be calculated.
   c. Total number of fruits with no preference indicated will be calculated.
   d. Same will be done for vegetables.
   e. Separate columns representing a combined total of the number of fruits and vegetables, liked, disliked, and no preference indicated will be calculated.

f. MISSING DATA – any blanks will be considered a possible no preference and recorded as a 2.

7. Parenting practices are entered as 0=”No don’t use”, 1=”Yes use,” and 2=”Yes works best.”
    a. Practices will be grouped by SCT construct
    b. MISSING DATA = 99 but only if all practices were left blank.

Child-Parent Matching

1. The final sample size of parents with full surveys will be matched with child who provided full interview. Data for nine children was not available for parents who provided a complete survey.

    New child-parent matched sample size n= 163

2. Twin siblings (n=4) will be identified and only one child-parent matched pair will be kept. One child data set will be deleted (on the request of Dr. Alfonso, and with the agreement of Dr. Vogel).

    New child-parent matched pair sample size n= 159

Data Integrity:

1. Frequencies were run on all variables to identify illegal numbers. Corrections were made.

2. Child Assessment Data
    a. Knowledge and preference
        i. Scores were totaled by hand on each individual interview recording form.
        ii. Data were then entered into SPSS for each fruit and vegetable, including hand calculated totals.
        iii. Data were then reviewed by comparing every entry in SPSS with recording form.
    b. Knowledge
        i. TRANSFORM>COMPUTE VARIABLE then SUM function, was used to create a totals column for “Knowledge.”
        ii. These new total column were crosschecked with manually entered variables for inconsistencies.
    c. Preference
        i. TRANSFORM>COUNT VALUES WITHIN CASES was used to count “Likes,” (1) “DISLIKES” (0) and NEVER TRIED (2). Since this function does not recognize missing values, cases that should not have been computed and were incorrectly assigned a “0” were checked and “0” was deleted.

ii. These new totals column were crosschecked with manually entered variables for inconsistencies.

d. Social Cognitive Constructs
    i. SCT constructs coded on each recording form were entered into SPSS.
    ii. Data were then reviewed by comparing every entry in SPSS with recording form.
e. Child F and V Consumption
    i. Data from recording sheets were entered into SPSS.
    ii. Data were then reviewed by comparing every entry in SPSS with recording form.

3. Parent Assessment Data
    a. After data were entered in SPSS, each variable and case was reviewed by comparing every entry in SPSS with the survey form.
    b. Availability
        i. TRANSFORM> COMPUTE VARIABLE then SUM function, was used to create a totals column for "Availability"
    c. Parent Reported Parent and Child Preference
        i. TRANSFORM>COUNT VALUES WITHIN CASES was used three separate times to count "Likes," (1) "DISLIKES" (0) and NOT INDICATED (2). Since the transform function does not recognize missing values, cases that should not have been computed and were incorrectly assigned a "0" were checked and "0" was deleted.

Data Analysis

Univariate descriptive statistics:

Child:

1. Child demographics:
    a. Frequencies will be reported as a percent.

2. Child knowledge:
    a. Frequencies of each F&V correctly named and total number correct will be reported as a percent.

3. Child preference:
    a. Frequencies of each F&V most liked, disliked, and never tried and total number liked, disliked, and never tried will be reported as a percent.

4. Child consumption:
    a. Frequencies of each F&V most consumed will be reported as a percent.

5. Child messages (Child interview):
    a. Identify the frequency of use of each message, the percent of each type of messages, and the proportions.

    b. The proportion of positive and negative messages will be calculated to answer research questions 2,3, and 4

    c. The proportions of all messages by SCT construct will be calculated to answer research questions 5 and 6.

Parent:

1. Demographic Component:
    a. Frequencies for gender, race, education level, income, relationship to child, geographic location to Swainsboro

2. Nutrition Component
    a. Parent knowledge (Question 1) :
        i. Report as a range (numbers of servings)

    b. Parent consumption (Questions 2-3):
        i. Frequencies and range of number of servings parents consume will be reported.

c. Availability (Question 4A):
    i. Frequencies of each F&V kept in the house and the total number of F&V will be computed separately and together.

d. Preference (Questions 4B, D, C, and E):
    i. Frequencies of each F&V the parent likes and child likes as reported by parents and the total number of likes will be computed.

e. Parenting practices (Question 5):
    i. Frequencies of use of each parenting practice will be calculated.
    ii. The proportion of practices under each construct of Social Cognitive Theory will be calculated to answer research questions 5 and 6.

Analysis by research questions:

Research Question 1 - What are rural pre-school aged (4 years old) children's perceptions of fruit and vegetable messages?

Descriptive statistics were performed to generate frequencies, means, and standard deviations for each type of message for the entire sample and by gender. Independent sample t-test with $\alpha \leq .05$ was used to assess gender and SES differences. Bonferroni post hoc was used to control for type-1 error.

Research Question 2 - What is the relationship between rural pre-school aged (4 years old) children's perceptions of fruit and vegetable messages and their consumption of fruit and vegetables at school?

Descriptive statistics were performed to generate means, standard deviations, and range consumption data. Independent sample t-test with $\alpha \leq .05$was used to assess gender and SES differences. Bonferroni post hoc was used to control for type-1 error. Next, the relationship between child perceived messages in each construct and the total amount of fruits and vegetables consumed; the total fruit only consumed; the total vegetable only consumed; the total potato only

consumed; and the total fruits and vegetables (not including potatoes) were calculated using Pearson's product-moment correlation, two-tailed, with $\alpha \leq .05$ used for significance level. Cases were filtered by SES and Pearson's was repeated.

Research Question 3 - What is the relationship between rural pre-school aged (4 years old) children's perceptions of fruit and vegetable messages and their knowledge of different kinds of fruits and vegetables?

Knowledge was represented as the number of correct answers achieved during the picture card game. Three categories were represented 1) the number of fruit correctly named, 2) the number of vegetables correctly named, and 3) the total number of fruits and vegetables correctly named. Descriptive statistics were performed to generate proportions and actual number (n) of participants correctly and incorrectly identifying each fruit and vegetable. Means, standard deviations, and range were calculated for total number of fruits and vegetables correctly identified. Independent sample t-test was used to assess gender and SES differences with $\alpha \leq .05$. Bonferroni post hoc was used to control for type-1 error. Next, the relationship between children perceived messages in each construct and child knowledge was calculated using Pearson's product-moment correlation, two-tailed, with $\alpha \leq .05$ used for significance level. Cases were filtered by SES and Pearson's was repeated.

Research Question 4 - What is the relationship between rural pre-school aged (4 years old) children's perceptions of fruit and vegetable messages and their preference of specific kinds of fruits and vegetables?

Preferences were categorized as the total number liked, number disliked and total never tried. Descriptive statistics were performed to generate proportions and actual number (n) of participants responding liked, disliked, and never tried for each fruit and vegetable. Means,

standard deviations, and range were calculated for total number liked, disliked, and never tried for fruits only, vegetables only, and fruits and vegetables together. Independent sample t-test with $\alpha \leq .05$ was used to assess gender and SES differences. Bonferroni post hoc was used to control for type-1 error. The relationship between child perceived messages in each construct and preference was calculated using Pearson's product-moment correlation, two-tailed, with $\alpha \leq .05$ used for significance level.

Research Question 5 - What is the relationship between rural pre-school aged (4 years old) children's perceptions of fruit and vegetable messages and the parenting practices (messages or actions) report using?

Parenting practices were categorized into SCT. Descriptive statistics were performed to generate proportions and actual number (n) of participants responding as the practice is used and the practice works best. Next, the relationship between child perceived messages in each construct and parent self-reported parenting practices was calculated using Pearson's product-moment correlation, two-tailed, with $\alpha \leq .05$ used for significance level.

Research Question 6 – What, if any, differences exist between parent and child preference responses?

Parent and child responses were matched to analyze responses related to parent self-reported preference, parent reported child preference, and child reported preference. McNemar test with binomial distribution determined significance of non-matching responses. Odds ratios and 95% confidence limits were then calculated to provide more information for interpretation of results.

APPENDIX I

DATA COLLECTION CALENDAR

Data Collection Calendar

Date	Activity
Tues., August 2, 2011	Attended staff meeting to meet teachers and explain study
Wed., August 3, 2011	Parent orientation – explained informed consent and distributed
Wed. August 10, 2011	Visit school observe classes and lunch room operations
Fri., August 12, 2011	Visit school observe classes and lunch room operations
Fri, August 19, 2011	Visit school observe classes and lunch room operations
Mon., August 22, 2011	Visit school observe classes and lunch room operations
Wed. August 24, 2011	Visit school observe classes and lunch room operations
Fri., August 26, 2011	Food waste training run
Mon. August 29 to Fri., September 1	Tray waste data collection for fruit and vegetable consumption
Mon. Sept. 12, 2011	Visit school observe classes and lunch room operations
Wed. Sept 14, 2011	Child interviews
Fri. Sept 16, 2011	Child interviews – Assisted with grandparents day activities
Mon. Sept 19, 2011	Child interviews
Wed. Sept 21, 2011	Child interviews
Fri. Sept 23, 2011	Child interviews
Mon. Sept 26, 2011	Child interviews
Wed. Sept 28, 2011	Child interviews
Mon. Oct 3, 2011	Child interviews
Wed. Oct 5, 2011	Child interviews
Thurs. Oct 6, 2011	Child interviews
Wed. Oct 12, 2011	Child interviews
Mon. Oct 17, 2011	Child interviews
Wed. Oct 19, 2011	Child interviews
Wed. Oct 26, 2011	Child interviews
Wed. Nov 2 , 2011	Child interviews
Mon. Nov 7, 2011	Child interviews
Mon. Nov 14, 2011	Child interviews
Thurs. Nov 17, 2011	Child interviews - Preschool Thanksgiving Lunch – assisted with activities

APPENDIX J

DISSERTATION TIMELINE

Timeline

	Activity	**Proposed Completion Date**
	Initial Concept Paper submitted to Chair	Jan 5, 2011
	Meet with Chair and approve progression	Jan 10, 2011
	Proposal refinement	January thru February
	Meeting with Chair to finalize committee	Feb 9, 2011
	First meeting with committee	March 7, 2011
	Meet with director of pre-school	March 11, 2011
	Revisions	April, 2011
	Meet with Chair about progression	April 20 ,2011
	Finalize proposal and solidify a proposal defense date	Week of May 9
	Proposal meeting with committee	May 24, 2011
	Endorse signature page(s) and college forms	May 24, 2011
	Submit study to IRB for review and approval	May 26, 2011
	Incorporate revisions…file w/JPHCOPH and COGS	July 20, 2011
	Meet with pre-school director and teachers	August 1, 2011
	Parent Orientation – Informed consent explanation	August 3
	Phase I Parent survey and consent process	August 3-26
	Classroom visitations – familiarization	August 8 – Sept. 12
	Phase II Lunch time tray waste data collection	August 29 – Sept. 1, 2011
	Parent survey data entry	Sept. 2011
	Phase III - Child interviews	Sept. 14 – Nov. 14, 2011
	Tray waste picture evaluations and data entry	November, 2011

Timeline (cont'd)

	Action Steps	**Proposed completion date**
	Child interview form coding and data entry	December, 2011
	Meet with Chair for updates	Jan 18, 2012
	Statistical analysis	Jan 16 – Jan 30, 2012
	Data analysis and write-up	Week of Jan 30, 2012
	Submit data analysis write up to Chair and Committee Biostatistician	Week of Feb 13, 2012
	Incorporate revisions, complete Chapter IV…submit to Chair	Week of Feb 20, 2012
	Submit Discussion (Chapter V)… check final formatting	Week of Feb 27, 2012
	Meet with Chair to finalize document…send to Committee	Week of March 5, 2012
	Defend dissertation	Monday, March 19th 2012
	Incorporate revisions, submit to Committee for review and approval	Apr. 9, 2012
	Committee to e-mail approval/final recommendations	Apr. 16, 2012
	Present copy to COGS for final format review and approval	Deadline April 19, 2012
	Notify IRB of Study Completion	Week of May 3, 2012
	Exit Interview	Week of May 7, 2012
	Deadline to submit final verified (approved) electronic dissertations to College of Graduate Studies	Thursday, May 10, 2012