AN OUTCOME AND PROCESS EVALUATION OF ‘FOOD FIT’: A THEORY BASED CHILDHOOD OVERWEIGHT PREVENTION CURRICULUM

A Thesis
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By:
Paul Branscum RD, LD

The Ohio State University
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Master’s Examination Committee: Approved By
Dr. Gail Kaye, Advisor
Dr. Jackie Buell
Dr. Hugo Melgar-Quinonez
Advisor, College of Education and
Human Ecology
**ABSTRACT**

In the United States, the prevalence of childhood overweight has more than tripled in the past three decades. Among risk factors commonly associated with this increase, poor diet quality has been noted as a major contributor and promising area for intervention. However, mostly mixed and modest outcomes have been reported for many child-based interventions that aim to improve diet quality. This is reportedly due to limitations that have been noted in their methodology, design, implementation, and evaluation. The purpose of this study is to evaluate the efficacy of a new theoretically based (Social Cognitive Theory (SCT)) nutrition curriculum ‘Food Fit’ (FF), designed to overcome limitations noted from previous studies. The FF program was implemented and evaluated with children at five after school sites (n=58). Evaluations included a per lesson pre and posttest to evaluate psychosocial variables of SCT (behavioral capabilities (BC), self-efficacy (SE), and outcome expectancies (OE)) and a standardized instrument was administered to evaluated dietary behaviors. A process evaluation was used to assure program integrity. At the end of each lesson, children were given a free choice between food items categorized as either ‘healthy-choice’ (HC) or ‘unhealthy-choice’ (UC), and reported the main reason for their selection after choosing. Differences in psychosocial variables were
evaluated between the children in these two groups. Statistically significant increases were found for specific psychosocial variables (i.e. self efficacy for eating fruit as a snack (p < .03), positive outcome expectancies for eating raw vegetables (p< .009)), as well as related dietary behaviors (increased consumption of fruits and vegetables as snacks (p=.0014), citrus fruits and juice (p=.0209), raw vegetables (p=.0006), and increased use of the food label (p=.0017)). Most children who chose an UC reported ‘taste’ most frequently, while those who chose a HC reported a ‘positive health attribute’ (such as ‘has less sugar’) most frequently. Children who chose a HC also appeared to have higher OE scores than children who chose an UC. These results suggest that participation in the FF program can positively and significantly enhance psychosocial variables of SCT related to specific dietary behaviors, which in turn, corresponde with significicant improvements in these dietary behaviors.
Dedicated to my parents for always having my back.
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VITA

Education

Dietetic Internship, June 2007
The Ohio State University, Department of Human Nutrition
Registered Dietitian, July 2007
Licensed Dietitian, July 2007

Bachelor of Science in Human Nutrition, June 2005
The Ohio State University, Columbus, OH
Overall GPA: 3.74
Magna Cum Laud

Professional Experience

The Ohio State University, Columbus, Ohio: 06/06 – 06/08
Graduate Research Assistant
- Conducted literature reviews and generated documents required for submission to The Ohio State University Internal Review Board (IRB).
- Participated in data collection, data input, and the generation of progress reports for the Principle Investigator.
- Supervised and trained undergraduate nutrition students to administer and evaluate a multi-site community based intervention.
- Advised undergraduate students conducting community-based research.
- Dietetic Intern Preceptor – Supervised and trained dietetic interns to administer and evaluate a community based intervention.

The Ohio State University, Columbus Ohio: 09/05 – 06/06
Graduate Teaching Assistant
- Assisted instructors with grading tests, quizzes and assignments.
- Maintained the grading system for large college courses.
FIELDS OF STUDY

Major Field: The College of Education and Human Ecology

*Master of Science in Nutrition*, expected June 2008
The Ohio State University, Columbus, OH
*Overall GPA*: 3.58
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<tr>
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CHAPTER 1

INTRODUCTION

Childhood Overweight

In the United States, during the past three decades the prevalence childhood overweight has tripled among school children and adolescents. Data from NHANES surveys taken from 1999-2004 indicate that during this time childhood overweight (BMI for age and sex ≥ 95th percentile) has increased from 13.9% to 17.1% and at risk for overweight (≥ 85th percentile) has increased from 28.2% to 33.6% (1). This is of particular concern, since it is estimated that 80% of overweight children and adolescents will remain obese throughout adulthood (35).

Overweight and obesity have been reported as a risk factor for many health related problems and have been associated with a higher health care costs. Overweight children have an increased risk for developing metabolic conditions such as type 2-diabetes, coronary artery disease, cardiovascular disease, inflammation, musculo-skeletal injuries, early physical maturation, and metabolic syndrome (5, 11, 35, 50, 51, 52, 54). Psychological conditions such as low self-esteem, depression, and social discrimination are also more prevalent among overweight children (5, 7,
The development of childhood overweight has been associated with genetic, environmental and behavioral influences. Genetic predispositions make certain individuals more susceptible to weight gain by causing either increased hunger or a decrease in resting energy expenditures (16, 37, 38). Elements of the home, school and community environment have been shown to impact the availability of healthier foods choices (i.e. low-fat dairy products and fresh fruits and vegetables) and may offer more nutrient-poor, energy dense food selections in their place (3, 15, 17, 41, 42, 53). Low participation in physical education classes in schools and unsafe neighborhoods have also been shown to limit children’s opportunities to engage in physical activities (18, 40). Parenting styles related to feeding practices have also been shown to impact children’s dietary habits and food preferences (16, 17). Elements of children’s lifestyle such as the amount of time spent in physical activities, ‘screen time’ (such as television, video game play, and computer usage), eating behaviors, and sleeping patterns are also thought to be contributing factors (15, 17, 20, 21, 23, 43).

**Interventions for Prevention and Treatment of Childhood Overweight**

Interventions that can favorably impact health behaviors associated with the prevention of overweight (such as a healthy diet) could help prevent the onset of overweight in childhood, and spare children from the associated metabolic and psychological consequences. However mixed or modest outcomes have been
reported for many health-promoting interventions. This is reportedly due to limitations noted in their methodology, design, implementation, and evaluation. The most common methodological limitations noted include: inadequate sample size, and un-blinded implementation staff (29). Limitations noted in program design and implementation include: lack of monitoring of program integrity, theoretical basis for interventions are rarely described or used to explain results, and the training program for implementation personnel is rarely described. (29, 31, 33) Interventions also tend to have an informative focus, without equipping children with skills and self-efficacy needed to overcome peer and emotional barriers to engage in healthful behaviors (34). Limitations for the evaluation of interventions include: inadequate sub-analysis, unclear relationship of dose effect for programming, and inappropriate data analysis (29).

In two recent meta-analyses, authors cited a need for theory-based nutrition curriculums to improve dietary behaviors thought to be associated with the prevention of childhood overweight. Social Cognitive Theory was also cited as the most successful theoretical basis for health promoting interventions among children (29, 34). While large randomized controlled trials are considered the gold standard for implementing and evaluating interventions, Stevens et al (31) argues that more evidentiary or intermediate studies are needed to evaluate the ability of interventions to impact process variables related to overweight prevention, such as diet. In addition they advocate for more research to evaluate the efficacy of single-component interventions to determine what components appear to be most promising for future multi-component interventions (31).
**Purpose & Relevance**

FF is a theory based (Social Cognitive Theory) nutrition intervention that was designed to surmount limitations noted from previous studies. The intervention targets dietary behaviors that are reportedly associated with childhood overweight, such as: inadequate intake of fruits and vegetables, and over consumption of added sugars and more calorically dense-larger portioned snack foods. Psychosocial variables of Social Cognitive Theory targeted during the intervention include: behavioral capabilities (BC - skills needed to perform a behavior), self-efficacy (SE - the confidence to execute skills or behaviors), and outcome expectancies (OE - the value that is placed on the outcome of a behavior). The purpose of this study is to evaluate the efficacy and effectiveness of Food Fit with children ages 6-11. The aims and hypotheses were as follows:
1. Determine the effect participation in the program ‘Food Fit’ has on children’s Behavioral Capabilities, Self Efficacy, and Outcome Expectancies for selected food behaviors.

Ho: There will be no significant changes in Behavioral Capabilities, Self Efficacy, and Outcome Expectancies for children who participate in the ‘Food Fit’ program.

H1: There will be significant changes in Behavioral Capabilities, Self Efficacy, and Outcome Expectancies for children who participate in the ‘Food Fit’ program.

2. Determine the effect Behavioral Capabilities, Self Efficacy, and Outcome Expectancies have on food selection behaviors in children.

Ho: Behavioral Capabilities, Self Efficacy, and Outcome Expectancies are not associated with food selection behaviors in children.

H1: Behavioral Capabilities, Self Efficacy, and Outcome Expectancies are associated with food selection behaviors in children.

3. Determine the effect participation in the program ‘Food Fit’ has on overall eating behaviors of children.

Ho: Participation in ‘Food Fit’ does not affect children’s overall eating behaviors.

H1: Participation in ‘Food Fit’ does affect children’s overall eating behaviors.
CHAPTER 2

REVIEW OF LITERATURE

Prevalence of Childhood Overweight

Childhood overweight is a major health problem currently affecting our youth. Among children, overweight (the child equivalent for adult obesity) is defined as a BMI for age and sex ≥ 95th percentile, and at risk for overweight (the child equivalent of adult overweight) is defined as a BMI for age and sex ≥ 85th percentile.

In the United States, during the past three decades the prevalence of childhood overweight has tripled among school children and adolescents (1). According to the most recent Nutrition Examination Survey (NHANES) 2003-2004, childhood overweight and at risk for overweight have significantly increased in recent years. When compared with data from previous surveys (NHANES 1999-2000) overweight have increased from 13.9% to 17.1% and at risk for overweight has increased from 28.2% to 33.6% among children ages 2-19. Investigators further noted children 6-11 experienced the largest increases during this time: ‘overweight’ increased from 15.1% to 18.8% and ‘at risk for overweight’ increased from 29.8% to 37.2% (1). This is reportedly a problem since overweight children are now experiencing more weight related health problems than ever before (54).
Overweight and obesity have increased across all economic, racial groups and geographical regions of the country. However disparities have been noted for minority and low-income groups, with the highest obesity rates reported in populations with the highest poverty and lowest education levels (3,54). In 2005, 20.6% of Ohio third graders were reported as overweight, while 37.6% were at risk for overweight (2). Investigators noted children who resided in Rural Appalachian counties (41.1%) in Ohio were significantly more likely to be overweight and at risk for overweight than children who resided in rural (37.9%), suburban (36.9%), or metropolitan (36.6%) counties. Ogden et al (1) reported among children 6-11 and all children 2-19, Non-Hispanic Black and Mexican American children were more likely to be overweight, compared to Non-Hispanic White children. In Columbus, Ohio self-report data indicate 30% of children are overweight. However prevalence of overweight among Non-Hispanic Black children (47.7%) was much greater than Non-Hispanic White children (20.9%). Investigators also noted that overweight among children living at 100% - 200% or below the poverty income bracket (35.6% - 41.3%) was much greater than children living above the 200% poverty income bracket (21.8%) (4).
Consequences of Overweight

Childhood overweight is a predominant risk factor for chronic metabolic conditions and psychological distress. Type-2 diabetes, coronary artery disease, cardiovascular disease, inflammation, musculo-skeletal injuries and early physical maturation are noted metabolic consequences (5, 11, 35, 50, 51, 52, 54). Psychological conditions associated with overweight and obesity includes: low self-esteem, depression, and social discrimination (5, 7, 8, 10, 35, 54).

The prevalence of type-2 diabetes has sharply increased among overweight children, and has increased 10 fold among adolescents in the past two decades (5, 35, 54). Type-2 diabetes is associated with an increased production of insulin, which over time can lead to insulin resistance. Insulin resistance is associated with risk factors for cardiovascular disease such as: increased synthesis of VLDL, a decline in the interaction between insulin on lipoprotein lipase in peripheral tissues, increased synthesis of cholesterol (hypercholesterolemia), increased HDL degradation, and increased production of plaque on blood vessel walls. Among adults, type-2 diabetes is a common risk factor for coronary artery disease. While it is not clear if youth have the same risk adults have, if found to be similar, youth with type-2 diabetes could experience life-threatening cardiovascular events in their 30’s and 40’s (5). Preliminary data also suggests early onset of type-2 diabetes places children and adolescents at greater risk for limb amputations, kidney failure and premature death (54).
Overweight children are more likely to have high triglyceride and low HDL levels, two common risk factors associated with cardiovascular disease. In a cohort of overweight youth (ages 5-17) (n = 9167) over 80% had at least one risk factor for cardiovascular disease (11). In another study, ninety percent of overweight children had high levels of both insulin and triglycerides (11, 35).

Overweight and obesity have also been associated with an increase in the inflammatory response. Inflammation is associated with an up-regulation of interleukin-1, which has down stream consequences such as an up-regulation of hepatic acute-phase reactants, such as C-reactive protein. Inflammation is also associated with an increase in free radical production producing oxidative stress, which over time may lead to further vascular damage increasing children’s risk for cardiovascular disease (5).

Thirty to fifty percent of overweight children reportedly have metabolic syndrome (5). Metabolic syndrome is a complex disorder and is defined as the presence of obesity and associated conditions such as: abdominal visceral fat deposition, hyperinsulinemia, hypertension, and hyperlipidemia (5,50). Compared with its individual components, metabolic syndrome has been shown to be a stronger predictor for coronary heart disease, cardiovascular disease, and mortality among adults (50). Weiss et al (51) reported up to 50% of severely overweight youth had characteristics of metabolic syndrome. Prospective data suggests an elevated BMI is the most important risk factor for developing metabolic syndrome in childhood, and each half unit increase in BMI among overweight children increases the risk for having metabolic syndrome by approximately fifty percent (5, 50).
Overweight children are also more likely to experience early physical maturation, which can lead to an increased production of sex hormones (35). This has been associated with severe conditions such as advanced bone age and higher bone density. Overweight females are also more likely to experience premature pubarche, which has been positively associated with insulin resistance, earlier menarche, production of insulin-like growth factor 1 (IGF1), and polycystic ovary syndrome (35, 52). These hormonal imbalances can also increase children’s risk for developing growth plate injuries and bone abnormalities. Overweight children are also at greater risk for putting damaging stress on growth plates and joints when engaged in weight bearing physical activities (35).

Psychological distress such as high rates of depression and low reported self-esteem is also more commonly reported for overweight children. (7, 10, 35, 54). This may stem from higher social discrimination overweight children experience from family members, peers, and teachers (35). Overweight children have also been noted to be more socially isolated and have fewer friends when compared with their normal weight peers (54). Overweight children are also teased more often, and experience higher rates of disordered eating and anxiety (5, 54). In a study examining the relationship of depression and obesity among adolescents in grades 7-12, adolescents with the highest BMI’s were found to have the highest depression rates. After a 1-year follow-up, sustained elevated BMI’s were again positively associated with higher depression rates (7). Childhood depression also may impact BMI into adulthood. Pine et al reported adults diagnosed with major depression in childhood
were more likely to have higher BMI’s than adults who had not been diagnosed with depression during childhood (8).

Medical expenses associated with overweight among children have also significantly increased in the past three decades. From 1979–1981 to 1997–1990 obesity associated hospital costs for youth increased from $12.6 million dollars to $110 million dollars. After adjusting for inflation in 2001, these medical expenses more than tripled from $35 million dollars to $127 million dollars. Projecting expenditures into adulthood would likely result in higher costs for both the individual and Medicare and Medicaid (36).

**Causes of Childhood Obesity**

Many factors have been reported to be associated with the development of childhood overweight. These include: genetic differences, elements of the home, school and community environment, television advertising, and components of children’s lifestyle (12, 13, 14, 15, 16, 17, 18, 19, 20). However it is unclear which factors account for the increase more so than others. By understanding the etiology of childhood overweight interventions can be tailored to impact preventative and causative attributes.

**Genetics**

Genetic variations have been shown to predispose some individuals for developing overweight and obesity during their lifetime. Specifically, children born with a low birth weight have been noted to be at greater risk for developing obesity.
It is hypothesized this is partly due to prenatal stress experienced by the fetus causing genetic alterations resulting in impairments in insulin secretion and sensitivity (39). Differences in food intake and energy expenditures that may impact the development of obesity are also thought to have genetic origins (16, 37, 38). Specifically, some individuals may be more likely to have an increased appetite and a higher preference for calorically dense foods (i.e. foods with a high content of fat or added sugar). Others have been found to expend fewer calories to maintain their weight (37, 38). While this may support genetics having a causal attribute for the development of obesity, it is important to note that parents also construct the home environment in which children are raised (16). Foods made available in the household and eating habits learned from the parent or caregiver may allow these genetic predispositions to be expressed (12).

**Home Environment**

Elements of the home environment can also influence children’s dietary habits, and potentially contribute to the development of overweight. Specific elements include: parental modeling, parenting style related to feeding practices, the classification of foods as ‘good’ or ‘bad’ for use as a reward or punishment and for use during holiday or family celebrations, and foods made available and accessible within the home by the parent or caregiver.

Direct modeling has been noted as a large contributor to children’s food preference and dietary intake. Children are more likely to eat foods they observe their parents, peers, and fictional heroes consume, with parents having the largest
influence (19). Parental modeling may also be a key contributor to the positive effect of eating meals as a family on diet quality among children. When compared with eating alone, children who eat meals with their family are more likely to have a higher intake of fruits, vegetables, grains, calcium and calcium rich foods, protein, iron, folate, fiber, and vitamins A, C, E, and B6 (17).

Patrick et al reported that parenting style related to feeding practices has also been shown to impact children’s dietary intake and food preference. Parents or caregivers who assume an ‘authoritarian’ style may restrict highly palatable-energy dense/nutrient poor or ‘bad’ foods and force the consumption of ‘good’ foods such as fruits and vegetables. This feeding style has been associated with lower intake of fruits, vegetables and juice. Children are also likely to become fixated on the restricted ‘bad’ foods leading to their over consumption when parents are not present. The ‘permissive’ feeding style allows a child to freely choose what foods and portion sizes to eat without parental guidance. This feeding style has been associated with lower consumption of milk, and all nutrients except fat. Lastly, the ‘authoritative’ feeding style balances authoritarian and permissive styles, by encouraging the consumption of ‘healthy’ foods, while giving the child freedom over food choices. Children from families who practice this style of feeding appear to have higher fruit and vegetable intakes, and a lower intake of junk foods (17).

Further problems can ensue when parents teach children to label foods as ‘good’ or ‘bad’. For instance, by limiting or withholding ‘bad’ foods as a punishment, children are more likely to become fixated and over consume these foods when given the opportunity. It can also be confusing to children when foods are
categorized as such, given the social context that are commonly placed on certain foods. For instance birthday parties and holiday celebrations are often celebrated with ‘bad’ foods such as cake. Later in life in times of stress, individuals may turn to these ‘bad’ foods given the positive experiences that are associated with their consumption (16).

The availability and accessibility of foods within the home have also been noted to impact dietary intake and food preference among children. Since parents keep foods in the home they prefer to eat, their children will have repeated exposures to these foods, which will likely influence and shape their preferences. This may lead to increase adiposity if children are constantly exposed to energy dense, nutrient poor foods (17). However, children who are exposed to more fruits and vegetables have been shown to be more likely to incorporate them into their diet. Repeated exposure of foods is also critical for influencing preference. Research suggests it normally takes at least 5-10 exposures to positively impact the preference and acceptance for a new food item (16).

School Environment

Unless home-schooled, most children spend a substantial amount of their time at either a public or private school (15). Foods made available and accessible in the school environment have been noted to impact children’s dietary intake (41). Among these foods are the sales of competitive foods, which make up the largest form of commercial activity within schools. Many schools are engaged in this activity to generate additional outside revenue (15). More than 90% of schools offer
competitive foods that are generally nutrient poor, and are not required to meet the USDA nutrition standards that federally subsidized meals must meet (18, 41, 53). The highest selling beverages in schools are sugar-sweetened beverages (i.e. sodas and sports drinks) and are currently sold in 58% of elementary schools, 83% of middle schools, and 94% of high school (15). In a recent cross-sectional study among 7th grade children, a significant association was noted between the availability of a’ la carte food items and children’s diet quality. Children reported lower fruit and vegetable intake and higher total and saturated fat intake in schools with a’la carte food items. However, children in schools without a’la carte food items either met or nearly met dietary recommendation for fruits, vegetables, and total and saturated fat (41).

Participation in physical education is also low among elementary aged children. The percentage of US public schools that require physical activity among third, fourth and fifth grade children are 51.3%, 51.5%, and 50.4% respectively. Only 8% of elementary schools provide daily physical education throughout the academic school year. In addition, 16.7% of elementary school children are exempt from required physical activities, which are replaced by school activities that provide little physical activity (40).

**Community Environment**

Environmental differences within the community in which children live are also thought to contribute to the development of overweight (42). Parents are now spending longer hours at their workplace, and may not have time to supervise their
children for outside play (18, 60). *Kumanyika et al* reports that unsafe neighborhoods, specifically in low-income areas, can also make it challenging for parents to allow their children to engage in unsupervised physical activities outdoors. Low-income and minority communities also tend to have fewer large supermarkets that carry fresh-high-quality foods such as fruits, vegetables, whole grains or low fat dairy products. Instead, residents in these areas buy food from small corner stores and bodegas, which tend to carry less healthful food selection. Prices of healthy foods in these locations are also higher compared with larger supermarkets (3).

*Kumanyika et al* additionally notes the availability of fast food restaurants in a community may contribute to the development of overweight among adults and children. Low-income and African American communities have been found to have more fast food restaurants and fewer full service restaurants compared with predominately Caucasian neighborhoods. However few studies have specifically evaluated the proximity of fast food restaurants with children’s weight status (3).

**Television and Advertising**

Television viewing in recent years has increased among all children, but has increased more among overweight children (20, 59). Currently, children watch an estimated 3 hours of television daily (20). According to data from NHANES III, overweight children watch the most amount of television, and children who watch less than 1 hour a day were least likely to be overweight (59).
Of concern, the food industry is the largest buyer of television advertising and television is the largest single source of media messaging about food. Food companies that sell energy dense-nutrient poor foods and beverages, spend large amounts of money to aggressively advertise to children, in an attempt to build brand awareness, recognition, preference and loyalty for products they sell (15). In 1995 the top 6 fast food chains that generally sell less nutritious foods, spent 2.5 billion dollars in advertising (20). This is a fraction of what government agencies spend to promote healthy eating behaviors. In 1997 the USDA spent 333 Million dollars to promote, and evaluate nutrition education programs, and in 1999 the advertising budget for the US National Cancer Institute’s ‘5-a-Day’ program, which promotes the consumption of fruits and vegetables, was 1.1 million dollars. As a result of this disparity children are exposed to more private industry advertisements, making it difficult to reach children with public health messages that promotes healthy eating (15).

Children are the most vulnerable recipients of marketing campaigns, and can be easily misled by their messages. Children under eight years old are not fully cognitively developed to understand the intent of television advertisements, namely as a strategy to promote a particular product. They tend to view them as an unbiased, fun, and entertaining sources of information. As children grow older (ages 8-12) cognitive abilities are further developed, but this group is still susceptible to persuasion by aggressive advertising campaigns (15).
Lifestyle

Elements of children’s lifestyle also appear to contribute to the development of childhood overweight. Significant elements include: decreased physical activity, an increase in sedentary activities (watching television), inadequate sleep, eating away from home more often, increased caloric consumption and poor diet quality.

Physical activity has been shown to be an important factor for the prevention of childhood overweight and long-term term weight maintenance (20). However, children’s energy expenditures have decreased in recent years (15,20). Sedentary activities such as television viewing, and playing video games have replaced physical activities (15,20). Overweight children also report spending less time engaged in physical activities compared with their leaner peers (20,21). In a cross-sectional study evaluating physical activity patterns among sixth graders, overweight children participated in significantly less moderate and vigorous physical activity (MVPA), and engaged in fewer continuous 5,10, and 20 minute bouts of MVPA. Overweight children have also been found to exhibit significantly less self-efficacy regarding their ability to overcome barriers to participate in physical activity, are less likely to ask parents to provide them with opportunities to engage in physical activity, and as a result are less likely to choose physical activity in place of sedentary activities (43).

*Snell et al* notes that sleeping patterns have also been associated with the development of overweight among children. Cross sectional studies suggest that children who sleep less, go to sleep later in the night, and awake earlier in the morning are more likely to be overweight, compared to children receiving adequate sleep. Recent studies suggest this may be the result of a disruption of appetite and
metabolism induced by a hormone imbalance. Less sleep has been shown to cause a reduction of leptin and an increase in ghrelin production, hormones associated with hunger and appetite. However, more research is needed to determine the causal relationship between sleep and overweight (23).

Eating away from home has also increased in recent years (15, 20). From 1977 – 1994 total caloric intake from fast food restaurants has increased among children from 2% to 10%. The frequency of eating away from home has also been positively associated with the intake of dietary fat, and negatively associated with the intake of fruit, vegetable and dairy groups (17).

Average calorie intake has also increased in past decades, accompanied by a decrease in diet quality among children (15, 16, 18, 20, 21, 22). Wang et al examined the weight changes of children in NHANES surveys taken from 1988-1994 and quantified the excess weight gain experienced by these children. After accounting for normal childhood growth, investigators reported children gained an additional .43 kg per year, and that behavioral changes resulting in a 110-165 daily caloric deficit could have counteracted this weight gain. Of interest, researchers suggested that changes in dietary intake might be easier to achieve compared with changes in physical activity (22). Similarly, Harper also noted that children’s caloric intake has increased on average by 80-230 calories between 1989 – 1996, while physical activity decreased (18).
Diet Quality

Changes in dietary behaviors among children in recent years are also thought to have contributed to the increase in childhood overweight. Specific changes include: high fat intake, inadequate fruit and vegetable consumption, low breakfast consumption, higher consumption of energy dense-nutrient poor snack foods, increased consumption of energy dense foods, increase in portion sizes of foods, and increased consumption of sugar sweetened beverages (15, 16, 17, 20, 21).

High Fat Intake

According to data reported from the NHANES 1999-2000, children and adolescents currently consume 33% of their calories from fat (44). Several studies have shown that high fat intake has been associated with an increase in adiposity. Dietary fat is also thought to be more obesogenic than other macronutrients. Compared with proteins and carbohydrates, meals higher in fat generally have a lower thermal effect, resulting in the expenditure of less energy to digest and absorb nutrients from the meal making it easier to gain excess weight (16). Fat is also highly palatable, yet energy dense, making it relatively easy to consume large amounts with smaller portions (16,20,21). Diets high in fatty foods are also noted to be low in fruits, vegetables, complex carbohydrates, and micro-nutrients (16).
While excess fat intake appears to contribute to poor diet quality, most interventions promoting low-fat diets have not been successful at preventing overweight among children. Therefore it has been recommended that messaging should focus on alternative strategies, such as eating an adequate amount of fruits and vegetables. (16,20).

_Inadequate Fruit and vegetable Intake_

Low consumption of fruits and vegetables have also been associated with poor diet quality, and is considered one of the most common risk factors for the development of chronic diseases (21). Currently children do not consume the recommended amounts of fruit and vegetable (16,20,21). My Pyramid for Kids ([www.mypyramid.gov](http://www.mypyramid.gov)) recommends that children ages 6-12 (on a 1800 Calorie plan) consume 2.5 cup equivalents of vegetables, and 1.5 cup equivalents of fruits. According to data from the 1994 to 1996 Continuing Survey of Food Intake by Individuals (CSFII), among adolescent (11-17) daily fruit consumption was 1.4 servings (approximately .7 cup equivalents), and vegetable consumption was 3.3 servings (approximately 1.65 cup equivalents). A closer look revealed white potatoes accounted for half of their reported vegetable servings, and fried potatoes (i.e. French fries and potato chips) contributed to over half of their white potato consumption. Consumption of dark green and orange vegetables were also very low (approx 22-25 grams). Among fruits, citrus fruit and juices contributed to more than half of total fruit consumption (48).
According to more recent data taken from the NHANES surveys (1999-2000 and 2001-2002), fruit and vegetable intake remain low among youth (2-18). Vegetable intake was 2.2 servings (1.1 cup equivalents), while fruit intake was 1.4 servings (.7 cup equivalents). Among children (6-11) daily average vegetable intake was 2.1 servings (1.05 cup equivalents) and fruit intake was 1.4 servings (.7 cup equivalents). Fried white potatoes remained the leading contributor (30.4%) to total vegetable intake among children and consumption of dark green and deep yellow vegetables remained low across all age groups (.18 servings daily (.09 cup equivalents)). The largest contributor to fruit intake was orange juice, which contributed 16.5% of daily fruit intake (55).

Inadequate Breakfast Consumption

Recent data indicate that more children are skipping breakfast than in previous years (20,21,45). Overweight children are also more likely to skip breakfast than their normal weight peers (20,21). Nationally representative data from 1991 indicate 12% of 8-10 year old children, and 20% of 11-14 year old children skipped breakfast on any given day. A more recent review reported 21% of 8 and 9 year old children and 42% of 12 and 13 year old children indicated they skip breakfast throughout the week (45).
**Increased Consumption of Snack Foods**

While breakfast consumption has decreased among children and adolescents, snacking appears to have increased (20,21). It is estimated that adolescents now consume one-fourth to one-third of their daily caloric intake in the form of snack foods. It appears that calories from snack foods have displaced calories eaten at meals and at home. From 1977-1996 calories eaten at home have decreased from 77% - 65%, and total calories from meals have decreased from 89% to 81% (28). Of concern, snack foods tend to be higher in fat and energy density, and frequent snacking has been associated with higher intakes of fat, sugar and calories. The most frequent snacks consumed among children include: potato chips, candy, and cookies (21). Children may also associate pleasurable physiologic responses, such as highly favorable flavor, with the consumption of energy dense-nutrient poor snack foods. This experience may become rewarding, and further reinforce the consumption of less healthy snack foods.

**Increased consumption of energy dense foods**

Little or no studies are available with children that demonstrate the impact energy dense foods have on daily Caloric intake. However studies are available with adults (21). In a study evaluating the effects portion size and energy density have on the caloric intake of a meal, women were served a casserole entrée with three different portion sizes (500, 700, 900 g) and at two different energy density levels (1.25 kcal/g, 1.75 kcal/g). Both energy density and portion size appeared to have an independent effect for total calories eaten at the meal. Despite having similar ratings
for hunger and fullness, women who were served the higher energy dense and largest portion consumed the most amount of calories (620 kcal) and women who were served the lower energy dense and lowest portion consumed the lowest amount of calories (398 kcal) (46).

Increased Portion Sizes

Neilson et al reported that between 1977 – 1996 portion sizes and total calories have increased for many foods consumed both inside and outside of the home. In particular, portion sizes of many common snack foods children often consume have increased. The average salty snack (potato chips, popcorn) has increased 60% from 1 oz to 1.6 oz, resulting in an increase consumption of 93 calories. Desserts have increased from 4.5 oz to 4.8 oz, resulting in an increase of 41 calories. French fries have increased from 3.1 oz to 3.6 oz, resulting in an increase of 68 calories. As previously noted, children now eat foods away from home more often. When portion sizes of foods prepared at home, restaurants and fast food establishments are compared, the largest portion sizes were foods served at fast food establishments (28).

In both the clinical and community settings, research indicates children who are served larger portion sizes are more likely to have a greater caloric intake, than if served smaller portion sizes (17, 26, 46). It has been noted that children 3 years old and younger are better at regulating their food intake, via responding to physiologic cues for hunger and satiety. However among older children (4 years and older) external cues such as portion size appears to have a greater influence on Caloric
intake (46). In a study by Fisher et al pre-school children (4-6 years old) that were served two times the age appropriate portion size for their lunch, consumed 25% more food, and 15% more calories than normal. It was also noted that most children were not aware the portion size had changed (26). It is currently unclear why external cues such as portion size influence the eating habits of older children but not with younger children. It is suggested that early experiences shape the development of eating behaviors among children and they may learn to either rely on internal cues of hunger, or may learn to rely on external cues such as portion size. A lack of a satiety response may also predisposed some children to overeat more so than others (46).

Over Consumption of Added Sugar and Sugar Sweetened Beverages

Murphy et al reported the consumption of added sugars has increased in recent decades among children and adolescents. Added sugar includes sugar and syrups that do not naturally occur in foods, and are added during processing and preparation (www.MyPyramid.gov). According to the data from CSF II surveys (self-report), from 1989 – 1996 the average intake of added sugar increased for all age groups 2 years and older from 15.7 teaspoons to 20.5 teaspoons. Since the nature of this survey was self-report this estimate may be modest, given that foods containing high amounts of added sugar have often been shown to be selectively underreported. According to data from the Economic Research Service, the annual availability of Caloric sweeteners has increased 23% between 1980 – 2000. It has been reported that individuals who consumed more than 18% of total energy intake from added sugar also have the lowest intake Vitamins A, C, B12, folate, calcium, phosphorous,
magnesium, and iron. High added sugar intake has also been associated with a greater consumption of grains, lean meats, saturated fats, and less fruits and vegetables (24).

The largest contributors to the intake of added sugars have been from sugar-sweetened beverages (20, 21, 24, 25). According to the USDA’s CFS 1989-1991, soft drinks were the 6th leading food source of energy among children, and represented over 50% of total beverage consumption (20). According to data from CSF II and NHANES (99-01), from 1977 – 2001 soft drinks consumption increased from 2.8% - 7% of total daily Caloric intake. Parenthetically, energy intake from milk decreased during this time from 8% - 5%. This shift in beverage consumption has resulted in a daily net increase of 50 calories, with soft drinks accounting for an increase of 94 calories, and milk accounting for a decrease of 44 calories. It is also important to note the decrease in calories from milk cannot be attributed to the consumption of lower fat milk, since total consumed ounces decreased during this time as well. The largest drop in milk consumption was seen among the age group 2-18, with a decrease from 13.3% to 8.3% of daily energy intake. Also within this age group soft drink consumption increased from 3% to 6.9% of daily energy intake (25).

Overweight children tend to consume higher amounts of soft drinks than their leaner peers (24). In an 8-week observational study with children ages 6-13, children who reported drinking more than 12 oz of a soft drink daily experienced more weight gain than children who consumed less than 12 oz daily (56). Children who consumed more soft drinks also were noted to have the highest daily caloric intake (20, 24, 35). In another study with 548 ethnically diverse school children the odds of becoming
overweight or obese increased by 60% for every additional serving of soft drink a child consumed (47). While not very well understood, it has also been suggested that liquid calories such as in soft drinks, are not as well regulated when compared with calories from solid foods (20, 24). This suggests that children who consume large amounts of calories from sugar-sweetened beverages may be more likely to inadvertently consume more total calories throughout the day.

**Interventions**

Interventions that aim to modify factors related to the development of childhood overweight could potentially prevent the onset of overweight and promote a healthy lifestyle into adulthood. This could also spare children from the physical and psychological consequences of excess weight, and help curtail future health care costs. Theory-based interventions have been shown to produce more favorable outcomes that those without (29). However, interventions that have been implemented and executed have produced mostly mixed or modest outcomes (29, 30, 31, 32, 33).

In a recent meta-analysis spanning from 1985 – 2003 researchers reviewed randomized controlled trials (RCT’s) designed to favorably impact nutrition and physical activity among children. Fifty-seven RCT’s met the author’s inclusion criteria, which included: students enrolled in the study were in elementary or secondary school, interventions included a school component, studies had a control-comparison group, and a variety of outcomes were measured. Among the 57 RCT’s, 19 were exclusively related to improving nutrition. Of these studies, 6 showed no
difference between treatment and control groups, 12 showed modest or mixed outcomes, and 1 showed significant improvements. Only 3 other studies from this analysis showed significant outcomes in the areas of: increasing physical activity, decreasing physical inactivity, and improving nutrition and increasing physical activity. The interventions from the four studies with significant outcomes were either implicitly or explicitly based on social cognitive theory (29).

In another recent meta-analysis, researchers reviewed 1310 articles to assess the effectiveness of health promoting interventions for the management of overweight among children and adolescents. Investigators were particularly interested in the effectiveness of dietary interventions as the sole component of treatment, however only 7 studies fit their criteria for analysis. Due to this small amount of studies, investigators only evaluated multi-component interventions that contained a dietary intervention component. While it was impossible for investigators to determine the sole effectiveness of the dietary interventions, analyses suggested multi-component interventions with a dietary component helped overweight children achieving weight loss. Investigators additionally noted the need for future studies to evaluate the efficacy and effectiveness of dietary interventions as the sole component of treatment (32).

Multi-component interventions tend to be school-based initiatives containing components that contribute to promoting health and wellness. Examples of such components include: promoting physical activity, improving diet quality, targeting home and school environments to foster and promote a healthy lifestyle, and involving parents and food service staff to provide more nutritious meals (30).
Examples of the most successful multi-component interventions include: Child and Adolescent Trial for Cardiovascular Health (CATCH), Pathways, and Planet Health. Children participating in the CATCH intervention reported significantly higher dietary knowledge compared with children not receiving CATCH. Children also consumed significantly less total and saturated fat, and spent significantly more time engaged in moderate to vigorous physical activity during PE classes (29). The Pathways intervention was specifically designed for a low-income Native American population. Children participating in Pathways reported having a lower total energy and fat intake compared with children not receiving the intervention, as well as higher health knowledge (65). However, while there was an increase in self-reported physical activity among children in the intervention, motion sensor monitors did not corroborate these findings. Children participating in the Planet Health intervention reported watching significantly less television, and girls reported consuming .32 more servings of fruits and vegetables (30, 61). However, fruit and vegetable consumption was not impacted among the boys (61).

Gimme 5 is a social cognitive theory based multi-component intervention. The primary objective of this intervention is to promote the consumption of fruit, juice and vegetable (FJV) among children through impacting psychosocial variables such as self-efficacy, outcome expectations, and social norms associated with FJV intake. Program methods include: developing ‘asking skills’ (through role playing and other activities) to increase access to fruits and vegetables in the home and fast food restaurants, increase preference for FJV by encouraging children to taste-test new recipes, teach children skills needed to prepare FJV recipes for snacks and meals,
encourage children to set goals related to FJV consumption, and help children problem solve for times when goals are not attained (49).

The Gimme-5 program was implemented and evaluated with third grade children from 32 elementary schools (16 treatment and 16 control) for three years. The first year investigators collected base-line data. Children receiving the intervention participated in 12 lessons over the course of 6 weeks during their 4\textsuperscript{th} and 5\textsuperscript{th} grade school years. During the year children were in the 4\textsuperscript{th} grade, the intervention’s primary focus was on vegetable consumption. During the 5\textsuperscript{th} grade year, the intervention’s focus was on fruit and vegetable consumption. A seven-day food record was completed each year (year 1 \( n = 1,732 \): year 2 \( n = 1,864 \): year 3 \( n = 1,946 \)) to assess FJV consumption. Knowledge, preference, outcome expectations, self-efficacy, social norms, and asking behaviors pertaining to FJV consumption were also measured by self-report. Investigators reported mostly mixed and modest results. Significant improvements were noted for children receiving Gimme 5 for: FJV combined intake (\( p = .038 \)), vegetables alone intake (\( p = .004 \)), but not fruit alone intake. Their also appeared to be significant improvements for self reported self-efficacy (\( p = .054 \)), asking behavior (\( p = .017 \)) and knowledge (\( p = .038 \)) pertaining to FJV consumption. However investigators noted these changes were small: for example by year 3, the difference in FJV intake between children who received Gimme 5 and those who did not was only .2 servings. Also by year 3, outcome expectations and preference for FJV’s, and self-efficacy for asking and shopping for FJV’s were not significantly different between the treatment and control groups (49).
There have also been many reported limitations in the methodology, program design, implementation, and evaluation of health-promoting interventions (29, 30, 31 33). Methodological limitations include: inadequate sample size, and evaluation staff was not blinded to outcome assessments creating the potential for bias (29). Limitations in program design and implementation include: lack of monitoring of program integrity, theoretical basis was rarely described or used to explain results, and the training program for implementation personnel is rarely described (29, 31, 33). Interventions also tend to have an informative focus, without equipping children with skills and self-efficacy needed to overcome peer and emotional barriers for undesirable health behaviors (34). Limitations for the evaluation of interventions include: inadequate sub-analyses, unclear relationship of dose effect for programming, and inappropriate data analysis (29). Many studies also do not report dietary outcomes, an important mediating variable for successful weight loss and weight maintenance interventions. It is unclear whether this is due to the use of inappropriate or poor quality tools or flawed methodology for collecting food intake or data was never collected (30).

Since multi-component overweight and obesity prevention and treatment interventions have produced mostly mixed and modest results, some argue that more intermediate studies evaluating the efficacy and effectiveness of single component interventions and the mediating process variables (such as self-efficacy) are needed (31). Stevens et al also argues that smaller single-component interventions are potentially more cost effective. They also note that these types of studies could ultimately clarify the efficacy and effectiveness of multi-component programming by
teasing out components found to be ineffective. They further note that these interventions may also be less overwhelming for children and families by promoting small specific changes instead of many changes simultaneously as with a multi-component intervention.

**Food Fit**

Food Fit (FF) is a curriculum designed by faculty from the department of Human Nutrition, at The Ohio State University. Food Fit is a single component-nutrition intervention based on social cognitive theory (SCT), and attempts to overcome limitations noted from previous studies. The objective of Food Fit is to positively impact children’s behavioral capabilities (BC), self-efficacy (SE), and outcome expectancies (OE) for specific food selection behaviors thought to be associated with the prevention of childhood overweight (33, 34). By participating in FF children will learn simple, discrete skills through skills and knowledge training, and participate in role-playing, taste testing, and role modeling. The program implementer will also use positive and vicarious reinforcement, to further enhance children’s SE and OE for the targeted behaviors. Lesson topics target dietary behaviors that are thought to contribute to the development of childhood overweight and include: Choosing Lower Calorie Snack Foods (Lesson 1), Choosing 1 Serving of a Snack Food When Eating from a Large Container (Lesson 2), Choosing Beverages Without Added Sugar (Lesson 3), Choosing Cereals With a Low Amount of Added Sugar (Lesson 4), Eating Whole Fruit and Choosing Fruit For Breakfast and Snacks
(Lesson 5), and Eating Vegetables and Choosing Raw Vegetables for a Snack (Lesson 6).

FF was designed to overcome limitations noted by previous studies. A skill based pre and posttest design was developed to evaluate the impact of each lesson on children’s BC’s (actual skills), rather than exclusively using self-report methods. A detailed process evaluation, listing essential sub-tasks needed to perform each lesson was developed and implemented to assure program integrity. A training program for the implementation and evaluation staff was also developed so the program can be replicated. A previously validated tool for assessing diet quality among adults was also used.

In conclusion, overweight and obesity continues to increase among adults and children, with the largest increases found among 6-11 year old children. This is of great concern, due to the negative health and psychological consequences that have been associated with overweight and obesity. While there are many factors that are thought to contribute to this problem, poor eating habits is an essential area that requires intervention. However, many interventions targeting the improvement of nutrition among children have produced modest and mixed results. This is reportedly due to limitations found for intervention’s methodology, program design, implementation, and evaluation. The purpose of this study is to evaluate the efficacy and effectiveness of the FF program with children ages 6-11. FF is a SCT-based nutrition intervention that was designed to positively impact children’s dietary behaviors, all while attempting to overcome limitations noted from previous interventions.
CHAPTER 3

AN OUTCOME AND PROCESS EVALUATION OF “FOOD FIT:”
A THEORY BASED CHILDHOOD OVERWEIGHT PREVENTION CURRICULUM

ABSTRACT

A Social Cognitive Theory based (SCT) nutrition intervention (Food Fit – FF) was designed and implemented with 3rd-5th grade children to impact diet quality and specific food selection behaviors associated with the prevention of childhood overweight. During the intervention children participated in hands-on activities and role-playing, and were encouraged to taste healthy foods and beverages. Evaluations included per lesson pre and posttests to evaluate psychosocial variables, and a standardized instrument to evaluate dietary behaviors. Process evaluations were conducted to assure program integrity. Children were also given a choice between food items after each lesson and reported the main reason for their selection. Favorable outcomes were seen for dietary behaviors (i.e. raw vegetable consumption (p<0.0006)), and psychosocial variables (i.e. outcome expectancies for eating raw vegetables (p<0.009)). These results suggest that participation in the FF program can positively and significantly enhance psychosocial variables of SCT related to specific
dietary behaviors, which in turn, correspondees with significant improvements in these dietary behaviors.

**INTRODUCTION**

Childhood overweight is a predominant risk factor associated with the development of chronic co-morbidities such as type-2 diabetes, cardiovascular disease, and metabolic syndrome, as well as psychological conditions such as depression, low self-esteem, and social discrimination (5, 7, 8, 10, 11, 35, 50, 51, 52, 54). From 1999-2004 the incidence of childhood overweight (BMI for age and sex ≥ 95th percentile) increased from 13.9% to 17.1% and at risk for overweight (≥ 85th percentile) increased from 28.2% to 33.6% (1). This is of particular concern, since it is estimated that 80% of overweight children will remain obese throughout adulthood (35).

Interventions that can favorably impact health behaviors associated with the prevention of overweight (such as a healthy diet) could help prevent the onset of overweight in childhood, and spare children from the associated metabolic and psychological consequences. However mixed or modest outcomes have been reported for many health-promoting interventions. This is reportedly due to limitations noted in their methodology, design, implementation, and evaluation. The most common methodological limitations noted include: inadequate sample size, and un-blinded implementation staff (29). Limitations noted in program design and implementation include: lack of monitoring of program integrity, theoretical basis for interventions are rarely described or used to explain results, and the training program
for implementation personnel are rarely described. (29, 31, 33) Interventions also tend to have an informative focus, without equipping children with skills and self-efficacy needed to overcome peer and emotional barriers to engage in healthful behaviors (34). Limitations for the evaluation of interventions include: inadequate sub-analysis, unclear relationship of dose effect for programming, and inappropriate data analysis (29).

In two recent meta-analyses, authors cited a need for theory-based nutrition curriculums to improve dietary behaviors thought to be associated with the prevention of childhood overweight (29, 32). SCT was also cited as the most successful theoretical basis for health promoting interventions among children (29, 34). While large randomized controlled trials are considered the gold standard for implementing and evaluating interventions, Stevens et al (31) argues that more evidentiary or intermediate studies are needed to evaluate the ability of interventions to impact process variables related to overweight prevention, such as diet. In addition, they advocate for more research to evaluate the efficacy of single-component interventions to determine what components appear to be most promising for future multi-component interventions (31).

FF is a theory based (SCT) nutrition intervention that was designed to surmount limitations noted from previous studies. The intervention targets dietary behaviors that are reportedly associated with childhood overweight, such as: inadequate intake of fruits and vegetables, and over consumption of added sugars and calorically dense-larger portioned snack foods. Psychosocial variables of SCT targeted during the intervention include: behavioral capabilities (BC) (skills needed to
perform a behavior), self-efficacy (SE) (the confidence to execute skills or behaviors), and outcome expectancies (OE) (the value that is placed on the outcome of a behavior). The purpose of this study was to evaluate the efficacy of FF and the impact participation in the program has on dietary behaviors and psychosocial variables of 3rd-5th grade children and whether these variables impact food selections.

**METHODS**

**Design**

Children from five YMCA sponsored after school programs were recruited for participation in this study. Children were in the 3rd, 4th or 5th grade. The sample consisted of children who gave verbal assent, and whose parents signed an informed consent form. Four sites were located in public schools and one site was located in a parochial/private school. Four sites were located in Franklin County, Ohio and one site was located in Fairfield County, Ohio (nearby Franklin County). Per-lesson assessments were collected weekly during the intervention. A dietary assessment was collected before and after the intervention (April–March). All sites participated in the intervention for 6 weeks (6 lessons) from April 2007 through May 2007. This study used a treatment only design with children acting as their own control. Approval from the Behavioral and Social Sciences Institutional Review Board, from The Ohio State University, was obtained March 20th, 2007.
**Intervention**

*Training Plan* - Fifty-eight undergraduate students enrolled in Human Nutrition 704 (Community Nutrition) at The Ohio State University were trained to implement and evaluate FF as a service-learning component of their class. Students were randomly assigned to 1 of 10 groups. Each group of 5-6 students were then randomly assigned to an after school site. For the initial lesson, students were randomly assigned one of the following tasks: administer the program, administer pre and post testing, conduct process evaluation or administer ‘Controlled Free Choice’ evaluation. For the following lessons, students systematically rotated through the other assigned tasks.

Students attended weekly training sessions during their laboratory class hours on Tuesdays (3 hours). During this session students participated in experiential learning and practiced performing the proper procedures for their assigned task. A detailed script, which outlined the process for each lesson, was distributed weekly to the students implementing the lessons. At the end of each training session, students were also able to ask questions pertaining to their assigned role. Lessons were implemented on the following Thursday of the same week. One-hundred percent of the students attended the weekly training sessions.

*Intervention – Food Fit* is based on SCT. Lessons are designed to be “stand-alone” sessions, allowing children absent from previous lessons the ability to participate. Each lesson was designed to be fun and experientially based, while targeting specific behavior changes. Pedagogical techniques employed to promote healthy eating behaviors included: (a) hands on activities to teach abstract concepts, (b) discrete
skills development through instructor modeling and practice (c) use of positive role models to model healthy eating behaviors, (d) role playing to practice learned skills and behaviors and to overcome barriers, (e) use of positive and vicarious reinforcement to encourage children to demonstrate targeted behaviors, and (f) taste testing of healthy foods promoted during the lesson.

Lessons were designed to last approximately 30-45 minutes. Lesson topics included: Choosing lower calorie alternatives for snack foods (Lesson 1), Choosing one serving of a packaged snack food (Lesson 2), Choosing beverages without added sugar (Lesson 3), Choosing cereals with a low amount of added sugar (Lesson 4), Eating fruit and choosing whole fruit for breakfast and snacks (Lesson 5), and Eating vegetables and choosing raw vegetables for a snack (Lesson 6).

Specific behavioral objectives were identified for each lesson and were used to design the structure and process of each session. Each lesson consisted of 5 sections: Introduction, Benefits and Consequences, Modeling and Taste Testing, Role-Playing, and Wrap-Up. During the ‘Introduction’ the instructor introduced and reviewed the lesson’s key objectives. In the ‘Benefits and Consequences’ section, children were engaged in hands on activities to demonstrate the positive benefits and negative consequences associated with the health behavior being promoted. During ‘Modeling and Taste Testing’, the instructor promoted and modeled the positive health behaviors, and used positive and vicarious reinforcement. During this section, children were also encouraged to taste-test healthy foods or beverages related to the lesson’s key objectives. Next, children participated in structured ‘Role-Playing’ with the instructor to practice skills learned in the lesson in two separate real-world
examples: one with a parent or guardian, and one with a peer. Finally, during ‘Wrap-Up’, the instructor reviewed the key objectives of the lesson, and children had the opportunity to ask questions about the lesson.

Outcome Evaluation

Figure 3.1 is a graphical representation of when the outcome evaluations were administered. A questionnaire was administered before the intervention to collect children’s demographic data. A child-modified version of the Food Behavior Checklist (CM-FBC) was used before and after the intervention to assess children’s self-reported dietary behaviors (57). The CM-FBC contains 19-items, and measures: fruit and vegetables consumption, milk consumption, fat and cholesterol consumption, and dietary behaviors such as use of the food label and frequency of eating away from home. Responses are either dichotomous (Yes/No) or frequency based (0-5).
A pre and posttest was administered at each lesson to assess children’s BC’s, SE, and OE’s pertaining to key skills and behaviors targeted during the lesson. BC’s were evaluated using skills and knowledge based items. For both SE and OE a root was used followed by a statement describing a skill or behavior targeted during the lesson. Based on previous research the SE root used was ‘I am sure I can’ (58). Since no previous research was found for the evaluation of OE’s using this method, the root ‘I want to’ was used. Children responded to these items using a 3 point Likert scale (agree, neutral, disagree).
At the end of each lesson children who participated in the pre and post testing were also given a choice of a food or beverage item to have as a snack or to take home (Controlled Free Choice). After the selection was made, children were immediately asked to report the main reason for their selection and their responses were recorded.

**Process Evaluation**

Using a standardized form, a process evaluator recorded whether the individual implementing the lesson performed the sub-tasks (scored: yes/no) needed to complete the lesson. Each lesson contained 50-70 sub-tasks.

**Statistical Analysis**

MINITAB (15.0, State College, PA) and SPSS (16.0, Chicago, IL) were used to perform statistical analysis for outcome measures. Statistical significance was determined using a p-value of < .05. To evaluate BC’s, SE’s and OE’s, responses to the set of items pertaining to each variable were first summed to make a composite score. For BC’s, one point was given for each correct response. For SE’s and OE’s, two points were given for the response ‘Agree’, one point was given for the response ‘Neutral’ and no points were given for the response ‘Disagree’. On average there were three items per variable. A paired t-test was used to evaluate differences between pre and posttest composite scores. To determine the source of variability for each variable, items were individually evaluated using McNemar’s Test, and tests of marginal homogeneity.
To evaluate the CM-FBC, a number of statistical techniques were used. First a composite score was evaluated. The composite score was created using items with a dichotomous response (yes/no). One point was awarded for each positive response with a maximum possible value of 14, and the difference between pre and posttest scores were evaluated using a paired t-test. To evaluate the source of variability for this score, each item was independently evaluated. McNemar’s test was used to evaluate items with a dichotomous response, and a paired t-test was used to evaluate items with a frequency based response. To determine whether the frequency of participation (dose) was associated with the composite CM-FBC score (scored as either ‘Healthy’ or ‘Unhealthy’), a cluster analysis was first used to partition children into two distinct groups based on the frequency of lessons attended. A paired t-test was then used to determine if the CM-FBC score was different between these two groups. Fisher’s exact test was used to determine if children’s diet perception (item 19 on CM-FBC) was associated with CM-FBC composite scores, scored as ‘less favorable’ or ‘more favorably’. Children were classified as ‘less favorable’ if they scored less than 50% of the possible composite score (0-7), and classified as ‘more favorable’ if the scored more than 50% of the possible composite score (8-14).

At the end of each lesson children were given a choice between ‘more healthy’ (HC) and ‘less healthy’ (UC) foods or beverages related to the lesson’s topic. A two-sample t-test was used to evaluate the differences between BC’s, SE, OE and children’s selection. A linear discriminate analysis was used to assess the prediction accuracy the psychosocial variables had on food selection.
RESULTS

Fifty-eight children were enrolled in the study. There were more males (57%) than females (43%). A majority of the children were in the 3rd and 4th grade (82%) and either 9 or 10 years old (76%). Ethnicities of the children varied from mostly Caucasian (67%), to African American (19%) with the remaining children self-identified as ‘Other’ (14%).

Outcome Assessments

Process Evaluation

For most lessons, the implementer from each group executed 100% of the assigned tasks. Table 3.1 reports the percentage of sub-tasks completed by each group, for each lesson.
Table 3.1 Percentage of sub-tasks completed during each lesson

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<td>98%</td>
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<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Lesson 6</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>99%</td>
<td>100%</td>
</tr>
</tbody>
</table>

** Represents missing data

Per Lesson Evaluation

The participation rates for each lesson was: 78% for Lesson 1, 71% for Lesson 2, 78% for Lesson 3, 66% for Lesson 4, 67% for Lesson 5, and 79% for Lesson 6. Significant improvements were observed for composite BC scores in lessons 2 (p = .001), 5 (p = .001), and 6 (p = .001) and a suggestive difference was observed for lesson 3 (p = .085). Significant improvements were observed for composite SE scores for lessons 1 (p=.006), 2 (p = .001), 3 (p = .006), and 5 (p = .015) and a suggestive difference was observed for lesson 6 (p = .055). Significant improvements were observed for composite OE scores for lessons 1 (p = .01), 3 (p = .001), and 6 (p = .001) and a suggestive difference was observed for lesson 5 (p = .085). A complete
list of composite scores can be found on Table 3.2. Items that were individually evaluated that also significantly increased can be found on table 3.3.

**Dietary Assessment**

Forty-eight children completed the dietary behaviors assessment (CM-FBC) before and after the intervention. Composite CM-FBC scores significantly increased after the intervention ($p < .001$). Significant improvements were also found for four specific self reported behaviors: consuming more fruits and vegetables as snacks ($p = .0014$), increased consumption of citrus fruits and juice ($p = .0209$), increased consumption of raw vegetables ($p = .0006$), and increased use of the food label to determine food selection ($p = .0017$) (Table 3.4).

<table>
<thead>
<tr>
<th></th>
<th>Behavioral Capacities</th>
<th>Self Efficacy</th>
<th>Outcome Expectancies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRE</td>
<td>POST</td>
<td>PRE</td>
</tr>
<tr>
<td>Lesson 1</td>
<td>45</td>
<td>3.45</td>
<td>3.61</td>
</tr>
<tr>
<td>Lesson 2</td>
<td>41</td>
<td>2.29</td>
<td>2.9****</td>
</tr>
<tr>
<td>Lesson 3</td>
<td>45</td>
<td>3.71</td>
<td>4.6*</td>
</tr>
<tr>
<td>Lesson 4</td>
<td>38</td>
<td>4.89</td>
<td>4.92</td>
</tr>
<tr>
<td>Lesson 5</td>
<td>39</td>
<td>1.97</td>
<td>2.5****</td>
</tr>
<tr>
<td>Lesson 6</td>
<td>46</td>
<td>1.98</td>
<td>2.43*****</td>
</tr>
</tbody>
</table>

*p < .10, **p < .05, ***p < .01, ****p < .001.

Table 3.2: Composite Psychosocial Variable Scores
<table>
<thead>
<tr>
<th>Measure</th>
<th>n</th>
<th>Item</th>
<th>Response Scale</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral Capability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson 1</td>
<td>45</td>
<td>Identify FL</td>
<td>A</td>
<td>.0006</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>Identify Calories on FL</td>
<td>A</td>
<td>.005</td>
</tr>
<tr>
<td>Lesson 2</td>
<td>41</td>
<td>Identify Serving Size on FL</td>
<td>A</td>
<td>.0005</td>
</tr>
<tr>
<td></td>
<td>41</td>
<td>Identify Servings Per Container on FL</td>
<td>A</td>
<td>.001</td>
</tr>
<tr>
<td>Lesson 3</td>
<td>44</td>
<td>Identify 100% Fruit Juice has no Added Sugars</td>
<td>B</td>
<td>.06</td>
</tr>
<tr>
<td>Lesson 5</td>
<td>39</td>
<td>Identify daily recommendations for Fruit Group</td>
<td>A</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>Identify amt. of 100% FL equal to 1 serving of Fruit</td>
<td>A</td>
<td>.001</td>
</tr>
<tr>
<td>Lesson 6</td>
<td>46</td>
<td>Identify daily recommendations for Veg Group</td>
<td>A</td>
<td>.0005</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>Identify a raw vegetable</td>
<td>A</td>
<td>.09</td>
</tr>
<tr>
<td>Self Efficacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson 1</td>
<td>45</td>
<td>Identify FL</td>
<td>C</td>
<td>.04</td>
</tr>
<tr>
<td>Lesson 2</td>
<td>41</td>
<td>Read Serving Size on FL</td>
<td>C</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>41</td>
<td>Portion 1 Serving of a Packaged Food</td>
<td>C</td>
<td>.001</td>
</tr>
<tr>
<td>Lesson 3</td>
<td>44</td>
<td>Use FL to Choose beverage w/oot Added Sugars</td>
<td>C</td>
<td>.07</td>
</tr>
<tr>
<td>Lesson 5</td>
<td>39</td>
<td>Eat Fruit as a Snack</td>
<td>C</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>Eat Fruit instead of Fruit Flavored Foods (i.e. Candy)</td>
<td>C</td>
<td>.06</td>
</tr>
<tr>
<td>Outcome Expectancies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson 1</td>
<td>45</td>
<td>Use FL to Choose Lower Cal Snacks</td>
<td>C</td>
<td>.02</td>
</tr>
<tr>
<td>Lesson 3</td>
<td>44</td>
<td>Choose drinks without added sugars</td>
<td>C</td>
<td>.06</td>
</tr>
<tr>
<td>Lesson 6</td>
<td>46</td>
<td>Eat raw vegetables</td>
<td>C</td>
<td>.009</td>
</tr>
</tbody>
</table>

Abbreviations: Calorie (Cal); Food Label (FL); Fruit Juice (FJ); Vegetable (Veg)

NOTE: The possible response scales include: A: multiple choice; B: True/False; C: Agree; Neutral; Disagree

Table 3.3. Items on the Per Lesson Pre and Post Tests with Significant Increases
Measure | n | Pre Score | Post Score
--- | --- | --- | ---
Composite Score | 48 | 7.2 | 8.4****

**Items with a significant improvement:**
- During the past week did you have citrus fruit or citrus juice?**
- Do you eat fruit or vegetables as snacks?***
- During the past week did you have raw vegetables?****
- When choosing a food to eat, do you use the Nutrition facts on the food label?***

*p < .10. **p < .05. ***p < .01. ****p < .001.

3.4. Children’s Dietary Behaviors

The cluster analysis partitioned children into 2 distinct groups: children who attended 1, 2, 3, or 4 lessons (attended ‘less frequently’) and children who attended 5 or 6 lessons (attended ‘frequently’). Forty-one percent of the children who completed the dietary assessment attended the intervention ‘frequently’, and 59% of the children attended the intervention ‘less frequently’. There was not a significant difference (p=.35) in composite CM-FBC scores between children who attended frequently and less frequently. However children who attended frequently had higher posttest scores and experienced a greater increase compared with pretest scores.
Children reported the perception of their diet quality on the CM-FBC as ‘Excellent’, ‘Very Good’, ‘Good’, ‘Fair’ or ‘Poor’ (item 19). Before the intervention there was no significant difference between self-reported diet quality perception and CM-FBM composite score (scored ‘Healthy’ or ‘Unhealthy’) (p < .35). However after the intervention, the correlation between children’s self reported diet quality perception and CM-FBC composite score was significant (p < .03) (Table 3.5).

<table>
<thead>
<tr>
<th></th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
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<tbody>
<tr>
<td><strong>Pre Test</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p &lt; .35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less Favorable</td>
<td>3*</td>
<td>7*</td>
<td>8</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>More Favorable</td>
<td>0</td>
<td>2</td>
<td>9*</td>
<td>9*</td>
<td>5*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post Test</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 49</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p &lt; .03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less Favorable</td>
<td>2*</td>
<td>3*</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>More Favorable</td>
<td>0</td>
<td>1</td>
<td>10*</td>
<td>17*</td>
<td>7*</td>
</tr>
</tbody>
</table>

**BOLD*:** Children who accurately self-reported diet quality.

Table 3.5. Children’s diet perception compared with composite CM-FBC score.

*Controlled Free Choice*

Children choose the UC more often than the HC, except for Lesson 4 (Table CFC). The most frequently reported reason children chose the HC was for a ‘health attribute’ (such as ‘has less sugar’) while the most frequent response children gave for
the UC was ‘taste’. When comparing children who chose a HC and UC, a significant difference for SE (p < .05) was found for lesson 6, while significant differences for OE were found for lessons 4 and 6 (Table CFC). A suggestive difference (p < .1) was found for BC for lesson 5. The discriminate analyses revealed the prediction accuracy of the psychosocial variables (BC, SE, and OE) ranged from 58% to 79% and on average was 65%.

<table>
<thead>
<tr>
<th></th>
<th>Lesson</th>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>BC Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HC</td>
<td>.78</td>
<td>.96</td>
<td>.88</td>
<td>.98</td>
<td>.83*</td>
<td>.86</td>
</tr>
<tr>
<td>UC</td>
<td>.68</td>
<td>.97</td>
<td>.86</td>
<td>.99</td>
<td>.68*</td>
<td>.77</td>
</tr>
<tr>
<td>SE Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HC</td>
<td>2.9</td>
<td>2.9</td>
<td>2.9</td>
<td>3.0</td>
<td>2.9</td>
<td>2.9**</td>
</tr>
<tr>
<td>UC</td>
<td>2.9</td>
<td>2.9</td>
<td>2.9</td>
<td>3.0</td>
<td>2.8</td>
<td>2.4**</td>
</tr>
<tr>
<td>OE Score</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>HC</td>
<td>2.9</td>
<td>2.6</td>
<td>2.8</td>
<td>2.8**</td>
<td>2.8</td>
<td>2.8**</td>
</tr>
<tr>
<td>UC</td>
<td>2.9</td>
<td>2.7</td>
<td>2.7</td>
<td>2.3**</td>
<td>2.7</td>
<td>2.5**</td>
</tr>
</tbody>
</table>

Abbreviations: Behavioral Capability (BC); Self Efficacy (SE); Outcome Expectancy (OE)

*p < .10. **p < .05. ***p < .01. ****p < .001.

Table 3.6. Psychosocial Variables Compared With Children’s Food Selection
DISCUSSION

This program evaluation demonstrates this nutrition intervention based on Social Cognitive Theory had a favorable impact on psychosocial variables related to children’s food selections and dietary behaviors. However, this study was designed to be an efficacy study, that is, the intervention was implemented and evaluated under ideal circumstance. There was approximately a 1:6 teacher/student ratio maintained during each lesson, and there was a separate evaluation staff. The study personnel were also trained every week, which likely contributed to the high completion rate of implementation tasks recorded during the process evaluation. Whether these results are attainable in other circumstances with a less intensive training plan warrants further investigation. Nonetheless, the outcomes of this study are strengthened by the randomization schedule used for the study personnel.

SCT posits that specific pedagogical techniques can be used to prompt changes in SCT variables (see Figure 3.1), and that changes in these variables can lead to changes in behavior (33). Results from this research provide support that pedagogical techniques noted can prompt changes in select SCT variables, and that changes in these variables can impact behaviors. Among the psychosocial variables evaluated in this study, more knowledge and skill-based items (BC) significantly increased compared to SE and OE items. This is similar to the results from ‘Gimme 5’ (49) and ‘Pathways’ (65), two other child-based health promoting interventions. In ‘Pathways’ (65), knowledge, attitudes and behaviors related to diet and physical activity were evaluated, and the only variable that significantly increased for those receiving Pathways by the end of the intervention was knowledge. ‘Gimme 5’ (49)
was a two-year intervention promoting fruit, juice and vegetable (FJV) consumption. Children receiving the intervention had significantly higher FJV knowledge in year two, but there was no significant change in FJV self-efficacy or outcome expectations. It appears BC’s may be easier to impact than other variables given the intervening variables that may influence them, such as the heavy marketing of certain foods (i.e. sugar sweetened beverages, snack foods), and lack of marketing for other foods (i.e. fruits and vegetables).

Significant improvements were found for many of the psychosocial variables (BC, SE and OE) targeted during the intervention. Changes in these variables also corresponded with changes in dietary behaviors as measured by the CM-FBC. For example, children’s BC’s and OE’s significantly improved (p < .001) and there was a suggestive difference for SE (p < .055) for Lesson 6 (Eating vegetables and choosing raw vegetables for a snack). These changes corresponded with increases in vegetable consumption, as measured by the CM-FBC. Children reported a significant increase in the consumption of raw vegetables (p=.006) and the consumption of fruit and vegetables as snack foods (p=.001). Similarly, children also reported using the Food Label more often to make food selections (p = .0017). This was a key learning objective for Lessons 1, 2, 3 and 4, and significant improvements were reported for many of these lessons’ BC, SE and OE. It is important to note that no significant changes occurred for any of the psychosocial variables in Lesson 4. This may be the result of a dose effect, since reading and identifying the Food Label was a key objective for the first four lessons, and pre test scores were already high (Table 3.2).
Eight items on the CM-FBC evaluated fruit and vegetable intake. Significant improvements were found for three of these items. The behaviors evaluated by these three items were behaviors promoted using specific recommendations and targeted messages: eating more than 1 kind of fruit daily, eating raw vegetables, and eating fruits and vegetables as a snack. For example, in Lesson 6, the specific recommendation ‘choose raw vegetables as a snack’ was used. While research has supported the use of both general and specific recommendations for health promotion, recently Brinberg et al reported that when compared with those who receive general recommendations for fiber consumption, individuals receiving specific recommendations had significantly higher knowledge about fiber and the fiber content of foods they consumed, higher consumption of foods containing fiber (while those with general messages decreased) and significantly higher fiber intake (62). Other items evaluating fruit and vegetable intake may not have changed because they were not promoted using specific recommendation, or because of other intervening variables. The use of specific recommendations, may have accounted for the favorable outcomes noted in this study.

Seven of the items on the CM-FBC were behaviors not targeted during the intervention (i.e. egg consumption or frequency of eating away from home). Therefore we would not expect and did not observe a significant change in these items. However, two items evaluated children’s consumption of sugar-sweetened beverages consumption, which was a focus of Lesson 3 (Choosing beverages without added sugars). While this behavior was targeted with a specific recommendation, no significant changes were observed. However, it may be that our assessment tool
(CM-FBC) was not well suited to evaluate changes in sugar-sweetened beverage consumption, since it only evaluates frequency, and not the total amount consumed.

SCT posits that SE is the most important determinant for executing more healthful nutrition behavior, such as buying and consuming healthy foods (66). However, SCT also posits that SE and outcome expectations can directly influence behavior by enhancing an individual’s ability to develop self-regulatory behaviors. That is, the ability to set goals, plan and monitor themselves. In a recent study evaluating how psychosocial variables of SCT determine food purchases and dietary intake among adults, it was noted that self-efficacy alone was not a predominant determinant. Instead, the most predominant determinant was the enactment of self-regulatory behaviors. When given a choice between UC and HC food items, children in this study generally chose the UC, except for Lesson 4. Consistent with SCT, it is conceivable that children with higher SE and OE, would be more likely to choose HC items. This was observed in two of the six lessons, whereby children who chose the HC item had significantly higher OE scores in lesson’s 4 and 6, and a significantly higher SE score in lesson 4. It is possible to conceive that children developed self-regulatory skills through the enhancement of SE and OE by participating in the intervention. However, self-regulatory skills were not evaluated, and warrant future research. In the other four lessons, there was not difference between children’s SE and OE, and food choice. Since self-regulatory behaviors were not directly targeted during this intervention, this may have contributed to this finding. Other intervening variables may have also influence children’s choice, such as brand recognition or how heavily the food item is advertised. For example in 1999 the amount of money spent
by the food industry on advertising was 7.3 billion dollars, and in 1997, 792 million dollars was spent on breakfast cereals, 549 million was spent on soft drinks, and 330 million was spent on snack foods (15).

A limitation to this study is that measures used to evaluate psychosocial variables and dietary behaviors were not validated, and mostly relied on self-report. Assessing children’s diet quality is reportedly a difficult task. There are some validated methods, such as direct observation and a 24-hour recall using assisted food records (64), however, these are invasive or requires extensive evaluator training. The original Food Behavior Checklist (FBC) (57) is a simple-validated tool, which measures adult’s food behaviors. We used the same FBC, and modified the questionnaire to make it child-appropriate. For example, we did not include food security items. A suggestion for future research is to validate this tool, by correlating its measures with other validated methods. Pre and posttests for each lesson were also not validated. Previous research has validated a method for evaluating children’s fruit and vegetable SE. We used the same approach, replacing fruit and vegetable behaviors, with behaviors targeted during the intervention. We could not find any previous research validating a method for evaluating OE therefore we used a similar format as the SE evaluation, but replaced the root. Items assessing BC were skills and knowledge based, and relied less on self-report. Future research is needed to validate tools that measure all of the psychosocial variables of social cognitive theory.

Other limitations for this efficacy study include: psychosocial variables were evaluated at the beginning and end of each lesson, with no follow-up analysis to evaluate if changes were maintained, the sample was a convenience sample of 3rd, 4th
and 5th grade children, there was no comparable control group, and participation varied each lesson because the intervention was done during the after school time. Suggestions for future research include: (a) scheduling a follow-up evaluation at the beginning of the study (b) using a cohort of children from one grade (preferably 3rd grade) to control for variability since children in 3rd-5th grade are at different cognitive developmental stages, (c) using a randomized controlled trial to account for variability, (d) and implement the intervention during the regular school day to help participation rates stay constant.
**IMPLICATIONS FOR PRACTICE**

FF positively changed variables of SCT, which in turn may have caused favorable increases in dietary behaviors. However, when working with children, it can be difficult to expect changes in dietary behaviors, since their parents are the gatekeepers of what is provided at home, and schools are the gatekeepers of what is provided at schools. That is why this intervention largely targeted snack foods and beverages, two areas for which children can make decisions. While favorable results were observed in this and other interventions, a purely educational approach may not substantially impact dietary behaviors long term. Therefore environmental changes such as providing more healthful foods in vending machines and policy driven initiatives would likely enhance the effectiveness of health promoting interventions, such as this.
Figure 3.2 (a) Graphical Representation of Social Cognitive Theory (33) (b) Social Cognitive Theory with Food Fit Pedagogy
CHAPTER 4

EPILOGUE

CONCLUSION

Food Fit is an overweight prevention curriculum, designed to target dietary behaviors that have been associated with the development childhood overweight. The FF program was evaluated using psychosocial measures during each lesson to evaluate program efficacy, a child-modified version of the validated instrument ‘Food Behavior Checklist’ to evaluate children’s dietary behaviors, and children were given a choice between HC and UC food or beverage items each lesson to evaluate children’s food selection behaviors. It was found that after participating in this curriculum significant improvements occurred for children BC’s, SE and OE’s for many of the lessons. It was further found that favorable changes occurred in children’s dietary behaviors. When given a choice between UC and HC food or beverage items, children in this study generally chose the UC, except for Lesson 4. However, children who chose the HC item had significantly higher OE scores in lesson’s 4 and 6, and a significantly higher SE score in lesson 4.
Limitations

There are a few limitations to this study to consider. The evaluations used during this study have not been validated with children. Psychosocial variables were evaluated during each lesson, with no follow-up measures taken. The sample was also a convenience sample of 3rd, 4th and 5th grade children, with no comparable control group. A dropout rate of 21%-34% was experienced each lesson because the intervention was implemented during the after school time.

Recommendations

Further research is needed to validate self-report tools for evaluating children’s dietary behaviors and psychosocial measures. Follow-up studies could also determine if changes in psychosocial variables and dietary behaviors are maintained over time. Using a cohort of children from one grade (preferably 3rd grade) could also control for variability since children in 3rd-5th grade are at different cognitive developmental stages. Future research is also needed to validate tools that rely on self-report, and measure children’s psychosocial variables. Evaluating a control group for comparison could also further strengthen outcomes. To help participation rates stay constant and minimize the dropout rate, future studies could implement the intervention during the regular school day.
LIST OF REFERENCES


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APPENDIX A

CONSENT FORM
The Ohio State University Parental Permission
For Child’s Participation in Research

Study Title: An Evaluation of an After School Program entitled Food Fit
Researcher: Dr. Gail Kaye
Sponsor: None

This is a parental permission form for research participation. It contains important information about this study and what to expect if you permit your child to participate.

Your child’s participation is voluntary.

Please consider the information carefully. Feel free to discuss the study with your friends and family and to ask questions before making your decision whether or not to permit your child to participate. If you permit your child to participate, you will be asked to sign this form and will receive a copy of the form.

Purpose: The purpose of this study is to evaluate the after school program entitled Food Fit.

Procedures/Tasks:

As a part of your child’s after school program, Food Fit will be offered weekly starting April 2007 – June 2007. You will not be asked to give any extra time outside of your child’s regular program hours and Food Fit is free to your child. Your child’s choice to participate, not participate, or withdraw from the study will have no affect on their ability to participate in the Food Fit program. The Food Fit program will be offered to all children (ages 6-11) at your after school program, and this permission slip is for participation in the assessment pieces that accompany Food Fit.

We would like to evaluate the impact of Food Fit by asking your child to complete some surveys. Before and after Food Fit we would like your child to complete a brief 10 minute survey about their normal eating behaviors. Every week Food Fit is provided a short assessment will be made before and after each lesson. Along with
these short assessments, we would like to provide your child with snacks every week, and ask them why they choose their selection. Also, an observational assessment will also be conducted every week. This assessment will help us make sure the program is being administered correctly. These assessments will help us evaluate the impact of Food Fit, and allow us to improve Food Fit for future programming.

**Duration:**
The Food Fit program includes 6, 1-hour lessons. Food Fit will be offered at your after school site 1 time per week.

Your child may leave the study at any time. If you or your child decides to stop participation in the study, there will be no penalty and neither you nor your child will lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with The Ohio State University.

**Risks and Benefits:**

There is minimal, if any, risk associated with participation in this evaluation. This research will show the investigators the impact Food Fit has on the eating behaviors of children, and help develop further programming designed to help children learn strategies and skills needed to choose healthy food selections.

**Confidentiality:**

Efforts will be made to keep your child’s study-related information confidential. However, there may be circumstances where this information must be released. For example, personal information regarding your child’s participation in this study may be disclosed if required by state law. Also, your child’s records may be reviewed by the following groups (as applicable to the research):

- Office for Human Research Protections or other federal, state, or international regulatory agencies;
- The Ohio State University Institutional Review Board or Office of Responsible Research Practices;
- The sponsor, if any, or agency (including the Food and Drug Administration for FDA-regulated research) supporting the study.

**Incentives:**

None.
Participant Rights:

You or your child may refuse to participate in this study without penalty or loss of benefits to which you are otherwise entitled. If you or your child is a student or employee at Ohio State, your decision will not affect your grades or employment status.

If you and your child choose to participate in the study, you may discontinue participation at any time without penalty or loss of benefits. By signing this form, you do not give up any personal legal rights your child may have as a participant in this study.

An Institutional Review Board responsible for human subjects research at The Ohio State University reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Contacts and Questions:
For questions, concerns, or complaints about the study you may contact  
Dr. Gail Kaye: 614-292-5512 or gkaye@ehe.ohio-state.edu

For questions about your child’s rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

If your child is injured as a result of participating in this study or for questions about a study-related injury, you may contact  Dr. Gail Kaye: 614-292-5512 or gkaye@ehe.ohio-state.edu.
Signing the parental permission form

I have read (or someone has read to me) this form and I am aware that I am being asked to provide permission for my child to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction. I voluntarily agree to permit my child to participate in this study.

I am not giving up any legal rights by signing this form. I will be given a copy of this form.

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Investigator/Research Staff

I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

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<td>Date and time</td>
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APPENDIX B

CHILD-MODIFIED FOOD BEHAVIOR CHECKLIST
Child-Modified Food Behavior Checklist

Answer the following items by checking yes or no. Note that some answers are related to serving portions.

1. Do you eat more that 1 kind of fruit daily?
   Yes   No

2. During the past week, did you have citrus fruit or citrus juice?
   Yes   No

3. Do you eat more that 1 kind of vegetable a day?
   Yes   No

4. How many servings of vegetables do you eat each day?
   None   1 Serving   2 Servings   3 Servings   4 Servings   5 Servings

5. Do you eat 2 or more servings of vegetables at your main meal?
   Yes   No

6. Do you eat fruit or vegetables as snacks?
   Yes   No

7. How many servings of fruit do you eat each day?
   None   1 Serving   2 Servings   3 Servings   4 Servings   5 Servings

8. During the past week, did you have raw vegetables?
   Yes   No

9. Do you drink milk daily?
   Yes   No

10. During the past week, did you have milk as a beverage or on cereal?
    Yes   No
11. During the past week, did you have fish?
   Yes  No

12. How many times a week do you usually eat food from a fast food restaurant?
   None  1 Serving  2 Servings  3 Servings  4 Servings  5 Servings

13. During the past week did you have eggs?
   Yes  No

14. If you eat eggs, about how many eggs do you usually eat in a week?
   None  1 Serving  2 Servings  3 Servings  4 Servings  5 Servings

15. Do you eat low-fat instead of high-fat foods?
   Yes  No

16. When choosing a food to eat, do you use the Nutrition facts on the food label?
   Yes  No

17. Do you drink regular soft drinks?
   Yes  No

18. Do you drink kool-aid, Gatorade, sunny delight, or other fruit drink/punch
   Yes  No

19. Would you describe your diet as
   Excellent  Very Good  Good  Fair  Poor
APPENDIX C

PER LESSON PRE AND POST TESTS
Pretest for Lesson 1

Subject #__________

Directions: Please use the foods in front of you to answer questions 1-3. You will not need the food items to answer the remaining questions.

1. On each food item, which letter is next to the Food Label?
   a. A
   b. B
   c. C
   d. D

2. How many calories does each package have?
   a. Pretzels _______
   b. Potato Chips _______
   c. Cheese Crackers _______

3. Amy is going to have a snack. Which food item should Amy pick if she wants to eat the snack with the least amount of Calories?
   a. Pretzels
   b. Potato Chips
   c. Cheese Crackers

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree
😊 = Neutral
şa = Disagree

4. I am sure I can identify the food labels on different foods on my own. 😊😊😊
5. I am sure I can read Calories on food labels on my own. 😊😊😊
6. I am sure I can use the food label to choose lower calorie snack foods on my own. 😊😊😊
7. I want to read the food label to choose lower calorie snack foods. 😊😊😊
8. I want to choose lower calorie snack foods when I eat. 😊😊😊

© GLK/PWB
Posttest for Lesson 1

Subject #________

Directions: Please use the foods in front of you to answer questions 1-3. You will not need the food items to answer the remaining questions.

1. On each food item, which letter is next to the Food Label?
   a. A
   b. B
   c. C
   d. D

2. How many calories does each item have in one serving?
   a. Chocolate Chip Cookies ______
   b. Fig Newtons ______
   c. Oreo Cookies ______

3. Bobby is at the store, and wants to buy a snack. Which option in front of you should Bobby pick if he wants to eat the snack with the least amount of Calories?
   a. Chocolate Chip Cookies
   b. Fig Newtons
   c. Oreo Cookies

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree
😊 = Neutral
😊 = Disagree

4. I am sure I can identify the food labels on different foods on my own. 😊😊😊
5. I am sure I can read Calories on food labels on my own. 😊😊😊
6. I am sure I can use the food label to choose lower calorie snack foods on my own. 😊😊😊
7. I want to read the food label to chose lower calorie snack foods. 😊😊😊
8. I want to choose lower calorie snack foods when I eat. 😊😊😊

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Pretest for Lesson 2

Subject #__________

Directions: Please use the foods in front of you to answer questions 1-4. You will not need the food items to answer the remaining questions.

1. How many wheat crackers are in 1 serving?
   a. 9 Crackers
   b. 15 Crackers
   c. 30 Crackers
   d. the whole bag

2. How many servings of wheat crackers are in this box?
   a. 1 serving
   b. 7 servings
   c. 9 servings
   d. 15 servings

3. How many Calories are in 1 serving of Wheat crackers?
   a. 100 Calories
   b. 150 Calories
   c. 60 Calories
   d. 160 Calories

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree ☹️ = Neutral ☹️ = Disagree

4. I am sure I can read the serving size on food labels by myself.

5. I am sure I can use the food label to find out how many servings are in a package of food, by myself.

6. I am sure I can use the food label to find out how many calories are in 1 serving of a food by myself.

7. I am sure I can use the food label to portion out 1 serving of a food, when it comes in a large container.

8. I want to read the serving size on foods labels before I eat a food.

9. I want to find out how many calories are in 1 serving of a food, before I eat it.

10. I want to eat 1 Serving of Snack of a Snack Food.
Posttest for Lesson 2

Subject #_________

Directions: Please use the foods in front of you to answer questions 1-4. You will not need the food items to answer the remaining questions.

1. How many animal cookies are in 1 serving?
   a. 1 cookie  
   b. 6 cookies 
   c. 12 cookies 
   d. The whole bag

2. How many servings of animal cookies are in this bag?
   a. 1 serving  
   b. 6 servings 
   c. 12 servings 
   d. 140 servings

3. How many Calories are in 1 serving of animal cookies?
   a. 140 Calories  
   b. 45 Calories 
   c. 12 Calories 
   d. 240 Calories

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree  😊 = Neutral  😊= Disagree

4. I am sure I can read the serving size
   on food labels by myself.

5. I am sure I can use the food label to find
   out how many servings are in a package of food, by myself.

6. I am sure I can use the food label to find out
   how many calories are in 1 serving of a food by myself.

7. I am sure I can use the food label
   to portion out 1 serving of a food, when it comes in a large container.

8. I want to read the serving size on foods labels
   before I eat a food.

9. I want to find out how many calories are in
   1 serving of a food, before I eat it.

10. I want to eat 1 Serving of Snack of a Snack Food.
Pretest for Lesson 3

Subject #_________

Directions: Please use the foods in front of you to answer questions 1-2. You will not need the food items to answer the remaining questions.

1. How much Added Sugars does each drink in front of you have?
   Coke ______
   Hi-C ______
   Bottled Water ______

2. Hank is doing his homework, and is thirsty. Which drink would be the healthiest choice?
   a. Coke
   b. Hi-C
   c. Bottled Water

3. True or False: Extra sugar is added to Skim Milk.

4. True or False: Extra sugar is added to 100% Fruit Juice.

For the remaining questions circle which face you think best describes how you feel about the statement.

5. I am sure I can tell how much Added Sugar a drink has by reading the food label on my own.

6. I am sure I can use the food label to choose drinks without Added Sugar on my own.

7. I want to read how much Added Sugars are in drinks by reading the food label before I drink them.

8. I want to use the food label to choose drinks without Added Sugar.

9. I want to choose drinks without Added Sugar.
Posttest for Lesson 3

Subject #________

Directions: Please use the foods in front of you to answer questions 1-2. You will not need the food items to answer the remaining questions.

1. How much Added Sugars does each drink in front of you have?
   - Powerade ______
   - Bottled Water ______
   - Root Beer ______

2. Lindsey is doing her homework, and is thirsty. Which drink would be the healthiest choice?
   a. Powerade
   b. Bottled Water
   c. Root Beer

3. True or False: Extra sugar is added to Skim Milk.

4. True or False: Extra sugar is added to 100% Fruit Juice.

For the remaining questions circle which face you think best describes how you feel about the statement.

5. I am sure I can tell how much Added Sugar a drink has by reading the food label on my own.
   Agree ☑️ Neutral ☐ Disagree ☐

6. I am sure I can use the food label to choose drinks without Added Sugar on my own.
   ☑️ ☐ ☐

7. I want to read how much Added Sugars are in drinks by reading the food label before I drink them.
   ☑️ ☐ ☐

8. I want to use the food label to choose drinks without Added Sugar.
   ☑️ ☐ ☐

9. I want to choose drinks without Added Sugar.
   ☑️ ☐ ☐
Pretest for Lesson 4

Subject #_________

Directions: Please use the foods in front of you to answer questions 1-4. You will not need the food items to answer the remaining questions.

1. How many grams of sugar does each cereal have in front of you?
   - Cinnamon Toast Crunch ______
   - Rice Krispies ______
   - Lucky Charms ______

2. Which cereal has the most grams of sugar?
   - a. Cinnamon Toast Crunch
   - b. Rice Krispies
   - c. Lucky Charms

3. Josh is at the store with his dad. When they go down the cereal lane, Josh’s dad tells him to pick out the cereal he wants to have for breakfast. Which cereal should Josh pick, if he wants to eat the cereal with them lowest amount of sugar in it?
   - a. Cinnamon Toast Crunch
   - b. Rice Krispies
   - c. Lucky Charms

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree
🙂 = Neutral
😔 = Disagree

4. I am sure I can tell how much sugar a cereal has by reading the food label on my own.

5. I am sure I can use the food label to choose cereals lower in sugar on my own.

6. I want to read how much sugar a cereal has by reading the food label.

7. I want to use the food label to choose cereals lower in sugar.

8. I want to choose cereals lower in sugar.
Posttest for Lesson 4

Subject #__________

Directions: Please use the foods in front of you to answer questions 1-3. You will not need the food items to answer the remaining questions.

1. How many grams of sugar does each cereal have in front of you?
   - Golden Grahams ______
   - Corn Flakes ______
   - Apple Jacks ______

2. Which cereal has the most grams of sugar?
   a. Golden Grahams
   b. Corn Flakes
   c. Apple Jacks

3. Pete just woke up. When he goes to the kitchen, he sees the three cereals you have in front of you, and needs to pick which one he is going to have. Which cereal should Pete pick, if he wants the cereal with the lowest amount of sugar?
   a. Golden Grahams
   b. Corn Flakes
   c. Apple Jacks

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree
😊 = Neutral
😊 = Disagree

4. I am sure I can tell how much sugar a cereal has by reading the food label on my own

5. I am sure I can use the food label to choose cereals lower in sugar on my own.

6. I want to read how much sugar a cereal has by reading the food label.

7. I want to use the food label to choose cereals lower in sugar.

8. I want to choose cereals lower in sugar.
Pretest for Lesson 5
Subject #_________

Directions: Please use the foods in front of you to answer questions 1-4. You will not need the food items to answer the remaining questions.

1. How many different fruits should we eat everyday?
   a. 1
   b. 3
   c. 5

2. What should you do if you do not eat a fruit for breakfast?
   a. Have 1 fruit for lunch and have 1 fruit for dinner
   b. Don’t worry about eating fruit
   c. Have fruit for a snack

3. Manny is going to have Corn Flakes for breakfast. What could Manny have to make sure he has fruit for breakfast?
   a. Put bananas on his Corn Flakes
   b. Eat a Strawberry Pop Tart
   c. Have toast, and put Grape Jelly on it.

4. Which cup in front of you would be the amount of 100% fruit juice that equals 1 serving of fruit?
   a. Cup 1
   b. Cup 2
   c. Cup 3

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree
😊 = Neutral
😊 = Disagree

5. I am sure I can eat fruit for breakfast every morning.

6. I am sure I can eat fruit for a snack if I don’t eat enough fruit at my meals.

7. I am sure I can eat whole fruit instead of foods that are fruit flavored.

8. I am sure I can portion out the amount of 100% fruit juice that equals 1 serving of fruit when I drink 100% fruit juice.

9. I want to eat fruit for breakfast every morning.

10. I want to eat fruit as a snack when I don’t eat enough fruit at my meals.

11. I want to eat whole fruits instead of foods that are fruit flavored.

12. I want to portion out the amount of 100% fruit juice that equals 1 serving of fruit when I drink 100% fruit juice.
Posttest for Lesson 5
Subject #_________

Directions: Please use the foods in front of you to answer questions 1-4. You will not need the food items to answer the remaining questions.

1. How many different fruits should we eat everyday?
   a. 1
   b. 3
   c. 5

2. What should you do if you do not eat a fruit for breakfast?
   a. Have fruit for a snack
   b. Have 1 fruit for lunch and have 1 fruit for dinner
   c. Don’t worry about eating fruit

3. Peter is going to have Cheerios for breakfast. What could Peter have to make sure he has fruit for breakfast?
   a. Eat a blueberry Pop Tart
   b. Have toast, and put Strawberry Jam on it.
   c. Put strawberries on his Cheerios

4. Which cup in front of you would be the amount of 100% fruit juice that equals 1 serving of fruit?
   a. Cup 1
   b. Cup 2
   c. Cup 3

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree
😊 = Neutral
😢 = Disagree

5. I am sure I can eat fruit for breakfast every morning.
6. I am sure I can eat fruit for a snack if I don’t eat enough fruit at my meals.
7. I am sure I can eat whole fruit’s instead of foods that are fruit flavored.
8. I am sure I can portion out the amount of 100% fruit juice that equals 1 serving of fruit, when I drink 100% fruit juice.
9. I want to eat fruit for breakfast every morning
10. I want to eat fruit as snacks when I don’t eat enough fruit at my meals.
11. I want to eat whole fruits instead of foods that fruit flavored.
12. I want to portion out the amount of 100% fruit juice that equals 1 serving of fruit, when I drink 100% fruit juice.
Pretest for Lesson 6

Subject #__________

Directions: Please use the foods in front of you to answer questions 1-4. You will not need the food items to answer the remaining questions.

1. How many different vegetables should we eat everyday?
   a. 1
   b. 3
   c. 5

2. Margaret didn’t eat a vegetable for breakfast. Which one of these snack foods is a raw vegetable that she could eat?
   a. French Fries
   b. Celery Sticks
   c. Baked Beans

3. What could you do if you do not eat a vegetable for breakfast?
   a. Have 1 vegetable for lunch and have 2 vegetables for dinner
   b. Have 1 vegetable for lunch, 1 vegetable for a snack, and have 1 vegetable for dinner
   c. You could do A or B
   d. Don’t worry about eating vegetables

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree
😊 = Neutral
😊 = Disagree

4. I am sure I can eat a raw vegetable 😊😊😊 for a snack every day.

5. I am sure I can eat raw vegetables 😊😊😊 instead of higher Calorie snack foods.

6. I am sure I can eat extra vegetables 😊😊😊 for dinner if I don’t eat enough vegetables during the day.

7. I want to eat raw vegetables for a snack every day. 😊😊😊

8. I want to eat raw vegetables instead of higher Calorie snack foods. 😊😊😊

9. I want to eat extra vegetables for dinner when I don’t 😊😊😊 eat enough vegetables during the day.
Posttest for Lesson 6

Subject #__________

Directions: Please use the foods in front of you to answer questions 1-4. You will not need the food items to answer the remaining questions.

1. How many different vegetables should we eat everyday?
   a. 1
   b. 3
   c. 5

2. Sima didn’t eat a vegetable for breakfast. Which one of these snack foods is a raw vegetable that she could eat?
   a. Corn Bread
   b. Onion Rings
   c. Lettuce Leafs

3. What could you do if you do not eat a vegetable for breakfast?
   a. Have 1 vegetable for lunch and have 2 vegetables for dinner
   b. Have 1 vegetable for lunch, 1 vegetable for a snack, and have 1 vegetable for dinner
   c. You could do A or B
   d. Don’t worry about eating vegetables

For the remaining questions circle which face you think best describes how you feel about the statement.

😊 = Agree
😊 = Neutral
😊 = Disagree

4. I am sure I can eat a raw vegetable for a snack every day.

5. I am sure I can eat raw vegetables instead of higher Calorie snack foods.

6. I am sure I can eat extra vegetables for dinner if I don’t eat enough vegetables during the day.

7. I want to eat raw vegetables for a snack every day.

8. I want to eat raw vegetables instead of higher Calorie snack foods.

9. I want to eat extra vegetables for dinner when I don’t eat enough vegetables during the day.
APPENDIX D

CONTROLLED FREE CHOICE FORM
Controlled-Free Choice Selection

Subject # ___________________

1. The main reason I choose (write down your snack item) ____________________ is because ________________________________________________________________________________________________________________________________________________
                                                                                   ________________________________________________________________________________________________________________________________________________
                                                                                   ________________________________________________________________________________________________________________________________________________
(If you are not sure, please go to #2.)

2. The main reason I chose my snack is because.
   [  ] I like the Taste
   [  ] I did not like the other options
   [  ] It has less sugar
   [  ] I like the package
   [  ] It has less calories
   [  ] My friend took the same
   [  ] My mom or dad always gives me this food
   [  ] My mom or dad never gives me this food
   [  ] Other → please go to #3

3. If I had to choose the main reason I choose my snack, it is because

                                                                                   ________________________________________________________________________________________________________________________________________________
                                                                                   ________________________________________________________________________________________________________________________________________________
                                                                                   ________________________________________________________________________________________________________________________________________________.
APPENDIX E

Process Evaluator Forms
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<tr>
<td>Lesson 1</td>
</tr>
<tr>
<td><strong>INTRODUCTION</strong></td>
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<tr>
<td>• Personal Introduction</td>
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<tr>
<td>• States Purpose of Lesson</td>
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<tr>
<td>• Def. Calorie</td>
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<tr>
<td>• Food Label</td>
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<tr>
<td>• Choose lower Cal snack foods</td>
</tr>
<tr>
<td>• Why pick lower calorie snack foods</td>
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<td><strong>BENEFITS/CONSEQUENCES</strong></td>
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<td>• ASK / DEFINE Calorie</td>
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<td>• ASK: Use of Calories</td>
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<td>• ASK: Where are Calories</td>
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<td>• ASK: Do all foods have same amt. of Calories?</td>
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<tr>
<td>• Demonstrate with examples</td>
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<tr>
<td>• States: Problem with too many Calories</td>
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<tr>
<td>• States: Fix problem: Choose Lower Calorie Snack foods</td>
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<tr>
<td>• Show Children FL</td>
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<tr>
<td>• ASK Cal in cup</td>
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<tr>
<td>• Re-States Cal in Pret. and Yogurt</td>
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<td><strong>ACTIVITY</strong></td>
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<td>• Explanation of Activity</td>
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<td>• Conducts Activity</td>
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<tr>
<td>• Follow up with Activity</td>
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<td>• Importance of Lower Cal Snack Foods</td>
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© GLK / PWB
The instructor was well prepared

1. Agree
2. Neutral
3. Disagree

**ROLE PLAYING**

- **ASK: Why select low Cal snacks**
- **Ask/Explain R.P.** Overall I would rate the instructor
  1. Excellent
  2. Very Good
  3. Good
  4. Fair
  5. Poor

**R.P. #1**
- Assign Roles
- Perform R.P.
- Ask/States Objectives
- Processes R.P.

**R.P. #2**
- Assign Roles
- Perform R.P.
- Ask/States Objectives
- Processes R.P.

**WRAP UP**

- Review Objectives
  - Def. Cal
  - Foods and Cal
  - Selecting lower Cal
  - Food Label
  - Cal on FL

- Questions?
<table>
<thead>
<tr>
<th>NAME</th>
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<tbody>
<tr>
<td>Lesson 2</td>
<td>• States: Review Key Points</td>
</tr>
<tr>
<td>* Personal Introduction</td>
<td>• Show King Sized Twix Bar</td>
</tr>
<tr>
<td>* States Purpose of Lesson</td>
<td>• Ask: Servings Per Cont.</td>
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<tr>
<td>• FL: Serving Size</td>
<td>• Count Servings in Pack.</td>
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<td>• FL: Servings Per Cont.</td>
<td>• Ask: 1 Serving on FL</td>
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<tr>
<td>• Portion 1 Serving Snack</td>
<td>• Ask: Cal. in 1 Serving</td>
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<tr>
<td>• Read Cal. for 1 Serving FL</td>
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</tr>
<tr>
<td>• Why Choose 1 Serving?</td>
<td></td>
</tr>
<tr>
<td>BENEFITS/CONSEQUENCES</td>
<td>• Remind children of skit about energy and our bodies</td>
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<tr>
<td></td>
<td>• Remind children about selecting 1 Serving of a Snack Food</td>
</tr>
<tr>
<td>• ASK / DEFINE Serving and Serving Size</td>
<td>• Show Box of Wheat Crackers</td>
</tr>
<tr>
<td>• ASK: How many Crackers in 1 Serving?</td>
<td>• Ask: amt. in 1 Serving</td>
</tr>
<tr>
<td>• ASK / DEFINE Servings Per Container</td>
<td>• Portion out 1 Serving</td>
</tr>
<tr>
<td>• ASK: How many Servings in box?</td>
<td>• Ask: Cal in 1 Serving</td>
</tr>
<tr>
<td>• ASK / DEFINE Calories in 1 Serving</td>
<td>• Taste Test Crackers</td>
</tr>
<tr>
<td>• States: Problem with too many Servings and Calories</td>
<td>• Remind children of skit about energy and our bodies</td>
</tr>
<tr>
<td></td>
<td>• Remind children about selecting 1 Serving of a Snack Food</td>
</tr>
<tr>
<td>ACTIVITY</td>
<td></td>
</tr>
<tr>
<td>• Explanation of Activity</td>
<td></td>
</tr>
<tr>
<td>• Conducts Activity</td>
<td></td>
</tr>
<tr>
<td>• Follow up with Activity</td>
<td></td>
</tr>
<tr>
<td>• What did body do with extra balls?</td>
<td></td>
</tr>
<tr>
<td>• Importance of Lower Cal Snack Foods</td>
<td></td>
</tr>
</tbody>
</table>

© GLK / PWB
3 = Executed Task Very Well  
2 = Executed Adequately  
1 = Executed Poorly  

**ROLE PLAYING**  
The instructor was well prepared  
1. Agree  
2. Neutral  
3. Disagree  

• **ASK: Why eat only 1 Serving of a Snack Food.**  
  
• **Ask/Explain R.P.**  
  
• **R.P. #1**  
  - Assign Roles  
  - Perform R.P.  
  - Ask / States Objectives  
  - Processes R.P.  
  
• **R.P. #2**  
  - Assign Roles  
  - Perform R.P.  
  - Ask / States Objectives  
  - Processes R.P.  

**WRAP UP**  

• **Review Objectives**  
  - FL: Serving Size  
  - FL: Servings Per Cont.  
  - Portion 1 Serving Snack  
  - Read/Cal. for 1 Serving FL  
  - Why Choose 1 Serving?  

• **Questions?**
NAME ____________________________

Lesson 3

INTRODUCTION

- Personal introduction
- States Purpose of Lesson
  - Def. Drink w/Added Sugar
  - Food Label - “Sugars”
  - Chose lower Sugared Drinks
  - Why pick lower Sugared Drinks.

ACTIVITY

- Explanation of Activity
- Conducts Activity
- Follow up with Activity
  - What did body do with extra balls?
  - Importance of Choosing Drinks w/out Added Sugars.

MODELING

- Show/Explain 23 grams of Sugar to children.

BENEFITS/CONSEQUENCES

- ASK / DEFINE Drink w/Added Sugars
- List Examples
- Show children Coke
  - Show Food Label
  - Show “Sugars”
- Explain Added Sugars

- Show Can of Coke
  - Ask amt of Sugar
  - Show 39 g of Sugar
  - Compare 39 g and 25 g

- Show Bottle of Water
  - ASK amt. of Sugar
  - Ask if ALL Water has 0 grams of Sugar.

- Making the Connection
  - Ok to have 25g sugar/d
  - Problem with TOO much Sugar.
  - Water is a better choice

- Taste Test Water

- States: Problem with too much Added Sugars
- States: Fix problem: Choose Drinks w/out Added Sugars

© GLK / PWR
3 = Executed Task Very Well  2 = Executed Adequately  1 = Executed Poorly

- Show/Explain 100% Fruit Juice as an exception to the "Sugar" rule.
  - Show OJ – read Food Label
  - Show Cran-Apple Juice --read Food Label

- Making the Connection
  - Ok to have 25g sugar/d
  - Problem with TOO much Sugar.
  - Water is a better choice

WEAP UP

- Review Objectives
  - Def. Drink w/Added Sugar
  - Food Label - "Sugars"
  - Choose lower Sugar Drinks

- Why pick lower Sugar Drinks.

ROLE PLAYING

- ASK: Why select low Cal snacks

- Ask/Explain R.P.

- R.P. #1
  - Assign Roles
  - Perform R.P.
  - Ask / States Objectives
  - Processes R.P.

- R.P. #2
  - Assign Roles
  - Perform R.P.
  - Ask / States Objectives
  - Processes R.P.

The instructor was well prepared
1. Agree
2. Neutral
3. Disagree

Overall i would rate the instructor
1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor

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<table>
<thead>
<tr>
<th>NAME</th>
<th>Lesson 4</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Explanation of Activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Conducts Activity</td>
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<tr>
<td></td>
<td></td>
<td>• Follow up with Activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What did booy do with extra balls?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Balis go in the way of dribbling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Importance of Choosing cereals low in Sugar.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BENEFITS/CONSEQUENCES</th>
<th>MODELING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ASK how to identify amt. Sugar in a food/drink</td>
<td>• Show Lucky Charms</td>
</tr>
<tr>
<td></td>
<td>• Identify amt. Sugar</td>
</tr>
<tr>
<td></td>
<td>• Show bag with 12 g sugar (4 1/2 packets)</td>
</tr>
<tr>
<td>• Show Lucky Charms</td>
<td>• Show Cinnamon Toast Crunch</td>
</tr>
<tr>
<td>• Show Food Label</td>
<td>• Ask Def. High Sugared Cereal</td>
</tr>
<tr>
<td>• Show “Sugars” on FL</td>
<td>• Ask Def. Low Sugared Cereal</td>
</tr>
<tr>
<td>• Identify cereal as a High Sugared Cereal.</td>
<td>• Define Med. Sugared Cereal</td>
</tr>
<tr>
<td>• Show Rice Krispies</td>
<td>• Identify amt. Sugar on FL</td>
</tr>
<tr>
<td>• Show Food Label</td>
<td>• Show bag with 9 g sugar (3 packets)</td>
</tr>
<tr>
<td>• Show “Sugars” on FL</td>
<td>• Compare High/Med cereal</td>
</tr>
<tr>
<td>• Identify cereal as a Low Sugared Cereal.</td>
<td></td>
</tr>
<tr>
<td>• Explain importance for choosing a Low sugared cereal.</td>
<td>• Making Connection</td>
</tr>
<tr>
<td></td>
<td>• Importance of NOT eating too much Sugar</td>
</tr>
<tr>
<td></td>
<td>• Importance of choosing low/med sugared cereals</td>
</tr>
<tr>
<td>Task</td>
<td>Rating</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Show Rice Krispies</td>
<td></td>
</tr>
<tr>
<td>1. Identify 1 oz sugar</td>
<td></td>
</tr>
<tr>
<td>2. Show bag with 2 g sugar (less than 1 packet)</td>
<td></td>
</tr>
<tr>
<td>3. Identify cereal as a low sugared cereal</td>
<td></td>
</tr>
<tr>
<td>4. Taste Test cereal</td>
<td></td>
</tr>
<tr>
<td>Make the Connection</td>
<td></td>
</tr>
<tr>
<td>1. Importance of not eating too much sugar</td>
<td></td>
</tr>
<tr>
<td>2. Importance of choosing low sugared cereals</td>
<td></td>
</tr>
<tr>
<td>Role Playing</td>
<td></td>
</tr>
<tr>
<td>1. Ask: Why select low sugared cereal?</td>
<td></td>
</tr>
<tr>
<td>2. Ask/Explain R.P.</td>
<td></td>
</tr>
<tr>
<td>3. R.P. #1</td>
<td></td>
</tr>
<tr>
<td>1. Assign Roles</td>
<td></td>
</tr>
<tr>
<td>2. Perform R.P.</td>
<td></td>
</tr>
<tr>
<td>3. Ask / States Objectives</td>
<td></td>
</tr>
<tr>
<td>4. Processes R.P.</td>
<td></td>
</tr>
<tr>
<td>5. R.P. #2</td>
<td></td>
</tr>
<tr>
<td>1. Assign Roles</td>
<td></td>
</tr>
<tr>
<td>2. Perform R.P.</td>
<td></td>
</tr>
<tr>
<td>3. Ask / States Objectives</td>
<td></td>
</tr>
<tr>
<td>4. Processes R.P.</td>
<td></td>
</tr>
</tbody>
</table>

**Wrap Up**

- Review Objectives
  - Identify Sugars on FL Cereal
  - Identify High Sugared Cereal
  - Identify Low Sugared Cereal
  - Identify Medium Sugared Cereal

- Questions?

The instructor was well prepared

1. Agree
2. Neutral
3. Disagree

Overall I would rate the instructor

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor

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<table>
<thead>
<tr>
<th>NAME</th>
<th>MODELING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 5</td>
<td><strong>Ask/Define: How many fruits daily?</strong></td>
</tr>
<tr>
<td><strong>INTRODUCTION</strong></td>
<td><strong>Identify Strategy for eating fruit</strong></td>
</tr>
<tr>
<td>• Personal introduction</td>
<td><strong>Show Children Strawberries</strong></td>
</tr>
<tr>
<td>• States Purpose of Lesson</td>
<td>• Define as Whole Fruit</td>
</tr>
<tr>
<td>• Frequency of fruit</td>
<td><strong>Show Nutrigrain Bar</strong></td>
</tr>
<tr>
<td>• Strategies for Eating Fruit</td>
<td>• Define as non-fruit</td>
</tr>
<tr>
<td>• Why Choose Fruit over Fruit Flavored Foods?</td>
<td>• List other non-fruits</td>
</tr>
<tr>
<td>• Fruit Juice</td>
<td>• Compare items for best choice</td>
</tr>
<tr>
<td>• Why Eat fruit Anyway?</td>
<td><strong>Taste Test Strawberries</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BENEFITS/CONSEQUENCES</th>
<th><strong>Define why it’s important to eat fruit for breakfast</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify Different Fruits</td>
<td><strong>Ask children about Juice</strong></td>
</tr>
<tr>
<td>• Ask/Define: How many fruits daily?</td>
<td>• Define 100% Fruit Juice</td>
</tr>
<tr>
<td>• Fruits are lower in kcal</td>
<td>• Show label 100% FJ</td>
</tr>
<tr>
<td>• Vitamins &amp; Minerals</td>
<td>• Show plastic cup with 4 oz marked and Define it’s amt as 1 serving</td>
</tr>
<tr>
<td>• Show Orange</td>
<td>• Show children Grapes</td>
</tr>
<tr>
<td>• Explain Vit. C</td>
<td>• Define as a better choice</td>
</tr>
<tr>
<td>• Put band aid on</td>
<td>• Taste Test Grapes</td>
</tr>
<tr>
<td>• State importance of different colored fruits</td>
<td>• Follow up with children</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Activity</strong></th>
<th><strong>Making connection</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Divide into 2 groups</td>
<td>• 3 diff. fruits daily</td>
</tr>
<tr>
<td>• Show/Explain Blk Wht MPK as a body</td>
<td>• Whole fruit vs Fruit Flavored Foods</td>
</tr>
<tr>
<td>• Define naturally color-ful foods as Fruits not Trix</td>
<td>•Amt. of Juice</td>
</tr>
<tr>
<td>• Explain Activity</td>
<td>• Vit’s and Min’s</td>
</tr>
<tr>
<td>• Explain foods through out the day, and give colored markers</td>
<td></td>
</tr>
<tr>
<td>NAME</td>
<td>MODELING</td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>Lesson 6</td>
<td>Introduction</td>
</tr>
<tr>
<td>• Personal Introduction</td>
<td>• Ask/Define: How many Veg’s daily?</td>
</tr>
<tr>
<td>• States Purpose of Lesson</td>
<td>• Identify Strategy for eating fruit</td>
</tr>
<tr>
<td>• Frequency of Veg’s</td>
<td>• 1 for Break/lunch/din</td>
</tr>
<tr>
<td>• Strategies for Eating Veg’s</td>
<td>• 1 for Break/lunch/snack</td>
</tr>
<tr>
<td>• Identify a raw Veggy</td>
<td>• 1 for snack/2 for dinner</td>
</tr>
<tr>
<td>• Eating raw Veggies for Snacks</td>
<td>• Identify Raw Vegetable</td>
</tr>
<tr>
<td>• Why Eat Veg’s Anyway?</td>
<td>• Show Children cherry tomatoes</td>
</tr>
<tr>
<td></td>
<td>• Define as raw veg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BENEFITS/CONSEQUENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify Different Veg’s</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>• Ask/Define: How many Veg’s daily?</td>
</tr>
<tr>
<td>• Veg’s are lower in kcal</td>
</tr>
<tr>
<td>• Vitamins &amp; Minerals</td>
</tr>
<tr>
<td>• Show Tomato</td>
</tr>
<tr>
<td>• Explain Vit. A</td>
</tr>
<tr>
<td>• Pat Sunglasses on</td>
</tr>
<tr>
<td>• State importance of different colored Veg’s</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>• Activity</td>
</tr>
<tr>
<td>• Divide into 2 groups</td>
</tr>
<tr>
<td>• Show/Explain Bk/Wht MPK as a body</td>
</tr>
<tr>
<td>• Define naturally color-ful foods as Veg’s not M&amp;M’s</td>
</tr>
<tr>
<td>• Explain Activity</td>
</tr>
<tr>
<td>• Explain foods through out the day, and give colored markers</td>
</tr>
<tr>
<td>• Conduct Activity</td>
</tr>
<tr>
<td>• Processes Activity</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

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ROLE PLAYING

• Explain importance of eating veg for snack
  The instructor was well prepared
  1. Agree
  2. Neutral
  3. Disagree

• Ask/Explain R.P.
  —

• R.P. #1
  —
  - Assign Roles
  - Perform R.P.
  - Ask / States Objectives
  - Processes R.P.
  Overall I would rate the instructor
  1. Excellent
  2. Very Good
  3. Good
  4. Fair
  5. Poor

• R.P. #2
  —
  - Assign Roles
  - Perform R.P.
  - Ask / States Objectives
  - Processes R.P.

WRAP UP

• Review Objectives
  —
  - Frequency of Veg’s
  - Strategies for 3 veg’s
  - Identify raw veg
  - Importance of eating
    raw veg for a snack
  - Lower cal. snack food
  - Vit/Min

• Questions?
  —

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APPENDIX F

Food and Beverage Items Used for evaluations
Lesson 1

PRE/POST Test Items

Ruffles Original Potato Chips (1 oz)
Rold Gold Tiny Twist Pretzels (1 oz)
Austin Cheese Crackers with Cheddar Cheese (1.38 oz)

Oreo 6-Cookie Pack (2 oz)
Fig Newtons (2 oz)
Snack Size Chips Deluxe Cookies: Original (2 oz)

Controlled Free Choice Items

Quaker Chewy Granola Bar with Butterfinger Candy Pieces (1 oz)
Snickers Candy Bar (2 oz)
Kelloggs Strawberry Nutrigrain Bar (1.3 oz)

Other Lesson Items

Dannon Light and Fit Blueberry Yogurt (6 oz)

Lesson 2

PRE/POST Test Items

Great Value Wheat Crackers (10 oz)
Keebler Shrek Animals Cookies (13 oz)

Controlled Free Choice Items

Rold Gold Pretzels in small zip-lock bags in three sizes: 1 oz, 2 oz or 3 oz

Other Lesson Items

King Size Twix Bar (3.35 oz)
Lesson 3

PRE/POST Test Items

Coca-Cola (12 oz)
Bug Juice: Leap’N Lem’N’Ade (10 oz)
Dasani Bottled Water (12 oz)
Powerade: Mountain Blast (12 oz)
Barq’s Root Beer (12 oz)

Controlled Free Choice Items

Sprite (12 oz)
Minute Maid Lemonade (12 oz)

Other Lesson Items

Minute Maid Original 100% Orange Juice (15.2 oz)
Minute Maid Cranberry Apple Raspberry (15.2 oz)
Meyer Fat Free Milk (8 oz)
Meger 1% Chocolate Lowfat Milk (8 oz)

Lesson 4

PRE/POST Test Items

General Mills Cinnamon Toast Crunch (1 oz)
Kellogg’s Rice Crispee (appox. 1 oz)
General Mills Lucky Charm (1 oz)
General Mills Golden Graham
Kellogg’s Corn Flakes (.75 oz)
Kellogg’s Apple Jacks (1.5 oz)

Controlled Free Choice Items

General Mills Coco Puffs (7/8 oz)
General Mills Cheerios (11/16 oz)
General Mills Trix (.75 oz)

Other Lesson Items

None
Lesson 5

PRE/POST Test Items
None

Controlled Free Choice Items
Medium Banana
Kellogg’s Strawberry Nutrgrain Bar (1.3 oz)
General Mills Strawberry Fruit Roll Up (.5 oz)

Other Lesson Items
Kellogg’s Blueberry Nutrgrain Bar (1.3 oz)
Welch’s 100% Grape Juice (24 oz)

Lesson 6

PRE/POST Test Items
None

Controlled Free Choice Items
Carrot Sticks with Dip
Cool Ranch Doritos
Classic Lays Potato Chips (1 oz)

Other Lesson Items
Raw Broccoli
Raw Cherry Tomatoes
Ranch Dip
Sour Cream and Onion Potato Chips