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Evaluating the effects of a multi-component school-based nutrition intervention program in elementary school students

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EVALUATING THE EFFECTS OF A MULTI-COMPONENT SCHOOL-BASED NUTRITION INTERVENTION PROGRAM IN ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

The objective of the study was to evaluate a multi-component school-based nutrition intervention program, Smart Bodies, to see if the curriculum increased nutrition knowledge, increased self-reported intakes of fruits and vegetables, and improved opinions, outcome expectations, social norms, and self-efficacy related to fruit and vegetables among elementary school students. The Smart Bodies curriculum was conducted in the classrooms of eighteen public schools in south Louisiana over a twelve-week period and included nutrition related games, videos, books and classroom activity tracking charts. Six hundred forty-one 4^{th} and 5^{th} grade students were included in the sample. A survey based on the Social Cognitive Theory was administered to evaluate nutrition knowledge, fruit and vegetable intake, opinions, self-efficacy, social norms and outcome expectations related to fruit and vegetable consumption both before and after the intervention. A factor analysis was run on each section to determine the number and nature of underlying factors affecting the relationship between each section of variables. Least square means tests using a mixed-model ANOVA were conducted on the knowledge section and on each factor.

The study results showed an increase in self-reported intakes of fruit and fruit juice ($p=0.01$) and a tendency towards an increase in nutrition knowledge in children who participated in the curriculum ($p=0.07$). The study also found that the students who completed the program had a better self-efficacy related to F&V ($p=0.01$) and a tendency for more positive opinions ($p=0.07$) about F&V consumption than those students who did not participate in the intervention. The results suggest that a multi-component, school-based nutrition intervention program may increase fruit and vegetable intakes and improve self-efficacy to consume fruits and vegetables.

CHAPTER 1
INTRODUCTION

Introduction

Research has indicated that establishing healthy habits, which include eating fruits and vegetables (F&V), early in childhood will decrease the likelihood of becoming overweight or obese in adulthood (Veugelers & Fitzgerald, 2005). With the incidence of overweight in children rapidly rising in the United States, several studies have been conducted to determine the effectiveness of school-based nutrition education programs focused on F&V consumption and targeted to a variety of school-age students. But, Dzewaltowski et al. (2002) reported that by grade six there is a motivational decline across a wide range of behaviors including choosing F&V. It is critical to begin teaching children the importance of healthy food choices, especially F&V, as early as elementary school. A healthy lifestyle, which includes an adequate intake of F&V, has been shown to improve weight status, decrease disease risk, and improve overall health (Veugelers & Fitzgerald, 2005).

Schools are a resourceful place to begin intervention programs. In 2005, over 33.5 million children were projected to be enrolled in public schools grades K through 8 and over 4.8 million children were projected to be enrolled in private schools grades K through 8 (U.S. Census Bureau, 2005). Schools are an important part of the social environment that shapes children's eating habits (Pilant, 2006). Theoretically, a multi-component school-based intervention program that is theory-based and includes nutrition education, physical activity education, and a parental component will be the most successful avenue in teaching children how to maintain healthy habits including adequate F&V intake throughout their lives (McArthur, 1998; Hyner, 2005; Ritchie, 2006).

The purpose of this study was to evaluate the effectiveness of a multi-component school-based nutrition intervention program, Smart Bodies, to see if the curriculum increased nutrition knowledge and improved attitudes about F&V in elementary school students. Smart Bodies is an interactive educational program based upon the Social Cognitive Theory designed to prevent overweight in children. The nutrition curriculum includes videos, books, games, and classroom activities designed to encourage children to consume F&V. Smart Bodies is a joint initiative of the Louisiana State University Agricultural Center and Blue Cross Blue Shield of Louisiana to integrate classroom activities with hands-on learning to educate children on the importance of a healthy lifestyle (www.smartbodies.org).

Objectives

The objectives of the study were as follows:

1. To test the hypothesis that nutritional knowledge and self reported F&V intake scores will be higher in students who participated in the Smart Bodies program as compared to the students who do not participate in the program.
2. To test the hypothesis that opinions, outcome expectations, social norms, and self-efficacy related to F&V will be more positive in students who participated in the Smart Bodies program as compared to students who did not participate in the program.
3. To test the hypothesis that there will be no difference in survey responses between boys and girls and no difference between students of different ethnic backgrounds who participated in the Smart Bodies program.
4. To test the hypothesis that there will be no difference in survey responses between fourth and fifth grade students who participated in the Smart Bodies program.

Research Statement

After experiencing a multi-component school-based nutrition intervention program based upon the Social Cognitive Theory, elementary school students will demonstrate increased nutrition knowledge and report greater intakes of F&V. In addition participating students will report more positive opinions, outcome expectations, social norms, and self-efficacy related to F&V. It is anticipated that responses will be similar between boys and girls who participate in the intervention and that no difference will be observed between fourth and fifth grade students.

Limitations

1. Teacher accuracy in reporting the engagement of the students in the Smart Bodies program is a limitation due to the fact that the teachers were asked to engage the students in the curriculum in the classroom on a regular basis.
2. The survey responses were self-reported data and the accuracy of information was dependent on the truthfulness and cooperation of the students.
3. The students' exposure to F&V was dependent on what the schools serve for breakfast and lunch each day.
4. Since the study was conducted in low-income public schools in an urban area of Southeastern Louisiana, the study results may not be generalizable to other population groups or geographical locals.

Definitions

1. Body Mass Index (BMI): An anthropometric measure defined as one's weight in kilograms divided by the square of one's height in meters (Centers for Disease Control and Prevention, 2005).

2. BMI-for-age percentile: In children and teens, body mass index is used to assess the status of being underweight, healthy weight, overweight, and at risk for overweight. Children's body fatness changes over the years as they grow, and girls and boys differ in their body fatness as they mature. The BMI for children, therefore, is referred to as "BMI-for-age percentile" and is gender and age specific (Centers for Disease Control and Prevention, 2005).
3. Weight categories for children:
    - Overweight: BMI-for-age $\geq 95^{th}$ percentile
    - At risk for overweight: BMI-for-age 85^{th} percentile to $< 95^{th}$ percentile
    - Healthy weight: BMI-for-age 5^{th} percentile to $< 85^{th}$ percentile
    - Underweight: BMI-for-age $< 5^{th}$ percentile

    (Centers for Disease Control and Prevention, 2005)
4. Social Cognitive Theory (SCT): The Social Cognitive Theory explores the reciprocal interactions of people and their environments and the psychosocial determinants of health behavior. The theory describes a dynamic, ongoing process in which personal factors, environment factors, and human behavior exert influence upon each other. According to the SCT, three main factors affect the likelihood that a person will change a health behavior (www.cancer.gov):
    - Outcome expectations: One's perceptions of the possible consequences of one's own actions (Bandura, 1997).
    - Self-efficacy: The belief that one is able to control challenging environmental demands by means of taking adaptive action (Bandura, 1997).

- Social Norms: The rules used to define appropriate and inappropriate values, beliefs, attitudes, and behaviors for a particular group. (Bandura, 1997).

Assumptions

1. It is assumed that the teachers will administer the Smart Bodies curriculum accurately and appropriately.
2. It is assumed that all the students taking the survey will understand and truthfully answer the questions.
3. It is assumed that the school cafeterias will serve F&V in accordance with the National School Lunch Program guidelines.

Justification

Research has described the positive impact of school-based wellness intervention programs since the mid 1990's (Leupker et al., 1996; Nicklas, 1997; Perry et al., 1998; Baranowski et al., 2000; Story et al., 2000; Levine et al., 2002; Newell, 2004). Yet, many of the programs did not compare the actual behavior change pre-intervention to post-intervention. Few studies have included a detailed behavioral survey and randomly assigned control and intervention groups like the one that this study employed. The majority of the prior studies have assessed their programs primarily through school observations and self-reported checklists from the teachers in the classrooms.

The Smart Bodies research project utilized a comprehensive validated survey based on the Social Cognitive Theory to evaluate the effectiveness of the program's intention to increase nutrition knowledge and improve attitudes about F&V in elementary school students. The data collected from this study will help to fill a gap in the current F&V knowledge base and will also

be made available to policymakers and nutrition educators in order to improve the school and classroom environment and positively impact the health and well-being of children.

CHAPTER 2
REVIEW OF LITERATURE

Overweight in Children

The increase in the number of overweight children has become a major public health concern in industrialized nations (Veugelers & Fitzgerald, 2005). In the United States, the Centers for Disease Control and Prevention (2005) reported that the prevalence of overweight status among children aged 6 to 11 has more than doubled since 1985, and the rate among adolescents aged 12 to 19 has more than tripled during the same time period. In addition, overweight children have a greater chance of becoming overweight or obese adults (Center for Disease Control, 2005; Veugelers & Fitzgerald, 2005, Ritchie et al., 2006). Educating children on the health benefits of maintaing a healthy weight is the first step in reducing the incidence of childhood obesity and preventing future health problems.

Poor nutrition, including the lack of F&V consumption, is widely recognized as one of the primary causes for excess body fat (Veugelers & Fitzgerald, 2005). Research has shown a positive relationship between F&V consumption and weight loss. In a study conducted by Fitzwater et al. (1991) obese adults were asked to restrict their diets to low-fat, high complex carbohydrate food emphasizing unlimited F&V. After 25 months, 69% of the participants lost an average of 13.9 pounds. Follow-ups were conducted at a range of 4 to 76 months and showed that 53% of the participants continued to lose or maintain their weight while staying on the high fruit and vegetable diet. The mean weight loss from pretreatment to end of follow-up was 17.6 $\pm$ 2.2 lb. In 2001, Epstein et al. conducted a study that compared increased F&V consumption and weight loss to decreased fat and sugar consumption and weight loss. The study design randomized families into two groups. Both of the groups were given a comprehensive weight control program, but one group was encouraged to increase F&V consumption while the other

group was encouraged to decrease fat and sugar consumption. After one year, the parents from the families that increased F&V consumption had greater weight loss as compared to the parents from the families that decreased fat and sugar consumption (p=.03).

Even though the benefits of a diet that incorporates F&V is well established, children today are not consuming adequate levels of F&V. Only twenty-six percent of children between the ages of 6 and 11 eat two or more servings of fruit each day (United States Department of Health and Human Services, 2000). In addition, only 27% of boys and 24% of girls between the ages of 6 and 11 eat three servings of vegetables each day (USDHHS, 2000). Childhood food consumption is a strong predictor of adulthood food consumption (Edwards & Hartwell, 2002). Therefore, increasing childhood consumption of healthy foods, which includes F&V, is an important objective in maintaining overall good health later in life.

Overweight children are at risk for the same health complications as overweight adults including: heart disease, high cholesterol, high blood pressure, and type 2 diabetes (Centers for Disease Control and Prevention, 2005). The incidence of type 2 diabetes, which was once considered an adult disease, has increased among children (USDHHS, 2001). This could be related to an advanced maturation process in overweight children. Precocious puberty has been associated with insulin resistance (Ritchie et al., 2006). In addition to the physical health threats caused by obesity there are also psychological and social threats (Ritchie et al., 2006). The Surgeon General (2001) reported that the most immediate consequence of being overweight, as perceived by the children themselves, is social discrimination. Overweight children associated being teased and shunned by their peers with their weight. Overweight children also tend to have a poor self-image and have fewer academic and employment opportunities (Backman et al., 2002).

The Center for Disease Control (2005) recommends both a diet that follows the USDA's Dietary Guidelines and daily physical activity to manage one's weight. A weight loss of 5 to 15% of the total body weight of an overweight person reduces their risk of some diseases, particularly heart disease. Weight loss can also lower blood pressure, blood sugar, and improve cholesterol levels (USDHHS, 2001). Weight maintenance and healthy diet choices, therefore, should be considered a lifelong effort which begins in childhood.

Social Cognitive Theory

Theories present a systematic way of understanding events or situations. Theories are a set of concepts, definitions, and propositions that explain or predict these events or situations (National Cancer Institute, 2006). Behavior theories, like the Social Cognitive Theory (SCT), are used to promote and evaluate behavior changes. The Social Cognitive Theory explains how people acquire and maintain certain behavioral patterns, while also providing the basis for intervention strategies (Bandura, 1997; Baranowski et al., 2000). At the interpersonal level, theories of health behavior assume that individuals exist within, and are influenced by, the social environment. The social environment includes family members, friends, co-workers and others. The advice, support and opinions of one's social environment influence his or her feelings and behavior. The individual will also have a reciprocal effect on their social environment (National Cancer Institute, 2006). The Social Cognitive Theory describes a dynamic, ongoing process in which personal factors, environmental factors and human behavior exert influence upon each other. The theory specifies a core set of determinants, the mechanism through which they work, and the optimal ways of translating this knowledge into effective health practices (Bandura, 2004). The core determinants include knowledge and attitude of the health risks and benefits of

different health practices, perceived self-efficacy, outcome expectations and social norms (Bandura, 2004).

Self-efficacy is a central determinant of the SCT because it affects health behavior both directly and by its influence on the other determinants. The stronger the self-efficacy, the higher the goals people set for themselves. If people do not believe that they can produce desired effects by their own actions, they have no incentive to persevere when faced with personal challenges (Bandura, 2004). Individuals are not self-efficacious in general; instead, their sense of self-efficacy is linked to specific behaviors or situations (Resnicow et al., 1997).

The outcomes people expect from their actions affect health behavior (Bandura, 2004). Outcome expectations take on three forms, physical outcomes, social outcomes and self-evaluative outcomes. First, the physical outcomes include the pleasurable and aversive effects of the behavior and the attached material loss or benefit (Bandura, 2004). Next, the social outcomes are the approval or disapproval the behavior produces on one's social environment (Bandura, 2004). Finally, the self-evaluative outcomes include the positive or negative reactions to one's own health behavior (Bandura, 2004).

Social norms are the rules used to define appropriate and inappropriate values, beliefs and behaviors in a particular group, and they influence self-efficacy and outcome expectations. Individuals place high value on their perceived reputation from others in their social environment. Behavior changes are heavily influenced by what people in the social environment perceive as normal behavior (Resnicow, 1997). Models of health behavior change that include social norms may be better able to predict behaviors that are performed in front of one's peers than behaviors that are performed in private (Garcia & Mann, 2003).

Children's perception of healthy foods and healthy eating habits is a determinant of their food choices as well as their familiarity with F&V. In a qualitative survey conducted by Edwards and Hartwell (2002), 75% of the children were familiar with the term "healthy eating." Of the seventy-five percent, 46% cited school as their source of information on healthy eating, 25% cited television, and another 25% cited family members. When the children were asked to define the term "healthy eating", 25% of the children identified the term as being related to both eating a balanced diet and eating F&V. When asked why it is important to eat F&V, 62% responded "to keep you healthy"; and 17% responded "to provide vitamins needed for a healthy life". Edwards and Hartwell's survey also included a food recognition section. They concluded that fruit was well liked and more easily recognized than vegetables, perhaps partly because the children had not tried many vegetables. Encouraging children to taste and develop a preference for F&V may encourage children to improve their intake of these foods.

The social cognitive theory has been used as a framework for dietary intervention. Behavior change can be described as involving two separate processes: motivational process and volitional process. During the motivational process, people move from 'I wish' to 'I will' and form an intention to change the behavior. During the volitional process, the behavior change is planned, started, and maintained (Garcia & Mann, 2003). Social cognitive models tend to focus on the motivational process which is central to designing an intervention that will motivate children to change their eating habits. Preventing unfavorable health habits is less problematical than trying to change the habits once they have become well-established as part of a lifestyle (Baranowski et al., 2000). Schools provide a natural setting for an effective preventive program because schools are a place where children can be easily reached. An effective preventive program includes four major components: information about the health risks and benefits, social

and self-management skills for translating informed concerns into effective practices, building of a resilient sense of self-efficacy to support the exercise of control in the face of setbacks, and creates social support for personal change (Bandura, 2004).

School-Based Nutrition Intervention Programs

Nutrition interventions in schools and other community locations have shown potential to positively change children's and adolescent's eating patterns. The majority of interventions for elementary school-aged children have been implemented in schools, after-school programs, summer camps, community centers, libraries and grocery stores (Hoelscher et al., 2002). Three school-based intervention programs that have shown noteworthy improvements in childhood nutrition behaviors include Team Nutrition, 5-a-Day Power Plus Program, and Gimme 5.

Team Nutrition (TN) is an educational and promotional initiative developed by the USDA to change children's eating behavior through social marketing techniques (Levine et al., 2002). The aim of TN is to reduce fat consumption and increase fruit, vegetable, and whole grain consumption. Team Nutrition provides training and technical assistance to school nutrition and food service personnel. Team Nutrition is also a multifaceted nutrition education program delivered through the schools to build children's skills and to motivate them to make food choices for a healthful diet. In-school education is provided through the use of flexible curriculum modules designed by Scholastic, Inc, in partnership with the USDA. The approach addresses behavioral goals in a manner that engages students and has them routinely apply new information. Students practice making food choices and assessing those choices (Levine et al., 2002).

Levine et al. (2002) conducted a pilot study in public elementary schools across the United States targeting kindergarten through fourth grade students. Throughout the two

semesters of intervention, the schools were asked to teach 8 or 9 Scholastic lessons in the classrooms, conduct 2 school-wide cafeteria events, 3 parent contact activities, 1district-wide TN community event, 1 district-wide media event, and provide 10 total hours of training for foodservice staff. Program assessments were made through questionnaires given to the teachers, self-reported data from the schools, and observational processes. The program was well received by the majority of participants. Recommendations for the program included more time to plan the classroom lessons, advance planning for the community chef events, training or technical assistance when organizing media events, and having the TN coordinators learn more about the local culture. Despite these potential barriers, the TN program did increase students' fruit, vegetable, and grain consumption and also increased community awareness of healthy food choices.

The 5-a-Day Power Plus Program, developed by the National Cancer Institute in collaboration with the Produce for Better Health Foundation, is another school-based nutrition intervention program that was piloted in St. Paul, Minnesota. The 5-a-Day Power Plus Program was a randomized school-based trial. The program was intended to increase fruit and vegetable consumption among children using a multi-component approach (Perry et al., 1998; Story et al., 2000). The study took place during the spring of 1995 and the participants were multiethnic children in the fourth and fifth grades of 20 elementary schools in St. Paul. The intervention consisted of behavioral curricula in the classroom, parental involvement, school food service changes, and industry support. Industry support was defined as a local producer providing fresh F&V to the schools for classroom taste-testing, take-home treats, and additional lunchtime produce. The 5-a-Day Power Plus Program was modeled after the SCT.

The 5-a-Day Power Plus Program was assessed by observation-based processes, evaluating the teacher's self-reported checklists, and by evaluating parental self-reported home activity cards. Trained observers observed 25 randomly selected students per school each month using standardized protocols and instruments. The observers recorded F&V availability at the schools and the number of F&V on each of the selected students' lunch trays (Story et al., 2000). The program did increase lunchtime fruit and vegetable consumption as well as the total calories attributable to fruit and vegetable consumption ($p<0.01$) (Perry et al., 1998). The monthly lunchroom observations showed that intervention schools were offering more F&V choices and were promoting more F&V consumption (6 servings) at school lunch compared to the students in the control schools (Story et al., 2000).

Gimme 5 was another multi-component intervention designed to impact fourth and fifth grade students' F&V consumption and related psychosocial variables (Baranowski et al., 2000). Gimme 5 included a curriculum, newsletters, videotapes and point-of-purchase education. The intention of the point-of-purchase education was to give the student suggestions on selecting and preparing fresh F&V from fast food and grocery store venues. The Gimme 5 study employed 16 elementary schools. Each of the schools was paired based on size, percentage of students on free or reduced lunch and percentage of annual student turnover. One school was randomly assigned to the treatment group and its pair was then assigned to the control group. The Gimme 5 program was also based on the SCT.

The evaluation of the program was measured through student 7-day food records in which the students recorded everything they ate or drank for seven days, observational processes, and self-reported checklists. Data was collected at baseline, mid-study (1.5 years), and post-study (3 years). The results showed increases in F&V weekday lunchtime consumption ($p=.07$),

self-efficacy (p=.05) and social norms (p=.06) in the intervention schools as compared to the control schools. The study concluded that school nutrition education interventions based on the SCT can positively influence students' F&V consumption (Baranowski et al., 2000).

School-Based Nutrition

Approximately 28 million children receive National School Lunch Program (NSLP) lunches every school day and about 8.9 million children receive breakfasts in the School Breakfast Program (Pilant, 2006). The School Meal Initiatives (SMI) for Healthy Children, finalized by the U.S. Department of Agriculture in 1995, requires that lunches offered in the NSLP provide one-third of the Recommended Dietary Allowances (RDA). In addition, NSLP lunches are required to meet the 1990 Dietary Guidelines for Americans for key nutrients applicable to children including ≤30% and ≤10% energy from total fat and saturated fat, respectively (Shanklin & Wie, 2001; USDA, 2004). A minimum quantity of 2 or more one-half cup servings of fruit or vegetables per lunch is also required as part of the NSLP. Several studies have been conducted to determine the compliance of School Lunch Programs with the USDA meal patterns and the RDAs (Shanklin & Wie, 2001, Pilant, 2006). The studies described the actual nutrient intake of nutrient components in NSLP lunches. The results indicated that school lunches usually served in the NSLP met the requirement of providing one-third of RDAs and the required fruit or vegetable servings; however, they did not comply with the 1990 U.S. Dietary Guidelines for the percentages of energy from fat and saturated fat, fiber or sodium. The studies showed that several of the NSLP were high in fat, saturated fat, and sodium and low in fiber. The high values can be attributed to the fact that the lunches contain high amounts of fried foods, ground meat, and simple carbohydrates, as well as low amounts of fresh F&V.

When looking at the number of students who participate in the NSLP, it seems relevant that schools would be identified as one of the societal sectors that should address the trend of promoting programs to help children maintain healthy eating habits (Pilant, 2006). Studies have shown that school meals and snacks contribute to the majority of nutrients consumed by children. Even though children may understand that good nutrition and good health are related, this may not always be reflected by the food choices children make while at school. Children's food choices are influenced by the types of foods available to them at school, nutrition information in the school, nutrition education provided in the classroom, and nutrition promotions that reach the families (Pilant, 2006). All of these factors must be examined and included when designing a proper school nutrition intervention.

Children also receive a mixed message when food is used as a reward at school. It is confusing for students to hear messages about good nutrition and healthy food choices and then be rewarded with parties or treats that do not include foods based on meeting nutrition standards (Pilant, 2006). Further confusing the message is commercial food sales in schools. A recent report by the US General Accounting Office showed that food sales were reported to be the most prevalent form of commercial activity in schools (Story & French, 2004). Soft drinks from vending machines and short-term fundraising were the primary sources of food sales. A study conducted by the US National School Health Policies and Programs 2000 (SHPPS) found that students could purchase soft drinks, sports drinks or fruit drinks that are not 100% juice in a vending machine, school store or snack bar in 58% of elementary schools, 83% of middle schools and 94% of high schools (Story & French, 2004). Schools may receive a percentage of the sales from vending machines which can help to supplement school income. This is an issue that hinders the message of good health to school children. It is important for schools to

recognize that not only does the health message of choosing F&V instead of sugar and high fat foods need to be addressed in the school but it also needs to be reinforced by the school.

CHAPTER 3
METHODS

Smart Bodies is an interactive educational program designed to prevent overweight in children. The Smart Bodies research was intended to evaluate the effectiveness of the Smart Bodies curriculum to see if the curriculum increased nutrition knowledge and improved attitudes about F&V in elementary school students. Smart Bodies is a joint initiative of the Louisiana State University Agricultural Center and Blue Cross Blue Shield of Louisiana intended to integrate classroom activities with hands-on learning to educate children on the importance of a healthy lifestyle (www.smartbodies.org). The study was approved by the Institutional Review Boards of Louisiana State University and the Louisiana State University Agricultural Center.

Participants

Public elementary schools in an urban area of southeastern Louisiana were recruited to participate by Smart Bodies representatives. An a priori power analysis was conducted on the knowledge section to determine the needed sample size. With an estimated medium effect size (.50), a beta:alpha ratio of 4:1, and significance set at $p < 0.05$, it was estimated that 120 students from each of four groups (4^{th} grade boys, 4^{th} grade girls, 5^{th} grade boys and 5^{th} grade girls) would be needed. It was estimated that the desired number of students could be attained with at least six matched pairs of schools. Students in participating schools were given a parental consent form to be taken home and signed by the students' parent or legal guardian. The students were also asked to give their signed assent to participate. Assent forms were attached to the pretest and posttest surveys. The study only included students with parental consent, signed assent, and those who completed both the pretest and posttest survey.

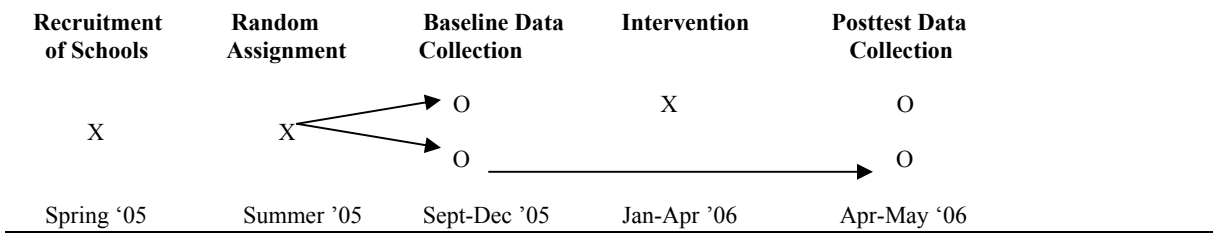

Figure 1: Research Design

Procedures

The study employed a randomized block design. The participating schools were paired-matched based upon student LEAP scores, percentage of children receiving free or reduced lunch, and school size. Once the pairs had been established, the researchers randomly assigned one school from each pair to a control group and its partnered school to the intervention group. The students were nested in schools so that the school was used as the unit of analysis and the children were used as the unit of measurement.

Data were collected in the form of a survey at baseline and again one to two weeks post-intervention. The same survey was given to both the fourth and fifth grade students. The target behavior assessed by the survey was F&V consumption in children. The survey also examined children's attitudes and opinions related to F&V consumption. The behavior and attitude sections of the survey were based on the components of the SCT and included estimated F&V intake, opinions about F&V, self-efficacy related to F&V, outcome expectations about F&V and social norms associated with F&V consumption in children. Trained research assistants administered the surveys to the fourth and fifth grade students of the participating schools. Once the baseline survey was administered to children in all of the schools, the intervention schools began the Smart Bodies curriculum.

Treatment

The Smart Bodies curriculum included an assembly program to introduce Smart Bodies to the school, games and books administered in the classroom that encouraged students to try new F&V, videos shown in the classroom designed to address specific nutritional issues, the Body Walk$_{tm}$ exhibit, OrganWise Guys$_{tm,}$ and Take10!$_{tm}$ activities. The Body Walk$_{tm,}$ developed by Kansas State Department of Education (Topeka, Kansas), is a traveling interactive exhibit that takes the students on a journey through the human body. The OrganWise Guys$_{tm}$, developed by OrganWise Guys, Inc. (Duluth, Georgia), are a cast of characters that help young children understand physiology and healthy behaviors through books, games, dolls and informational videos. Take 10!$_{tm}$, developed by the International Life Sciences Institute Center for Health Promotion (Washington, DC), is a classroom based, grade-specific educational tool that encourages short bouts of physical activity integrated with academic lessons.

The fourth and fifth grade teachers from the intervention schools attended a workshop during a regularly scheduled in-service at the school prior to beginning the curriculum. Each workshop was led by a trained Smart Bodies representative. The materials given to the teachers included Smart Bodies posters, transparencies, games, videos, books, worksheets and dolls. The Smart Bodies curriculum was administered in the intervention schools for twelve school weeks and the structure of the program followed a general timeline. First, the teachers were asked to show eight Smart Bodies videos during the 12-week intervention. Second, the teachers were asked to play one of the fruit and vegetable related games and read one of the fruit and vegetable related books at least once a week in the classroom. Third, the students were given a homework assignment to be completed at home with the child's parent or legal guardian that emphasized the health benefits of eating F&V. Finally, if the teacher saw that every student in the class

tasted a fruit or vegetable at lunch during a school day, the teacher marked a poster with a fruit or vegetable sticker for that particular day. The teachers recorded all of their classroom activities by placing stickers on posters when completing a required exercise. Research assistants visited the intervention schools unannounced once every other week during the 12-week intervention to verify that the curriculum was being conducted appropriately and to answer any questions from the teachers or students. The treatment was verified by not utilizing the students of the non-responsive teachers.

Approximately one to two weeks after the completion of the intervention, research assistants conducted the posttest survey. The pretest and posttest surveys were administrated using the same protocol.

Instrumentation

A validated survey was used as the method for measuring the treatment outcomes. The survey consisted of five sections: nutrition knowledge, F&V intakes, F&V opinions, social norms related to F&V, outcome expectations related to F&V, and self-efficacy related to F&V. The ten knowledge questions on the survey were developed by the Smart Bodies researchers and were similar to the grade-specific Take 10! nutrition knowledge questions. The knowledge questions reflected information from the OrganWise Guys$_{TM}$ videos and books included in the curriculum. The questions were reviewed by a panel of experts in the fields of nutrition and elementary education. The questions were then validated by piloting the knowledge section during the fall 2005 semester on fourth and fifth grade students in four public elementary schools in an urban area of southeastern Louisiana. The knowledge questions were intended to directly measure what the students learned from the curriculum.

The intake, self-efficacy, outcome expectations, and social norms questions were designed and validated using a similar population group by Baranowski, et al. (2000). The seven intake questions were designed to measure how much of a certain fruit or vegetable the students were consuming both before and after participation in the Smart Bodies program. There were eighteen self-efficacy questions that measured the students' willingness to choose or not choose F&V instead of less healthy food choices. The outcome expectations section contained nine questions that measured positive outcomes related to the students eating F&V and four questions that measured negative outcomes related to the students eating F&V. The social norms section consisted of four questions that evaluated social perceptions associated with choosing F&V. The opinion section was devised and validated by Cullen (2000) and contained thirty-eight different F&V. The students were asked to describe how much they liked or disliked each fruit or vegetable. An example of each type of question is illustrated below in Table 1.

Table 1: Examples of Survey Questions

Survey Sections	Number of Items	Sample Item	Response Scale
Nutrition Knowledge	10	In order to keep you bones strong and healthy you should eat foods rich in calcium such as___.	A
F&V Intakes	7	How often do you eat or drink orange juice?	B
F&V Opinions	38	Apple	C
Social Norms	4	Most people in my family think that eating 2 or more servings of fruit or juice each day is a good thing.	D
Positive Outcome Expectations	9	If I eat F&V everyday, it will keep me from getting fat.	E
Negative Outcome Expectations	4	If I eat F&V everyday, my friends will make fun of me.	E
Self-efficacy	18	For breakfast, I think I can add fruit to my cereal.	F

The possible response scales include the following: **A**: 1=low fat milk, 2=apples, 3=hamburgers, 4=French fries; **B**: 0=never, 1=1-3x/mo, 2=1-2x/wk, 3=3-4x/wk, 4=5-6x/wk, 5=1x/day, 6=2x/day, 7=3x/day, 8=4x/day, 9=5+x/day; **C**: 1=I don't like this, 2=I like this, 3=I like this a lot, 4=I don't know what this is; **D**: 1=A very good thing, 2=A good thing, 3=Not important, 4=I don't know; **E**: 1=I disagree very much, 2=I disagree a little, 3=I am not sure, 4=I agree a little, 5=I agree very much; **F**: 1=I'm sure I cannot, 2=I don't think so, 3=I am not sure, 4=I think so, 5=I'm sure I can

Statistical Analysis

The pretest and posttest surveys were scanned into Remark OMR Version 6 (Gravic, Inc, Malvern, PA, 2005) software for grading. Statistical analyses were run using SAS 9.1 (Cary, North Carolina, 2006). A factor analysis was run on each section of the survey except the nutrition knowledge section. The factors were labeled based on the common factor. A Cronbach's alpha was performed to determine the reliability of each construct. Least square means tests using a mixed-model ANOVA (SAS Proc Mixed) were conducted on the knowledge section and on each factor. The unit of analysis for comparing treatments (control vs. intervention) was the school. All other comparisons utilized the child as the unit of analysis. The probability value was set at $p < 0.05$.

CHAPTER 4
RESULTS

Eighteen public schools (nine pairs) participated in the research study. Posttest data could not be collected from one of the control schools; thus, the control school and its intervention partner were eliminated leaving sixteen schools (eight pairs). In the final group there were 53 fourth and fifth grade teachers in the control schools and 46 fourth and fifth grade teachers in the intervention schools. It was determined by the researchers that fourteen (30%) of the intervention school teachers did not properly implement the curriculum. This decision was based on the fact that these teachers recorded less than three Smart Bodies activities per week and the research assistants did not observe them correctly implementing the program during the unannounced school visits. Therefore, the students in the classrooms of these fourteen teachers were eliminated from the study. The final sample included 321 fourth and 320 fifth grade students (*n*=641). Of these students, 371 were girls (175 fourth grade and 196 fifth grade), 270 were boys (147 fourth grade and 123 fifth grade), 496 were Black, 87 were White, 13 were Hispanic, 24 were Asian and 21 identified themselves as Other which included bi-racial backgrounds and races not listed (Table 2).

Table 2: Participant Demographic Breakdown

	Control (n=347)	**Intervention** (n=294)
Ethnicity		
Black	241	255
White	79	8
Hispanic	7	6
Asian	6	18
Other	14	7
Gender		
Boy	151	119
Girl	196	175
Grade		
Fourth	166	155
Fifth	181	139

Reliability and Factor Analysis

A Cronbach's alpha test was run to determine the reliability of each section of the survey except for the nutrition knowledge section. The results from the Cronbach's alpha test are represented in Table 3. A reliability coefficient of .70 was determined to be an acceptable measure of reliability. The pretest F&V Intake section had a reliability coefficient of .69 which mathematically rounded to .70 and was therefore considered to be an adequate measure of reliability. The social norms and negative outcome expectations sections of the survey had reliability coefficients below the .70 threshold and were considered to be unreliable measures of behavior. The results of the social norms and negative outcome expectations sections, consequently, are not included in the data analysis.

Table 3: Sample Items and Cronbach's Alpha Reliabilities for Each Scale

	Number of Items	**Sample Item**	**Response Scale**	**Alpha Reliability**	
				Pre	*Post*
F&V Intakes	7	How often do you eat or drink orange juice?	A	.69	.74
F&V Opinions	38	Apple	B	.91	.90
Social Norms	4	Most people in my family think that eating 2 or more servings of fruit or juice each day is a good thing.	C	.02	.10
Positive Outcome Expectations	9	If I eat F&V everyday, it will keep me from getting fat.	D	.72	.74
Negative Outcome Expectations	4	If I eat F&V everyday, my friends will make fun of me.	D	.26	.33
Self-efficacy	18	For breakfast, I think I can add fruit to my cereal.	E	.92	.91

The possible response scales include the following: **A**: 0=never, 1=1-3x/mo, 2=1-2x/wk, 3=3-4x/wk, 4=5-6x/wk, 5=1x/day, 6=2x/day, 7=3x/day, 8=4x/day, 9=5+x/day; **B**: 1=I don't like this, 2=I like this, 3=I like this a lot, 4=I don't know what this is; **C**: 1=A very good thing, 2=A good thing, 3=Not important, 4=I don't know; **D**: 1=I disagree very much, 2=I disagree a little, 3=I am not sure, 4=I agree a little, 5=I agree very much; **E**: 1=I'm sure I cannot, 2=I don't think so, 3=I am not sure, 4=I think so, 5=I'm sure I can

A factor analysis was run on each section, except the nutrition knowledge section, to determine the number and nature of underlying factors affecting the relationship between each section of variables. Eigenvalues approximating 1.0 were used to determine the number of

factors for each section. Factor loadings approximating .40 were used as the cutoff point in the rotated factor matrices. There were a few questions from each section whose factor loading was not high enough to be included in a factor. The rotated factor matrices are represented in Table 4 and Table 5 and only include the questions with factor loadings approximating .40 or higher. If a factor had two factor loadings approximating .40 or higher, the highest factor load was used. The factor labels are represented in Table 6.

Outcome Evaluation

Treatment. Treatment was examined at the school level. The treatment results were examined by combining the pretest and posttest scores for the intervention schools and for the control schools (Table 7). Self-reported intakes for factor one, fruit and fruit juice consumption, was higher in the intervention group ($F(1, 14)=7.75$, $p=.01$). There was a tendency for the opinions of factor four, vegetables used for seasoning (bell peppers, garlic and onion), to be more negative in the intervention group ($F(1, 14)=3.02$, $p=.10$). No differences were observed between the intervention and control groups regarding nutrition knowledge, outcome expectations or self-efficacy.

Ethnicity. Least Square Means (LSM) differences in ethnicity were observed using pretest and posttest scores combined and were examined at the individual level (Table 8). Asian students' scores in nutrition knowledge approached a significantly higher score from those of the Black and the Hispanic students ($F(4, 636)=9.33$, $p=.10$). The Asian students also had a higher opinion of factor three, uncommon fruits and vegetables (apricots, cantaloupe, mangos, papaya, avocado, cauliflower, and coleslaw) when compared to Black students ($F(4, 407)=8.50$, $p=.00$), but had a lower opinion of factor five (apples, bananas, and corn) compared to White students

(F(4, 407)=2.56, p=.04). The Asian students had the higher score for self-efficacy factor one, eating fruit instead of a sugary snack, when compared to Hispanic students (F(4, 418)=2.38, p=.05).

The Black students' self-reported intake of factor three, potatoes, was significantly higher than that of the White students (F(4, 385)=5.38, p=.00). The Black students also had significantly higher opinions of potatoes (factor 6), when compared to Hispanic students (F(4, 407=3.24, p=.01). The Black students reported higher opinions of factor two, common fruits (grapes, kiwi, oranges, peaches, pears, pineapple, plums, strawberries, tangerines, and watermelon), compared to the White students (F(4, 407)=3.10, p=.02).

Gender and Grade. Data examined representing gender and grade LSM included the pretest and posttest scores combined for the intervention and control groups and were observed at the individual level (Table 8). There was a tendency for a difference between the genders with the girls appearing to score somewhat higher than the boys for self-efficacy factor one, eating fruit instead of a sugary snack (F(1, 418)=2.74, p=.10). The fifth grade students scored higher on the nutrition knowledge section (F(1, 636)=9.33, p=.00); and, the fifth grade students also had a higher outcome expectation for factor two, positive self-evaluations of eating F&V everyday (F(1, 520)=5.20, p=.02). The fourth grade students had a better opinion for factor three, uncommon fruits and uncommon vegetables (F(1, 407)=5.35, p=.02) and there was a trend for fourth graders to report higher intakes of factor two, green salad and vegetables (F(1, 385)=2.87, p=.09).

Table 4: Rotated Factor Pattern for Social Norms, F&V Intakes, Self-efficacy, and Outcome Expectations.

	Factor 1	Factor2	Factor 3
Intakes			
How often do you eat/drink the following:			
1. Orange/grapefruit juice	**.82**	.12	.06
2. Fruit juice	**.76**	.14	.14
3. Green salad	.06	**.76**	.21
4. French fries	.16	-.07	**.87**
5. Other potatoes	.06	.36	**.76**
6. Vegetables	.23	**.79**	-.03
7. Fruit	**.51**	.50	.10

	Factor 1	Factor 2	Factor 3
Self Efficacy			
How sure are you that you can…			
1. Eat fruit instead of my usual dessert with lunch at home	**.59**	.08	.18
2. Eat fruit instead of a cookie for a snack	**.80**	.22	.14
3. Eat fruit instead of a candy bar for a snack	**.78**	.27	.19
4. Eat raw vegetables with dip instead of a cookie	.19	**.81**	.16
5. Eat raw vegetables and dip instead of a candy bar for a snack	.18	**.85**	.16
6. Eat raw vegetables with dip instead of chips for a snack	.15	**.82**	.18
7. Eat a big serving of vegetables with dinner	.13	.35	**.62**
8. Eat fruit instead of dessert at dinner	**.69**	.13	.33
9. Eat 2+ servings of fruit or juice each day	**.52**	.00	**.50**
10. Eat 3+ servings of vegetables each day	.21	.20	**.74**
11. Eat 5+ servings of fruit and vegetables each day	.33	.21	**.72**

	Factor 1	Factor2
Outcome Expectations		
If I eat fruits and vegetables every day…		
1. It will keep me from getting fat	**.73**	-.06
2. My family will be proud of me	**.70**	.08
3. I will have a prettier smile	.09	**.74**
4. My friends will start eating them too	.18	**.52**
5. I will be healthier	**.68**	.34
6. I will have more energy	**.60**	.34
7. I will have stronger eyes	.39	**.57**
8. I will become stronger	**.61**	.46
9. I will think better in class	**.56**	.46

Note: Rotated factor table only includes questions that correspond with a factor.

Table 5: Rotated Factor Pattern for Opinions.

	Factor1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Opinions						
How much do you like these fruits/vegetables:						
1. Apple	.09	.16	.06	.04	**.62**	.11
2. Apricots	.04	.16	**.64**	.01	.12	.16
3. Bananas	.04	.27	.10	.12	**.43**	.31
4. Cantaloupe	.32	.29	**.43**	-.25	.00	.06
5. Grapes	.08	**.47**	-.05	.03	.43	-.09
6. Kiwi	.19	**.58**	.26	.06	-.15	.03
7. Oranges	.07	**.51**	-.03	.08	.46	-.08
8. Mangos	.12	.40	**.55**	.08	-.07	.04
9. Papaya	.03	.17	**.61**	.12	.03	.09
10. Peaches	.04	**.58**	.09	.17	.24	.28
11. Pears	.04	**.54**	.15	.06	.19	.34
12. Pineapple	.12	**.47**	.03	.14	.43	.05
13. Plums	.16	**.63**	.07	.02	.10	.19
14. Strawberry	.18	**.66**	.04	.01	.04	.02
15. Tangerines	.17	**.51**	.19	.00	.07	.06
16. Watermelon	.19	**.48**	.16	-.07	.13	-.10
17. Avocado	.10	.05	**.56**	.29	.03	-.01
18. Bell peppers	.30	.19	.15	**.58**	-.02	-.07
19. Broccoli	**.68**	.07	.13	.06	.07	.08
20. Carrots	**.52**	.10	.28	-.10	.29	-.08
21. Cauliflower	.32	-.01	**.43**	.27	.15	-.12
22. Celery	**.53**	.14	.20	.12	.21	-.10
23. Coleslaw	.31	-.06	**.43**	.26	.07	.00
24. Cabbage	**.59**	.23	.02	.11	.02	.13
25. Corn	.26	.00	.14	-.08	**.53**	.06
26. Cucumber	**.46**	.32	.18	.02	.04	-.19
27. Garlic	.13	.02	.17	**.68**	.03	.09
28. Greens	**.64**	.15	.03	.19	.01	.27
29. Green beans	**.60**	.12	.04	.19	.11	.24
30. Lettuce/Salad	**.62**	.28	.06	.10	.15	-.08
31. Onion	.21	.03	.15	**.72**	.09	.01
32. Peas	**.45**	-.07	.11	.19	.30	.36
33. Potato salad	.36	.17	-.01	.15	-.03	**.44**
34. Sweet potatoes	.23	.15	.15	-.12	.13	**.64**
35. Spinach	**.59**	.15	.07	.20	-.01	.23
36. Tomatoes	**.40**	.28	.15	.25	-.05	.15

Note: Rotated factor table only includes questions that correspond with a factor

Table 6: Factor Labels

	Intakes	**Opinions**	**Social Norms**	**Outcome Expectations**	**Self-efficacy**
Label					
Factor 1	Fruit/Fruit juice	Common vegetables	Family & fruit consumption	(+) Self-perceptions	Eat fruit instead of…
Factor 2	Vegetables	Common fruits	Family/friends fruit & vegetable consumption	(+) Self-evaluations	Eat raw veggie instead of…
Factor 3	Potatoes	Uncommon fruits and uncommon veggies			Eat servings of veggies
Factor 4		Vegetables used for seasoning			
Factor 5		Apple, banana, & corn			
Factor 6		Potatoes			

Treatment Interactions. The treatment interactions were examined at the individual level and included Treatment X Gender, Treatment X Grade, and Treatment X Test (Table 9). The Treatment X Gender results suggest that the boys in the intervention group appear to have a higher opinion of factor two, common fruits, compared to boys in the control group ($F(1, 407)=3.10$, $p=.10$). However, no difference was observed between girls in the intervention group and girls in the control group related to opinions factor two. The girls in the intervention group had a lower outcome expectation score for factor two, positive self-evaluations related to F&V consumption, compared to girls in the control group ($F(1, 520)=3.79$, $p=.05$). There was no difference between boys in the intervention group and boys in the control group for outcome expectations factor two. There was only one difference noted in the Treatment X Grade results. The fifth grade students in the intervention group reported a higher intake of factor one, fruits and fruit juice, compared to fifth grade students in the control group ($F(1, 385)=6.38$, $p=.01$). No differences were observed between the fourth grade students in the intervention group and the fourth grade students in the control group for self-reported intakes of factor one.

The nutrition knowledge results for the Treatment X Test (Table 9) interaction showed that both groups scored similarly on the pretest but the intervention group approached a significantly higher score on the posttest compared to the pretest ($F(1, 636)=3.22$, $p=.07$). There was also a difference from pretest to posttest in the intervention group for the opinions of factor five, apples, bananas, and corn which approached significance as well ($F(1, 407)=3.41$, $p=.07$). The intervention posttest scores for self-efficacy factor one, eating fruit instead of a sugary snack, was significantly higher compared to intervention pretest scores ($F(1, 418)=7.95$, $p=.01$). There was no difference between pretest and posttest scores for the control group related to the above factors.

Table 7: Least Square Means for Treatment

	n	Treatment	
		Con	*Int*
Knowledge	16	--	--
Intakes	16		
Factor 1		**-.34**	**.17****
Factor 2		--	--
Factor 3		--	--
Opinions	16		
Factor 1		**--**	**--**
Factor 2		**--**	**--**
Factor 3		**--**	**--**
Factor 4		**.11**	**-.20***
Factor 5		**--**	**--**
Factor 6		**--**	**--**
Outcome Expectations	16		
Factor 1		**--**	**--**
Factor 2		**--**	**--**
Self-efficacy	16		
Factor 1		--	--
Factor 2		--	--
Factor 3		--	--

Note: Treatment evaluated by school. All statistical tests used SAS PROC Mixed with a Tukey-Kramer adjustment for LSM.

p<.10*, p<.05**

Table 8: Least Square Means for Ethnicity, Gender, and Grade

	n	Ethnicity					Gender		Grade	
		Black	*White*	*Hispanic*	*Asian*	*Other*	*Boy*	*Girl*	*Fourth*	*Fifth*
Knowledge	637	**6.8^{y}**	**7.2**	**6.8^{y}**	**7.6^{x}****	**7.0**	--	--	**6.7**	**7.5****
Intakes	504									
Factor 1		--	--	--	--	--	--	--	--	--
Factor 2		**--**	**--**	**--**	**--**	**--**	--	--	**.23**	**-.05***
Factor 3		**.12^{x}****	**-.52^{y}**	**-.29**	**-.35**	**-.02**	--	--	--	--
Opinions	498									
Factor 1		--	--	--	--	--	**--**	**--**	--	--
Factor 2		**.07^{x}****	**-.46^{y}**	**-.31**	**-.12**	**.24**	**--**	**--**	--	--
Factor 3		**.11^{y}**	**.31**	**.51**	**.97^{x}****	**.18**	**--**	**--**	**.56**	**.19****
Factor 4		**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Factor 5		**-.09**	**.33^{x}****	**-.06**	**-.42^{y}**	**.23**	**--**	**--**	**--**	**--**
Factor 6		**.13^{x}****	**.02**	**-.66^{y}**	**-.23**	**-.42**	**--**	**--**	**--**	**--**
Outcome Expectations	574									
Factor 1		**--**	**--**	**--**	**--**	**--**	--	--	--	--
Factor 2		**--**	**--**	**--**	**--**	**--**	--	--	**-.15**	**.18****
Self-efficacy	519									
Factor 1		**-.07**	**.06**	**-.10^{y}**	**.54^{x}****	**-.04**	**-.05**	**.20***	--	--
Factor 2		**--**	**--**	**--**	**--**	**--**	**--**	**--**	--	--
Factor 3		**--**	**--**	**--**	**--**	**--**	**--**	**--**	--	--

Note: Ethnicity, gender, and grade evaluated by individual. All statistical tests used SAS PROC Mixed with a Tukey-Kramer adjustment for LSM.

^{xy} Means within a row with different superscripts are significantly different based on LSM.

p<.10*, p<.05**

Table 9: Least Square Means for the Treatment Interactions

	n	Tx X Gender				Tx X Grade				Tx X Test			
		Con B	*Int B*	*Con G*	*Int G*	*Con 4*	*Int 4*	*Con 5*	*Int 5*	*Con Pre*	*Con Post*	*Int Pre*	*Int Post*
Knowledge	637	--	--	--	--	**--**	**--**	**--**	**--**	**6.8**	**7.2**	**6.9**	**7.5***
Intakes	504												
Factor 1		--	--	--	--	**-.24**	**.08**	**-.45**	**.25****	--	--	--	--
Factor 2		**--**	**--**	**--**	**--**	--	--	--	--	--	--	--	--
Factor 3		**--**	**--**	**--**	**--**	--	--	--	--	--	--	--	--
Opinions	498												
Factor 1		--	--	--	--	--	--	--	--	--	--	--	--
Factor 2		**-.21**	**.06***	**-.16**	**-.13**	--	--	--	--	--	--	--	--
Factor 3		**--**	**--**	**--**	**--**	--	--	--	--	--	--	--	--
Factor 4		**--**	**--**	**--**	**--**	--	--	--	--	--	--	--	--
Factor 5		**--**	**--**	**--**	**--**	--	--	--	--	**.03**	**.07**	**-.17**	**.06***
Factor 6		**--**	**--**	**--**	**--**	--	--	--	--	**--**	**--**	**--**	**--**
Outcome Expectations	574												
Factor 1		--	--	--	--	--	--	--	--	--	--	--	--
Factor 2		**.13**	**.09**	**.07**	**-.24****	--	--	--	--	--	--	--	--
Self-efficacy	519												
Factor 1		--	--	--	--	--	--	--	--	**.11**	**.04**	**-.04**	**.20****
Factor 2		--	--	--	--	--	--	--	--	**--**	**--**	**--**	**--**
Factor 3		--	--	--	--	--	--	--	--	**--**	**--**	**--**	**--**

Note: Treatment interactions evaluated by individual. All statistical tests used SAS PROC Mixed with a Tukey-Kramer adjustment for LSM.

p<.10*; p<.05**

CHAPTER 5
DISCUSSION

Discussion

The study was designed to determine if participation in a multi-component school-based nutrition intervention program based upon the Social Cognitive Theory would increase nutrition knowledge and self-reported intakes of F&V in elementary school students. The study also examined the suggestion that the students who participated in the intervention would report more positive opinions, outcome expectations, social norms, and self-efficacy related to F&V. The conclusions are strengthened by the randomization of schools within matched pairs and by nesting the students within the schools so that the school was used as the unit of analysis and the children were used as the unit of measurement.

The first study objective examined if students who participated in the Smart Bodies curriculum would have greater knowledge of the importance of eating F&V and would report greater intakes of F&V than children who did not participate in the program. While the nutrition knowledge in both groups of children increased, there was a tendency towards a greater score for children in the intervention group. The students from both the control and intervention schools were preparing for the state-wide LEAP tests during the Smart Bodies implementation. The test preparations could have been a factor in the nutrition knowledge scores of both groups increasing. The nutrition knowledge results of this study are similar to those reported in the Gimme 5 study (Baranowski, et al., 2000). Even though the Gimme 5 study showed a slight increase in the nutrition knowledge scores of the intervention students compared to the control students, the increase was not statistically significant.

The results did show an increase in self-reported intakes of fruit and fruit juice among the students in the intervention group but did not show a change in vegetable consumption. Self-

reported and observational data from the original Gimme 5 (Nicklas, 1997), the Minnesota 5-a-Day Power Plus (Perry et al., 1998), and the Tooty Fruity Veggie Project (Newell, 2004) also showed an increased intake of fruit and fruit juice among their participants. Gimme 5 (Baranowski et al., 2000), however, showed an increase in vegetable consumption among its participants. Fruit may be more appealing to children because it is sweet, easy to eat, and most fruit can be consumed raw (Perry et al., 1998). In addition, many children are introduced to fruit by their parents earlier than they are introduced to vegetables (Edwards & Hartwell, 2002). It has also been reported that a majority of adults do not know how to buy or prepare vegetables and therefore may not serve vegetables to their children (Edwards & Hartwell, 2002). It may be more of a challenge to get children to try new vegetables if their parents or guardians are not eating vegetables. According to teacher focus groups conducted at the conclusion of the Smart Bodies program, some of the teachers stated that there was a limited variety of vegetables served in the school cafeterias. The cafeterias regularly rotated between peas, corn, and green beans (Unpublished data, 2006)

There appeared to be ethnic differences in the self-reported intakes of potatoes with Black students describing the highest consumption. Any differences between ethnicities however should be interpreted with caution because of the unequal representation of groups and the possibility of sampling bias. These findings are substantiated by the traditional diet of the Black culture. The African-American diet is typically high in potatoes (Christina, Garces & Sutherland, 2006). The current study was one of only a few that considered more than two ethnic groups in the analysis of the results. Most of the current research either compared White and Black students or did not report results related to ethnicity (Newell, 2004; Baranowski et al., 2000; Perry et al., 1998; Nicklas, 1997).

The second objective examined whether or not students who participated in the Smart Bodies program had more positive opinions, outcome expectations, social norms, and self-efficacy related to F&V. One of the key behaviors that Smart Bodies targeted was children's exposure to F&V. For the majority of students, their exposure to F&V was limited to what the schools served at breakfast and lunch. The students were rewarded in the classrooms for trying a fruit or vegetable every school day at lunchtime. According to teacher focus groups, apples, bananas, and corn were commonly served at the schools (Holston et al., 2006). The students in the intervention group reported more positive opinions of these foods than the students in the control group. One of the challenges that many schools face is to provide a variety of F&V to the students with minimum plate waste and without going over their budgets (Shanklin & Wie, 2001). It is important to note that the positive opinions related to apples, bananas, and corn were accomplished by using existing resources in the intervention schools' cafeterias.

The only variable to show a variety of responses related to F&V opinions was ethnicity. Once again, the differences in opinions could reflect a sampling bias due to an unequal ethnic representation. The Black students reported higher opinions of common fruits (grapes, oranges, etc.) and potatoes while the White students reported higher opinions of apples, bananas, and corn. The Asian students had the highest opinion of uncommon F&V (apricots, mangoes, etc). As mentioned earlier, many of the previous studies do not provide information related to ethnicity. But, when looking at traditional ethnic diets, Black culture does incorporate many of the fruits from the Opinion Factor 2 list (Table 4) and potatoes in its recipes. Furthermore, traditional Asian recipes include several of the fruits from the Opinion Factor 3 list (Table 4) (Christina, Garces & Sutherland, 2006). It is reasonable to assume that the opinions of students

from different ethnic backgrounds would be higher for the foods that they are accustomed to eating at home with their families.

There were no differences seen with regard to outcome expectations between the control and intervention groups. This could have been attributed to the survey not accurately measuring the outcomes. For example, the question, "If I eat fruits and vegetables everyday I will have stronger eyes." may not have represented the intervention's intentions properly. If the students marked positive answers on the pretest but then did not notice that their eyes were stronger at the completion of the intervention, then they would have marked a negative response for this particular question. Thus, the results would not show a difference related to outcome expectations. It may have been more appropriate to develop questions from the Smart Bodies books and videos that could have been a better measure of the outcomes expected from participating in the program.

The Smart Bodies lessons focused on education to help the students develop the confidence or self-efficacy to make healthier choices. The students in the intervention group showed a positive self-efficacy when asked if they thought that they could choose fruit instead of a sugary snack. Self-efficacy is an individual's confidence in their ability to perform a particular behavior (Garcia & Mann, 2003). Therefore, providing the students with the proper nutrition education intervention appears to give them the confidence that they need to execute the healthy behaviors that they are taught.

The social norms and negative outcome expectations questions could not be evaluated during this study because of a low alpha reliability for the two sections. While the survey had been validated with a similar population, its use with this group and this curriculum did not have enough reliability for the results to be examined. Consequently, the effect that the Smart Bodies

program had on social norms and negative outcome expectations related to F&V consumption could not be determined.

The third and fourth objectives assumed that the intervention would be equally effective for boys and girls and for fourth and fifth grade students. No differences between the genders were observed except there was a tendency for girls to have a higher self-efficacy to eat fruit instead of a sugary snack. The research is not definite as to the responses of the genders to nutrition intervention programs. The 5-a-Day Power Plus study from Minnesota and Gimme 5 both showed that elementary-age girls were more responsive to increasing F&V consumption than the boys (Baranowski et al., 2000; Perry et al., 1998). However, the Cafeteria Power Plus Project saw no significant difference between the genders of the first and third grade participants as related to F&V consumption. The students' F&V intakes were measured in the school cafeteria during lunchtime using observational methods (Perry et al., 2004). In the present study it was the boys who increased their opinion of common fruits while the girls appeared to resist change. The differences seen in previous studies may be explained by the supposition that girls are more receptive to nutrition education concerning eating patterns than boys. And, since dieting is a concern more prevalent among females than males, the interventions, therefore, increased interest in F&V consumption with the girls (Perry et al., 1998). Consequently, the girls in the intervention group showed a decrease in Outcome Expectations Factor 2, positive self-evaluations. The change was driven by only three responses and the questions may not have measured the intended outcome. For example, the question, "If I eat fruit and vegetables everyday, I will have a prettier smile.", may have been critically evaluated by the participating girls. If, after eating fruits and vegetables everyday throughout the intervention the girls did not notice a difference in their smile, then they would have recorded a negative response on the post-

test survey. Further consideration should be given to determine the effect that nutrition education interventions have among genders.

Several differences were noted between the fourth and fifth grade students. The fifth grade students scored higher on the nutrition knowledge section and also had higher Outcome Expectations for Factor 2, positive self-evaluations related to F&V. In addition, the fifth graders had higher opinions of uncommon F&V (apricots, cantaloupe, mangos, papayas, avocado, cauliflower, and coleslaw) compared to the fourth graders. The fifth grade nutrition knowledge scores could reflect superior comprehension of the Smart Bodies curriculum, better curriculum facilitation by the fifth grade teachers, or the suggestion that the older students had a broader nutrition knowledge base before receiving the Smart Bodies curriculum. The high outcome expectations regarding positive self-evaluations related to F&V among fifth grade students is contradictory to current research. Most studies have shown an age-related decline in children's positive perceptions associated with F&V or have shown no difference between grades (Perry et al., 2004; Dzewaltowski et al., 2002; Baranowski, 2000). Future research should consider whether or not grade-level has an effect on students' responses to nutrition education intervention programs. It is important to answer this question so as to direct interventions at the grade level anticipated to have the greatest effect.

It has been suggested that teacher training and staff development are critical components to the reliability of the implementation of an educational curriculum (Story et al., 2000). The Smart Bodies curriculum was designed to be implemented by the teachers in the classroom. The teachers from the intervention schools participated in a one day training workshop during a school in-service. Focus groups, involving the teachers, conducted after the completion of Smart Bodies revealed that some of the teachers were either not comfortable presenting the material or

that the teachers felt overwhelmed with other classroom activities (Holston et al., 2006). Even though the study did not see complete program facilitation from all of the teachers (30% of the teachers were non-compliant), the overall results are positive and encouraging. To promote better teacher facilitation in the future, more thorough teacher training (more than one day) could be attempted and the use of multimedia resources could assist in teacher trainings (Baranowski et al., 2000). Videos and computer-based support may provide a more convenient avenue for training the teachers which may not occupy too much of the teachers' time outside of the classroom. In addition, utilizing the teachers as examples for the students may increase curriculum compliance and facilitation. By educating the teachers about the health benefits of eating F&V and by having the students see the teachers eating more F&V at school students may be encouraged to also increase their F&V consumption.

Many of the school-based health promotion research projects have been conducted with white, middle-class populations in suburban schools (Story et al., 2000). The Smart Bodies program was implemented in a school district where the majority of students are from minority backgrounds. And, according to the teacher focus groups, many of the students were not accustomed to consuming F&V on a regular basis (Holston et al., 2006). All schools in all districts must work to overcome similar challenges; however, urban schools face unique barriers like limited resources, larger class sizes, and low teacher morale (Story et al., 2000). The Smart Bodies program, like the 5-a-Day Power Plus Program, provides evidence for the feasibility, acceptability, and efficacy of intervention studies in urban public schools with multi-ethnic student populations (Story et al., 2000). Smart Bodies is a creative, cost-effective program that can be easily incorporated into current classroom lessons.

Our results show that a multi-component school-based nutrition intervention program can be effective in promoting dietary change. The key ingredient to the effectiveness of a school-based intervention program is having multiple components. Environmental interventions by themselves have proven to have limited impact without classroom and community involvement (Perry et al., 2004). The Cafeteria Power Plus project was developed to increase F&V consumption by providing nutrition education in the school cafeterias. But, during lunchtime, the students were standing in line, selecting food, paying, or eating inside a noisy cafeteria. This limited the intervention to the kinds and amounts of F&V served, the attitudes and behaviors of the cafeteria staff, and to specific activities that could be done within the physical environment of the school cafeterias (Perry et al., 2004). While the Cafeteria Power Plus project did see positive changes in the consumption of F&V by the students, the results were not as powerful as the results from studies that also included classroom or parental involvement (Newell, 2004; Baranowski et al., 2000; Perry et al., 1998; Nicklas, 1997).

Conclusions

The Smart Bodies school-based intervention was successful in increasing self-reported intakes of fruit and fruit juice and tended to increase nutrition knowledge in children who participated in the curriculum. The study also found that the students who completed the program had more positive opinions, outcome expectations, and self-efficacy related to F&V consumption than those students who did not participate in the intervention. The study results are consistent with similar studies that also demonstrated increased fruit and fruit juice consumption. Future research should focus on increasing vegetable consumption by increasing the students' exposure to vegetables both at school and in the home. In addition, a more direct method of measuring F&V intakes, such as recording plate waste in the school cafeterias or

observing children in the lunch room, could be employed in future studies. Additional attention should to be placed on developing stronger teacher trainings and providing the teachers with incentives to maintain their excitement level about the intervention. Further, the teachers should be encouraged to make personal changes in their own lives so that they can reflect healthy eating habits not only to the students but also to the parents. The Smart Bodies program appears to be a low cost, successful avenue to educate elementary students on the importance of healthy eating, increasing consumption of fruit and fruit juice, and improving opinions and self-efficacy about F&V. Further research efforts are needed to improve the curriculum so that it helps children to develop better opinions, outcome expectations, and self-efficacy regarding vegetables and results in better intakes of these nutrient-rich foods. The Smart Bodies program could be used as a model for future interventions to accompany policy change that could positively change the way children think about fruits and vegetables.

Study Approval

The study was approved by the Institutional Review Board of Louisiana State University. The study was granted exempted approval on March 24, 2004 and was given approval number HE04-08.

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APPENDIX A: PARENTAL CONSENT FORM

Dear Parent:

Selected schools in East Baton Rouge Parish are participating in a project called "Smart Bodies." Thanks to support from Blue Cross-Blue Shield and the LSU AgCenter, children in your child's school will have the opportunity to participate in the Body Walk exhibit and the Take 10! / OrganWise Guys curriculum. The goal of the project is to help children learn about the human body and the importance of eating right and being physically active.

The school principal and the teachers at your child's school have volunteered to participate in this project. It is important for us to evaluate whether or not the program is having the positive effect that we hope it will. We need your help to complete this project, which is described in detail on the next page. If you agree to allow your child to participate, your child's height and weight will be measured and recorded. These measurements will be taken individually, and no one will have access to the information. One year following the program, fifth grade students that were measured as fourth graders will have their heights and weights re-measured. Your child will also complete surveys about fruits and vegetables and about physical activity before the project begins and after they have participated in the curriculum. Your child's name and the name of the school will not be used in any way when the results of the project are reported.

If you give us permission for your child to participate, we will explain why we are doing the project and ask your child if they are willing to help us. Your child will be told that participation is voluntary, that they can refuse to participate, and that they can decide to stop being in the study at any time without getting in trouble. We will only involve your child if he or she agrees to participate. We will provide you with a report indicating how your child's height and weight compare with other children their age, and ask for your feedback concerning the way the information is provided.

If you have any questions or concerns about the project, you may call us at the numbers below and we will be happy to answer your questions. If you will give us your permission for your son or daughter to participate, please sign this letter below and return it to your child's teacher. Thank you very much for your help.

Georgianna Tuuri, PhD, LDN, RD
Assistant Professor
LSU School of Human Ecology
578-1722

Melinda Solmon, PhD
Professor
LSU Department of Kinesiology
578-2639

Child's Name: _____(Please print) Child's Teacher: _____

Child's Date of Birth: _____Child's Grade: _____ Child's Race/Ethnicity: _____

I will allow my child to participate in the study described on the following page.

Parent's Signature _____ Date _____

Address where you would like the Body Mass Index Report Mailed:

_____

_____

_____

Project Title: Smart Bodies Program

Investigators: The following investigators are available for questions, M-F, 8:00 a.m.-4:30 p.m.

Georgianna Tuuri, PhD, LDN, RD	Melinda Solmon, PhD
LSU School of Human Ecology	LSU Department of Kinesiology
(225) 578-1722	(225) 578-2639

Purpose of the Study: The purpose of this study is to see if the Smart Bodies Program helps kids learn to like and eat more fruits and vegetables and to be more physically active. It also helps parents learn about their child's weight.

Inclusion Criteria: Fourth and fifth grade children from selected schools who attend the Body Walk Exhibit and participate in the Take 10! / OrganWise Guys curriculum for 10-12 weeks will be included.

Exclusion Criteria: Children who are not fourth or fifth graders or who do not participate in the program.

Description of the Study: The Smart Bodies Program will take place at your child's school. Before the program starts, your child will fill out a questionnaire about how many fruits and vegetables he/she eats and how physically active he/she is. In addition, your child's height and weight will be measured and recorded and a report will be mailed to you that will describe how your child's weight compares to that of other children the same age. If you have any questions about this report you can contact your child's school nurse or Dr. Tuuri or Dr. Solmon at Louisiana State University at the numbers listed above. During the next 12 weeks, your child's teacher will use the Take 10! / OrganWise Guys curriculum in the classroom. The teacher will take 10 minutes each day to lead the class in an activity while they learn. At some point during the program, your child will also visit an exhibit at his/her school called the "Body Walk" where he/she will learn about the human body and the importance of eating right and being physically active.

Benefits: Children will learn about the benefits of eating fruits and vegetables and being physically active and will eat more fruits and vegetables and will be more physically active. Parents will learn about their child's weight as it compares to other children of similar age and gender.

Risks: There are no known risks.

Right to Refuse: Participation is voluntary, and a child will become part of the study only if both the child and the parent agree to the child's participation. At any time, the child may withdraw from the study.

Privacy: School records of participants in this study may be reviewed by the investigators. Results of the study may be published, but no names or identifying information will be included for publication. Participant identity will remain confidential unless disclosure is required by law.

Financial Information: There is no cost for participating in the study. When the study is finished the students will be rewarded with a special event day at school.

The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Chairman, Institutional Review Board, (225) 578-8692. I will allow my child to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

APPENDIX B: CHILD ASSENT

SMARTBODIES CHILD ASSENT FORM

I,_____, agree to be in a study to find ways to help children eat healthy and become more physically active in school. I will have to fill out a survey and have my height and weight measured by researchers from LSU. I will follow all the regular class rules, even when I am working with the researchers. I can decide to stop being in the study at any time without getting in trouble.

_____

Child's Signature Age Date

_____

Witness* Date

* (N.B. Witness must be present for the assent process, not just the signature by the minor.)

APPENDIX C: SURVEY

SMARTBODIES Survey Fall 2005 1

Name: _____ **Age:** _____

Birth month:		**Day:** __ __	**Year:** _____	**Class #:** __ __	**Race/Ethnicity**	
January	J	0 0	**1990** 0	0 0	Black	1
February	F	1 1	**1991** 1	1 1	Caucasian (white)	2
March	M	2 2	**1992** 2	2 2	Hispanic/Latino	3
April	A	3 3	**1993** 3	3 3	Asian	4
May	M	4 4	**1994** 4	4 4	Other	5
June	J	5 5	**1995** 5	5 5		
July	J	6 6	**1996** 6	6 6	**Boy**	B
August	A	7 7	**1997** 7	7 7	**Girl**	G
September	S	8 8	**1998** 8	8 8		
October	O	9 9	**1999** 9	9 9	**4th grade**	4
November	N				**5th grade**	5
December	D					

Directions: Bubble in the correct answer for each question below. Make sure to fill in each bubble carefully.

1. Which activity makes your heart beat the fastest?

①	②	③	④
stretching	**basketball**	**walking**	**sit-ups**

2. The heart beats faster during exercise because:

①	②	③	④
the muscles get tired	**the muscles need oxygen**	**the heart gets tired**	**the heart needs calcium**

3. The minimum number of minutes of exercise you need each day is _____.

①	②	③	④
10	**20**	**30**	**40**

4. The total number of minutes of exercise you should get each day is _____.

①	②	③	④
10	**20**	**30**	**60**

5. You should exercise _____ a week.

①	②	③	④
one day	**three days**	**five days**	**seven days**

6. Which activity uses the largest muscles?

①	②	③	④
arm circles	**forward lunges**	**side stretches**	**sit-ups**

These materials are printed in conjunction with USDA, Food and Nutrition Service, Food Stamp Nutrition Education Program.

7. The largest muscles in the body are in the _____.

①	②	③	④
arms	**legs**	**chest**	**stomach**

8. Which activity would burn the fewest calories?

①	②	③	④
sit-ups	**forward lunges**	**jog in place**	**jumping jacks**

9. Muscles are attached to the bones of the body by_____?

①	②	③	④
hair	**skin**	**tendons**	**calcium**

10. The large muscles in the front of the thighs are called the_____.

①	②	③	④
hamstrings	**quadriceps**	**calves**	**abdominals**

11. One thing you can do to keep from getting heart disease is____.

①	②	③	④
watch more TV	**eat foods with less fat**	**brush your teeth**	**wash your hands**

12. You should eat at least 5 servings each day of___.

①	②	③	④
veggies & fruit	**breads & cereals**	**milk foods**	**meats**

13. In order to keep your bones strong and healthy you should eat foods rich in calcium such as___.

①	②	③	④
low-fat milk	**apples**	**hamburgers**	**french fries**

14. Instead of choosing French fries, it's healthy to choose___.

①	②	③	④
a lettuce & tomato salad	**a baked potato**	**a low-fat yogurt**	**any of these foods**

15. In order to keep your intestines healthy you should____.

①	②	③	④
eat foods high in fiber	**drink Kool-Aid**	**make sandwiches with white bread**	**eat hamburgers**

16. Which food has the most fiber?

①	②	③	④
a slice of watermelon	**a sugar cookie**	**a slice of bologna**	**a spoon-full of low-fat mayonnaise**

17. To make sure your kidneys do their job, you should drink lots of___.

①	②	③	④
soft drinks	**Kool-Aid**	**water**	**tea**

18. Which meal gives you energy to start your day and think better at school?

①	②	③	④
breakfast	**lunch**	**dinner**	**afternoon snack**

19. You should eat lots of fruits and vegetables because they are high in___.

①	②	③	④
fat	**sunshine**	**fiber**	**seeds**

20. Who needs to eat plenty of fruits and vegetables?

①	②	③	④
children	**adults**	**grandparents**	**everyone**

Directions: Below this question are some happy faces and some sad faces. After reading the question, bubble in the face that best describes how you feel about the question. Make sure to fill in the bubble carefully.

21. How do you feel about taking part in physical activities to make your health better and to get your body in better condition?

Very sad	Sad	No feeling either way	Happy	Very happy

How often do you eat or drink the following?

22. Orange juice or grapefruit juice

⓪	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Never	1 to 3 times/ month	1 to 2 times/ week	3 to 4 times/ week	5 to 6 times/ week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more per day

These materials are printed in conjunction with USDA, Food and Nutrition Service, Food Stamp Nutrition Education Program.

How often do you eat or drink the following?

23. Other fruit juices, fortified fruit drinks

⓪	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Never	1 to 3 times/ month	1 to 2 times/ week	3 to 4 times/ week	5 to 6 times/ week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more per day

24. Green Salad

⓪	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Never	1 to 3 times/ month	1 to 2 times/ week	3 to 4 times/ week	5 to 6 times/ week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more per day

25. French fries or fried potatoes

⓪	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Never	1 to 3 times/ month	1 to 2 times/ week	3 to 4 times/ week	5 to 6 times/ week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more per day

26. Other potatoes, including boiled, baked, and potato salad

⓪	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Never	1 to 3 times/ month	1 to 2 times/ week	3 to 4 times/ week	5 to 6 times/ week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more per day

27. Not counting salad or potatoes, about how many servings of vegetables do you eat?

⓪	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Never	1 to 3 times/ month	1 to 2 times/ week	3 to 4 times/ week	5 to 6 times/ week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more per day

28. Not counting juices, how many servings of fruit do you usually eat?

⓪	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Never	1 to 3 times/ month	1 to 2 times/ week	3 to 4 times/ week	5 to 6 times/ week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more per day

Please respond to the following question using the scale below:

29. I am going to exercise or play sports for at least 30 minutes at least 3 times during the next week.

strongly disagree	**moderately disagree**	**slightly disagree**	**slightly agree**	**moderately agree**	**strongly agree**
①	②	③	④	⑤	⑥

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How much do you like these fruits?

Fruits	I do not like this	I like this	I like this a lot	I don't know what it is
30. Apple	①	②	③	④
31. Apricots	①	②	③	④
32. Bananas	①	②	③	④
33. Cantaloupe	①	②	③	④
34. Grapes	①	②	③	④
35. Kiwi	①	②	③	④
36. Oranges	①	②	③	④
37. Mangos	①	②	③	④
38. Papaya	①	②	③	④
39. Peaches	①	②	③	④
40. Pears	①	②	③	④
41. Pineapple	①	②	③	④
42. Plums	①	②	③	④
43. Strawberry	①	②	③	④
44. Tangerines	①	②	③	④
45. Watermelon	①	②	③	④

How much do you like these vegetables?

Vegetables	I do not like this	I like this	I like this a lot	I don't know what it is
46. Avocado	①	②	③	④
47. Baked/broil potato	①	②	③	④
48. Bell peppers	①	②	③	④
49. Broccoli	①	②	③	④
50. Carrots	①	②	③	④
51. Cauliflower	①	②	③	④
52. Celery	①	②	③	④
53. Coleslaw	①	②	③	④
54. Cabbage	①	②	③	④
55. Corn	①	②	③	④

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	I do not like this	I like this	I like this a lot	I don't know what it is
56. Cucumber	①	②	③	④
57. French fries	①	②	③	④
58. Garlic	①	②	③	④
59. Greens	①	②	③	④
60. Green beans	①	②	③	④
61. Lettuce/salad	①	②	③	④
62. Onion	①	②	③	④
63. Peas	①	②	③	④
64. Potato salad	①	②	③	④
65. Sweet potatoes	①	②	③	④
66. Spinach	①	②	③	④
67. Tomatoes	①	②	③	④

Please respond to the following question using the scale below:

68. How many days during the next week do you plan to exercise or play hard enough to make your heart beat fast and sweat for at least 30 minutes?

one day	two days	three days	four days	five days	six days	seven days
①	②	③	④	⑤	⑥	⑦

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STOP!

Close your survey packet and wait for instructions before going on to the next page.

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Directions: Below are several pairs of statements. Choose which of the two statements describes you the best and then check whether it is really true for you or sort of true. You can only answer ONE question on each line. Make sure to fill in each bubble carefully.

EXAMPLE:

really true for me	sort of true for me				sort of true for me	really true for me
■	Ⓑ	Some kids really like to do their homework	BUT	Other kids like to play video games instead of doing their homework	Ⓒ	Ⓓ
Ⓐ	Ⓑ	Some kids like to wear shorts when it is cold outside	BUT	Other kids like to wear long pants when it is cold outside	■	Ⓓ

	really true for me	sort of true for me				sort of true for me	really true for me
69.	Ⓐ	Ⓑ	Some kids feel bad when they run hard	BUT	Other kids feel good when they run hard	Ⓒ	Ⓓ
70.	Ⓐ	Ⓑ	Some kids like exercising a whole lot	BUT	Other kids don't like exercising very much.	Ⓒ	Ⓓ
71.	Ⓐ	Ⓑ	Some kids have more fun playing games and sports	BUT	Other kids don't care much about playing games and sport	Ⓒ	Ⓓ
72.	Ⓐ	Ⓑ	Some kids think that exercise is the most important thing for good health	BUT	Other kids think that other things are more important for good health	Ⓒ	Ⓓ
73.	Ⓐ	Ⓑ	Some kids get nervous about playing games and sports	BUT	Other kids don't get nervous about playing games and sports	Ⓒ	Ⓓ
74.	Ⓐ	Ⓑ	Some kids wish they could play sports more than they get to	BUT	Other kids don't want to play sports more than they have to	Ⓒ	Ⓓ
75.	Ⓐ	Ⓑ	Some kids feel really tired after exercise	BUT	Other kids don't feel tired after exercise	Ⓒ	Ⓓ
76.	Ⓐ	Ⓑ	Some kids think playing games and sports are their favorite thing	BUT	Other kids think playing games and sports are not their favorite	Ⓒ	Ⓓ
77.	Ⓐ	Ⓑ	Some kids' think that the more exercise they get the better	BUT	Other kids don't think that more exercise is better	Ⓒ	Ⓓ
78.	Ⓐ	Ⓑ	Some kids are popular with others in games and sports	BUT	Other kids are not popular in games and sports	Ⓒ	Ⓓ
79.	Ⓐ	Ⓑ	Some kids don't like getting sweaty when they exercise	BUT	Other kids don't mind getting sweaty when they exercise	Ⓒ	Ⓓ
80.	Ⓐ	Ⓑ	Some kids like to burn a lot of energy by exercising	BUT	Other kids don't like to burn a lot of energy by exercising	Ⓒ	Ⓓ

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	really true for me	sort of true for me			sort of true for me	really true for me
81.	Ⓐ	Ⓑ Some kids like playing outdoor games	BUT	Other kids don't like playing outdoor games	Ⓒ	Ⓓ
82.	Ⓐ	Ⓑ Some kids think it is very important to always be in good shape	BUT	Other kids don't think it is important to be in good shape	Ⓒ	Ⓓ
83.	Ⓐ	Ⓑ Some kids get teased by other kids about being overweight	BUT	Other kids do not get teased by about being overweight	Ⓒ	Ⓓ
84.	Ⓐ	Ⓑ Some kids don't like getting out of breath when they exercise	BUT	Other kids don't mind getting out of breath when they exercise	Ⓒ	Ⓓ
85.	Ⓐ	Ⓑ Some kids will feel good after exercise	BUT	Other kids don't feel good after exercise	Ⓒ	Ⓓ
86.	Ⓐ	Ⓑ Some kids get told by other kids that they aren't very good at games and sports	BUT	Other kids are told that they are good at games and sports	Ⓒ	Ⓓ
87.	Ⓐ	Ⓑ Some kids friends like playing games and sports	BUT	Other kids' friends don't like playing games and sports	Ⓒ	Ⓓ
88.	Ⓐ	Ⓑ Some kids don't like playing games and sports very much	BUT	Other kids like to play games and sports a lot	Ⓒ	Ⓓ
89.	Ⓐ	Ⓑ Some kids get their feelings hurt in games and sports	BUT	Other kids don't get their feelings hurt when they play games and sports	Ⓒ	Ⓓ

What do you think about eating fruits and vegetables?

	A very good thing	A good thing	Not Important	I don't know
90. Most people in my family think that eating 2 or more servings of fruit or juice each day is___	①	②	③	④
91. Most people in my family think that eating 3 or more servings of vegetables each day is___	①	②	③	④
92. Most kids my age think that eating 2 or more Servings of fruit or juice each day is___	①	②	③	④
93. Most kids my age think that eating 3 or more Servings of vegetables each day is___	①	②	③	④

If I eat fruits and vegetables every day….

	I disagree Very much	I disagree a little	I am not sure	I agree a little	I agree very much
94. my friends will make fun of me	①	②	③	④	⑤
95. it will keep me from getting fat	①	②	③	④	⑤
96. my family will be proud of me	①	②	③	④	⑤

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If I eat fruits and vegetables every day….

	I disagree Very much	I disagree a little	I am not sure	I agree a little	I agree very much
97. I will have a prettier smile	①	②	③	④	⑤
98. my friends will not come to my house to eat	①	②	③	④	⑤
99. my friends will start eating them too	①	②	③	④	⑤
100. I will be healthier	①	②	③	④	⑤
101. I will have more energy	①	②	③	④	⑤

If I eat fruits and vegetables every day….

	I disagree Very much	I disagree a little	I am not sure	I agree a little	I agree very much
102. I will have stronger eyes	①	②	③	④	⑤
103. I will become stronger	①	②	③	④	⑤

If I eat fruits and vegetables every day….

	I disagree Very much	I disagree a little	I am not sure	I agree a little	I agree very much
104. I will have less energy that if I eat a candy bar	①	②	③	④	⑤
105. I will think better in class	①	②	③	④	⑤
106. I will not enjoy eating that meal or snack	①	②	③	④	⑤

How sure are you that you can:	Im sure I cannot	I don't think so	I am not sure	I think so	Im sure I can
For breakfast, I think I can…					
107. drink a glass of my favorite juice	①	②	③	④	⑤
108. add fruit to my cereal	①	②	③	④	⑤

How sure are you that you can:	I'm sure I cannot	I don't think so	I am not sure	I think so	I'm sure I can
For lunch at school, I think I can…					
109. eat a vegetable that's served	①	②	③	④	⑤
110. add fruit to my cereal	①	②	③	④	⑤
111. eat a green salad	①	②	③	④	⑤
For lunch at home, I think I can…					
112. eat a carrot or celery sticks instead of chips	①	②	③	④	⑤
113. eat my favorite fruit instead of my usual dessert	①	②	③	④	⑤

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How sure are you that you can:	I'm sure I cannot	I don't think so	I am not sure	I think so	I'm sure I can
For a snack I think I can choose…					
114. my favorite fruit instead of my favorite cookie	①	②	③	④	⑤
115. my favorite fruit instead of my favorite candy bar	①	②	③	④	⑤
116. my favorite raw vegetable with dip instead of my favorite cookie.	①	②	③	④	⑤
117. my favorite raw vegetable with dip instead of my favorite candy bar	①	②	③	④	⑤
118. my favorite raw vegetable with dip instead of my favorite chips	①	②	③	④	⑤
For dinner, I think I can…					
118. eat a big serving of vegetables	①	②	③	④	⑤
120. eat my favorite fruit instead of my usual dessert	①	②	③	④	⑤
121. eat a green salad	①	②	③	④	⑤
I think I can…					
122. eat 2 or more servings of fruit or juice each day	①	②	③	④	⑤
123. eat 3 or more servings of vegetables each day	①	②	③	④	⑤
124. eat 5 or more servings of fruits and vegetables each day	①	②	③	④	⑤

Please respond to the following question using the scale below:

125. This week I am very sure that I will exercise or play active games and sports for at least 30 minutes at least 3 times this week.

strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree
①	②	③	④	⑤	⑥

Use the space provided below to answer the following question about physical activity:

126. How does physical activity help your body?

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VITA

Linda Catherine Silverman was born February 16, 1977, to parents Jack and Peggy Silverman. Linda graduated from Airline High School in Bossier City, Louisiana, in May of 1995. She attended Texas A&M University before transferring to Louisiana State University in January of 1997. Linda received her bachelor's degree in dietetics from Louisiana State University in December of 2000. She worked as an Area Sales Representative in Orlando, Florida, for four years before coming back to Louisiana to begin her master's program. During her tenure as a graduate student, Linda completed a Graduate Assistantship under the supervision of Dr.Georgianna Tuuri. Linda plans to graduate from her master's program in May of 2007. Linda is currently working as a dietetic intern at Southern Regional Medical Center in Riverdale, Georgia. She will complete her internship in May of 2007 and then sit for the national exam to become a Registered Dietitian.