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Evaluation of the effectiveness of a body mass index-for-age percentile health report in raising parent awareness of their child's weight status

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**EVALUATION OF THE EFFECTIVENESS OF A BODY MASS INDEX-FOR-AGE
PERCENTILE HEALTH REPORT IN RAISING PARENT AWARENESS OF THEIR
CHILD'S WEIGHT STATUS**

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Science

In

The School of Human Ecology

by

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B.N.Y.S., N.T.R. University of Health Sciences, India, 2002
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ABSTRACT

Overweight in children has become a major health concern. Research suggests that many parents may not be aware of their child's actual weight status. The objectives of this study were to test the effectiveness of a body mass index (BMI)-for-age percentile report in raising parent awareness of their child's weight status. Eighteen public elementary schools in southeast Louisiana were pair matched and divided into nine intervention and nine control schools. Children in the intervention and the control schools were divided into two groups 1) healthy weight ($BMI \geq 5^{th}$ to $<85^{th}$ percentile) and 2) at risk and overweight ($BMI \geq 85^{th}$ percentile). Forty children were randomly selected from each of the two weight groups from the intervention and the control schools. Parents of children in the intervention group received a BMI-for-age percentile health report along with a short questionnaire. Parents of children in control schools received the questionnaire only. Parents in the intervention group have 4.7 times more accurate perception about their child's weight compared to the control group (OR: 4.7, 95% of CI: 0.89-24.86, $p=0.00$). After receiving the report, more parents of at risk or overweight children were concerned and only fewer parents of healthy weight children were anxious about their child's weight. When parents were compared based on their child's weight regardless whether they got the report, parents of at risk or overweight children were more than five times less likely to perceive the correct weight classification of their child (OR: 1.8, 95% of CI: 0.05-0.62, $p=0.00$) and less concerned about their child's weight (OR: 0.98, 95% of CI: 0.32-2.93, $p=0.00$) when compared to parents of healthy weight children. All parents were willing to help their child follow healthy behaviors regard less of the report and their child's weight status. A BMI-for-age percentile report appears to be an effective way to increase parent awareness and concern regarding their child's weight status. With increased awareness, parents may be more likely to encourage their children to achieve a healthy weight.

CHAPTER 1

INTRODUCTION

The prevalence of overweight in children is increasing rapidly in the United States (Rhee, DeLago, Arscott-Mills, Mehta, and Davis, 2005). Approximately 14% of children who are between two and five years of age and 19% of children of age 6-11 years old are overweight (Ogden, Carroll, Curtin, McDowell, Tabak, & Flegdal, 2006). In the past 30 years the prevalence rates have doubled for children between two and five and have almost tripled for children between six and eleven (Rhee et al., 2005). The relative risk of an overweight child becoming an obese adult is six to seven times greater than that of his/her normal-weight peers (Golan, Fainaru & Weizman, 1998). Overweight status can have a negative impact on one's self-esteem and contribute to medical complications such as hypertension, type 2 diabetes, and cardiovascular diseases (Veugelers & Fitzgerald, 2005).

The successful treatment of overweight in children may serve as an effective approach for the prevention of adult obesity and its related morbidity and mortality (Golan et al., 1998). Research suggests that lack of physical activity and decreased consumption of healthful foods, particularly fruits and vegetables, as well as low cognitive stimulation of healthy habits in the home might be significantly related to the prevalence of overweight in children (Strauss & Knight, 1999). Research studies from the past 20 years suggest that parental involvement may play an important role in the prevention of overweight in children, because parents or adult caregivers may serve as role models and may have a powerful influence on young children's eating habits and activities (Rhee et al., 2005). Parental awareness of their child's weight status may be an important factor affecting the dietary and lifestyle environment for their children. Research suggests that nearly 75% of parents fail to identify their overweight child as being

overweight and are unable to perceive their child's weight accurately (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000).

Research using behavioral change models such as the Social Cognitive Theory suggests that increased parent awareness of the child's weight status and increased knowledge of healthy eating behaviors and physical activity will improve the parent's willingness to help their child by influencing the environment around the child (Golan & Weizman, 2001; Patrick & Nicklas, 2005). Parental awareness regarding their child's weight may be an important factor for an intervention program to be successful.

Justification

Obesity has become one of the greatest problems not only in the United States as a whole but it is also one of the most pressing public health challenges in Louisiana (Office of Public Health, 2005). The prevalence of obesity in Louisiana adults has been higher than the national average for the past ten years (Centers for Disease Control and Prevention [CDC], 2005a). Louisiana ranks high in terms of death rates due to obesity-associated chronic diseases such as cardiovascular disease, cancer, and diabetes (CDC, 2005b). Poor nutrition and sedentary lifestyles contribute to Louisiana's national placement of 50th place for its state health ranking over the last three years (United Health Foundation, 2005). The 2002 Louisiana Health Report Card revealed that 36.3% of Louisiana adults were overweight or obese (CDC, 2005a). Louisiana ranked eighth in the nation in the prevalence of obesity, and was among the top six states in total obesity related medical expenditures (CDC, 2005a).

The rate of overweight in children and teens is also increasing in Louisiana. A survey in New Orleans public schools in children aged six to 11 years old indicated that 18.2% were at risk of overweight and 13.8% were Overweight (The Youth Risk Behavior survey, 2003). Reduced participation in physical activity and sports, increased consumption of high caloric foods and soft

drink products may contribute to significant increases in childhood overweight (Office of Public Health, 2005). Louisiana also has a high proportion (84.2%) of people who eat less than five servings of fruits and vegetables per day (CDC, 2005c). Louisiana has consistently remained above the national average (76.2%) in the number of people failing to consume five servings of fruits and vegetables per day (CDC, 2005c). According to the CDC, nearly 75% of American adults and 79% of high school students reported a consumption of less than five servings of fruits and vegetable in a day (CDC 2004). Youth Risk Behavior Surveillance System (YRBSS) data collected from 9th to 12th- grade students indicate that only 21.4% of students eat more than five servings of fruits and vegetables per day (Grumbaum, Kann, & Kinchen, 2002).

Since the late 1970's, numerous school-based health promotion interventions aimed at health education focused on nutrition and physical fitness have been developed and tested (Resnicow & Robinson, 1997). Two of the most successful school based preventive intervention programs, "Planet Health" and "Eat Well and Keep Moving" were able to significantly reduce television viewing and increase fruit and vegetable intake of children. "Planet health" program resulted in a decrease in overweight in adolescent women (Gortmaker, Peterson, Wiecha, et al. 1999, Gortmaker, Cheung, Peterson, et al. 1999). Several programs like the Louisiana Department of Education Team Nutrition, Louisiana Action for Healthy Kids, Louisiana School Health Index, and the Department of Education Principals Survey have been conducted in Louisiana schools which aim at preventing overweight in children (Office of Public Health, 2005). The Child and Adolescent Trial for Cardiovascular Health (CATCH) study showed that aspects of the school climate like school lunch menus, participation in physical education (PE) classes, and teacher and staff self-reports were associated with the prevention of cardiovascular risk factors as well as overweight (Hayman et al. 2004). Beginning in the 1990s several intervention programs addressed the role of parents as key players in preventing weight related

problems in children (Rhee et al., 2005; Golan & Crow, 2004; Golan, Weizman, Apter & Fainaru, 1998). But only a limited number of programs have been conducted which combine school and family (Warren, Henry, Lightowler, Bradshaw, & Perwaiz, 2003). A relatively new program called the Smart Bodies Program is providing an opportunity to study the influence of both school and home environment (parental involvement) around the child and how these factors might be important for the success of intervention programs (<http://www.smartbodies.org>).

Objectives

1. Increase parental awareness of their child's weight status by sending a gender specific Body Mass Index-for-age percentile health report.
2. Increase parental willingness to help their child to be at a healthy weight, eat more fruits and vegetables, and be more physically active.
3. Elicit the barriers expressed by parents to serving more fruits and vegetables to their child, encouraging their child to be more physically active, and limiting their child's sedentary lifestyle (television/videogames).
4. Test the hypothesis that parents who receive a Body Mass Index (BMI) health report will be more aware of their child's weight status and will express more interest in helping their child achieve and maintain a healthy weight, compared to the parents who receive no such report.

Hypothesis

The parents who receive a BMI-for-age percentile health report will perceive their child's weight status more accurately and express higher concern compared to parents who receive no such report.

The parents who receive a BMI-for-age percentile report will report increased willingness to discuss their child's weight with his/her healthcare provider, ask their child's school nurse or PE teacher about ways to help him/her be at a healthy weight, serve their child more fruits and vegetables, encourage their child to be more physically active (playing outdoor games/ sports) and limit their child's time watching television or playing videogames.

The parents of at risk or overweight children who receive the BMI health report will express more accurate perception and concern about their child's weight status and will express higher willingness to help their child be at a healthy weight.

Limitations

The results of the present study are applicable to the parents of children enrolled in low income public elementary schools in Southern states but cannot be generalized to the parents of children of other ages, racial/ethnic groups, socio-economic groups or parts of the United States. The participants were primarily Black parents of 4th-grade children attending public elementary schools, where more than 50% of the students were eligible to receive free or reduced price lunches. The self-reported data is limited by the truthfulness of the parent response to the questionnaire.

Definitions

Body Mass Index: An anthropometric measure defined as one's weight in kilograms divided by the square of one's height in meters (CDC, 2005d).

BMI-for-age percentile: In children and teens, BMI is used to assess the status of being underweight, 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 (CDC, 2005d).

BMI-for-age percentile categories (CDC, 2005d):

Overweight: A BMI-for-age greater than or equal to the 95th percentile.

At risk of overweight: A BMI-for-age greater than or equal to the 85th percentile to less than the 95th percentile.

Normal weight: A BMI-for-age greater than or equal to the 5th percentiles to less than the 85th percentile.

Underweight: A BMI-for-age less than the 5th percentile.

Social Cognitive Theory (SCT): The SCT defines human behavior as a triadic, dynamic, and reciprocal interaction of personal factors, behavior, and the environment (Bandura, 1997). The SCT explains how people acquire and maintain certain behavioral patterns, while also providing the basis for intervention strategies (Bandura, 1997).

Environment: Environment refers to the external factors that can affect a person's behavior.

There are social and physical environments. The social environment includes family members, friends and colleagues while the physical environment refers to such variables as living space and availability of certain foods (Parraga, 1990).

Assumptions

1. The participants (parents) who receive the BMI report were able to read and understand the information provided in the BMI report.
2. The participants understood the questions asked.
3. The participants were truthful in their responses.

CHAPTER 2

LITERATURE REVIEW

Introduction

The prevalence of overweight in children is increasing at a rapid rate in the United States (US) and in Louisiana. The prevalence among children and adolescents has doubled in the past two decades in the US (Ogden, Flegdal, Carroll, & Johnson, 2002). Overweight is associated with morbid medical conditions including diabetes, hypertension and heart disease (Veugeliers & Fitzgerald, 2005). Overweight also results in psychological problems such as depression and negative self-image, both of which reduce one's quality of life (Must, 1996). The literature suggests that behavior modification methods might be useful for treating obese children (Albu, et al. 1997; Epstein, McCurley, Wing & Valoski, 1990; Epstein, Valoski & Wing, 1990; Golan & Crow, 2004).

Research studies beginning in 1990 suggest that parents are key players in family intervention programs and that their attitudes towards child weight status and recognition of their child's weight are crucial for the programs to be successful (Epstein et al. 1985; Fisher, Mitchell, Smiciklas-Wright & Birch, 2002; Johnson & Birch, 1994; Robinson, 1999). Studies based on behavior change models such as the Social Cognitive Theory suggest that parents may play an important role by influencing the social and physical environment around the child and in providing support to learning healthy habits (Golan et al., 2001; Wind, Bobelijn, De Bourdeaudhuij, Klepp & Brug, 2005). It is proposed that sending a BMI health report card to parents will be an effective approach to inform them about their child's weight status and will motivate them to help their child achieve a healthy weight (Chomitz, Collins, Kim, Kramer, & McGowan, 2003).

Literature Review

Overweight among children is a serious public health problem that has reached epidemic proportions (Rhee et al., 2005). Between 1970 and 2004 the prevalence of overweight children increased from 4% to 17.1% (Ogden et al., 2006). According to the Centers for Disease Control & Prevention (CDC) statistics, 13.9% of children who are between two and five years of age and 18.8% of children 6-11 years of age are overweight (CDC, 2005d).

Overweight in children has both immediate and long-term physical and psychosocial effects. Moderate to severe overweight can promote hyperlipidemia, early onset of puberty, obstructive sleep apnea, pancreatitis, gall bladder disease, noninsulin-dependent diabetes, hypertension, coronary artery diseases and polycystic ovary syndrome (Webber, Wattigney, Srinivasan & Berenson, 1995; Ogden et al., 2002). For overweight children, the risk is ten times greater for hypertension in young adulthood, three to eight times greater for dyslipidemias, and more than two times greater for diabetes mellitus than that of normal weight children (Must & Strauss, 1999). Overweight elementary school children have been found to have lower self-esteem, more depression and a greater incidence of a negative-self image than normal weight children. Overweight children are also targets of systematic discrimination at an early age (Pierce & Wardle, 1993). The relative risk of an overweight child becoming an obese adult is six to seven times greater than that of normal weight children (Veugelers & Fitzgerald, 2005).

Research has proposed that family and parental dynamics are strong environmental determinants for overweight in children (Alaimo, Olson, & Frongillo, 2001). Other factors include lack of physical activity and lack of consistent access to healthful food choices, particularly fruits and vegetables (Alaimo et al., 2001). In addition, low cognitive stimulation of healthy habits in the home, low socio-economic status and maternal obesity are predictors of

overweight in children (Strauss & Knight, 1999). Several studies have examined the relationship between low consumption of fruits and vegetables and overweight in children (Epstein et al., 2001; Sahota et al., 2001). Sahota and colleagues (2001) suggested that a higher intake of fruit and vegetable is significantly associated with a lower risk of overweight in children. Epstein and colleagues (2001) proposed that there is a negative relationship between children's BMI and their fruit and vegetable intake. Research also suggests that high fruit and vegetable intake can reduce the risk of developing diabetes, cardiovascular diseases and some types of cancers (Epstein et al., 2001; Sahota et al., 2001). Even though the potential benefits of consuming fruits and vegetables have been suggested, it has been reported that a major percentage of the American population does not meet their daily requirement for this food category (CDC, 2004). The recent Youth Risk Behavior Survey data for high school children indicated that only 29.1% of students were consuming fruits and vegetable more than or equal to 5 times in a day and only 14.9% were participating in sufficient moderate physical activity (Youth Risk Behavior Surveillance- United States, 2003).

Increased sedentary leisure lifestyle with the wide availability of entertainment like television, videos, and computer games combined with a decrease in the frequency and duration of physical activities for children due to urbanization might play an important role in developing overweight in children (Berkey, Rockett, & Field, 2000). National survey data indicates that only 64.6% of US children 8 to 16 years of age reported three or more bouts of vigorous physical activity per week, and more than 38.3% watch more than three hours of television per day (Anderson, Crespo, Bartlett, Cheskin, & Pratt, 1998). Several cross-sectional studies have found a significant correlation between overweight prevalence and television viewing in children (Gortmaker et al., 1996; Dowda, Ainsworth, Addy, Saunders & Ringer, 2001; Lowry, Wechsler, Galuska, Fulton & Kann, 2002). Anderson and colleagues (1998) proposed that children who

watched four or more hours of television per day had significantly greater BMI, compared with those watching fewer than two hours per day. In 12 to 18-year-old children, the prevalence of overweight increased 2% for every additional hour of television watching per day. Crespo and colleagues (2001) also found a positive association between television watching time and the prevalence of overweight in 8 to 16-year-old youth even after controlling for age, race/ethnicity, family income, weekly physical activity, and energy intake.

A series of studies in behavioral psychology based on interpersonal theories such as the Social Cognitive Theory have suggested that health behavior in individuals is influenced by the environment around them (National Cancer Institute [NCI], 2005). Several research studies based upon the Social Cognitive Theory also suggest that a child's eating patterns are strongly influenced by characteristics of both the physical and social environment (Strauss et al., 1999; Patrick & Nicklas, 2005; Wind et al., 2005). The physical environment involves accessibility of food, mealtime structure, and sources of food; the social environment includes parents, friends, colleagues, healthcare professionals and other socioeconomic and socio-cultural factors such as parents' education, parental support and ethnicity influence (Patrick & Nicklas, 2005; Wind et al., 2005).

Several studies have suggested that family-based interventions might be useful in the prevention of overweight in children (Epstein, McCurley, Wing & Valoski, 1990; Epstein, Valoski & Wing, 1990; Nader, 1993; Golan, Fainaru et al., 1998). Parental involvement may play an important role in the prevention of overweight in children, because home is the first place where the child acquires health habits (Epstein, McCurley et al., 1990; Epstein, Valoski et al., 1990; Nader, 1993; Robinson, 1999). Parents and adult caregivers serve as role models and exert a powerful influence on young children's eating habits and activities (Robinson, 1999).

Parents might influence their children's eating patterns through the foods that they make available to children and with their child-feeding strategies (Robinson, 1999).

Several research studies have suggested that a child's fruit and vegetable consumption is strongly influenced by the availability and accessibility of fruits and vegetables in the home (Wind et al., 2005). It has been proposed that parents serve as an example for their children and that children were more likely to eat the foods that the parents usually eat (Johnson & Birch, 1994). Fisher and colleagues (2002) found that the parents who consumed more fruits and vegetables had daughters who consumed more fruits and vegetables. Patrick and colleagues (2005) also proposed that nutrition education interventions to increase fruits and vegetables consumption can be aimed at affecting psychosocial factors such as self-efficacy, awareness/knowledge of the healthy eating and family and social support.

Parental Involvement in the Preventive Programs of Overweight in Children

Several research studies from the past 20 years have suggested that parental involvement might play an important role in childhood overweight prevention programs (Golan, Fainaru et al., 1998; Golan & Weizman, 2001; Etelson, Brand, Patrick & Shirali, 2003; Patrick & Nicklas, 2005). A family based approach using parents as one of the agents of change might be a critical step in preventing overweight in children (Golan & Weizman, 2001). This approach includes a strong emphasis on providing an environment around the child that encourages healthy practices related to weight control (Golan & Weizman, 2001).

A series of studies in the early 1990s conducted by Epstein and colleagues (1985) suggested that family interventions including parental support and establishing a healthy home environment are important determinants in the treatment of overweight in children for short-term and long-term results (5-10 year follow-up). A health-centered study of overweight Israeli children aged 6 to 11 years in which parents were targeted as the primary mediators of change, showed greater weight loss, increased

behavior changes, and better retention of achievement rates in weight reduction than when only the children were targeted (Golan, Fainaru et al., 1998). The mean reduction in percent overweight was greater at all follow-up points in the children from the parent-involved group compared with those in the children-only group. Seven years after the program ended, the mean reduction in children's overweight status was greater in the parent-involved group (29%) compared to the children-only group (20%) (Golan, Fainaru et al., 1998). Similar results were reported by Golan and colleagues (1998) in a study of 60 overweight children ages 6–11 years who were followed for one year. Seventy-nine percent of the children lost more than 10% of their excess weight and 35% reached non-obese status in the parent-targeted group, in contrast with the children-only group in which only 38% lost more than 10% of their excess weight and only 14% reached non-obese status (Golan, Weizman et al., 1998).

Parental Perception of Their Child's Weight

Participation in intervention programs that use a family based approach might be dependent on the parents' ability to recognize that their child is overweight. Such information might help them to understand that being overweight puts their child at risk for short-term and long-term health problems. It might encourage them to provide healthy and balanced meals and to help their child be more physically active. Only a few studies have addressed the extent to which parents are able to recognize that their children are overweight (Baughcum et al., 2000; Etelson et al., 2003; Maynard, Galuska, Blanck & Serdula, 2003; Carnell, Edwards, Crocker, Boniface & Wardle, 2005; Rhee et al., 2005; Campbell, Williams, Hampton & Wake, 2006). These studies reported that more than 50% of parents failed to identify their children as being overweight (Baughcum et al., 2000; Etelson et al., 2003; Rhee et al., 2005; Wind et al., 2005). Etelson and colleagues (2003) reported that parents of overweight children systematically underestimate their children's weight. They examined the parental attitudes about excess weight in childhood, knowledge about healthy eating habits, and perception about their child's weight using a self-administered questionnaire given to parents of four to eight years old

children in a well-care center (Etelson et al., 2003). The results indicated that parents' level of concern about their child's excess weight was similar to their level of concern about a history of sunburns or prolonged television watching (Etelson et al., 2003). In the Etelson and colleagues (2003) study, only 48% of the parents perceived their child's weight accurately. The parents of overweight children exhibited the lowest accuracy (10.5%) and the parents of normal weight children exhibited the highest (72.2%).

A study conducted with 5,500 mothers of children aged 2 to 11 years from the third National Health and Nutrition Examination Survey indicated that one-third of mothers failed to correctly classify their overweight child as being overweight (Maynard et al., 2003). This failure of mothers to recognize the overweight status of their child might reflect a reluctance to admit that their child is overweight or a lack of understanding of what overweight means (Maynard et al., 2003). In addition, 32.1% of the mothers of an overweight child classified their child as at "about the right weight." Moreover, a higher percentage of the mothers perceived their daughters as being overweight (29%) as compared to their sons (14.0%) (Maynard et al., 2003). Similar low parent perception rates were observed in a study conducted in the United Kingdom (Warren, Henry, Lightowler, Bradshaw & Perwaiz, 2003). Recent studies conducted in Australia also supported these low perception and low concern among parents in pre school age overweight children (Carnell, Edwards, Crocker, Boniface & Wardle, 2005; Campbell, Williams, Hampton & Wake, 2006). Carnell and colleagues reported that only 1.9% of parents with overweight children and 17.1% of those with obese children described their child as overweight/obese. Campbell and colleagues reported that 71% of parents of overweight children perceived that their child to be of similar weight to their healthy weight peers and only 5% of mothers were concerned about their child's overweight status (Campbell, Williams, Hampton & Wake, 2006).

The child's age, parental beliefs about the child's weight as a health problem, parents' education and their perception of their own weight are factors associated with the parents' readiness to make lifestyle changes (Rhee et al., 2005). Research implies that mothers with a low level of education were less likely to perceive their overweight child as being overweight (11%) compared with mothers who had achieved higher educational levels (33%) (Baughcum et al., 2000). In addition, the literature suggests that many parents realized their child's weight is a health problem only after the physician or health care provider made a comment (Rhee et al., 2005).

A school generated BMI health report approach might be an effective way to inform parents about their child's weight status and to reinforce information provided by the child's health care provider. A pilot study conducted by Chomitz and colleagues (2003) indicated that the parents who received a BMI health report and intervention material were more aware of their child's weight status. The intervention material included tips and resources for healthy living and managing overweight. In addition parents who received the report stated that they planned to seek medical help and to work on a plan to improve their diet and physical activity habits (Chomitz et al., 2003). Another study conducted in Arkansas also suggested that parents of overweight children who received a BMI health report from the school were more aware of their child's weight status (University of Arkansas, 2006). Parents who recognize that their child is overweight might be more likely to support appropriate behavior modifications to prevent further weight gain and reduce health risks associated with overweight in children.

Summary

Overweight in children has become a serious health hazard and has been increasing in the United States since 1980. Untreated overweight in children leads to severe medical and psychological problems. Recent research studies indicate that increased physical inactivity and decreased intake of fruits and vegetable might contribute to the development of overweight in children. Beginning in 1990,

a series of studies have suggested that family based treatment programs might be very useful in achieving both short and long-term results. Moreover, parents might play an important role by changing the home environment and helping their children adopt a healthy lifestyle. In addition to the parents' involvement, their recognition of their child's weight status might be essential for successful treatment programs. The BMI health report is proposed to be an effective tool to increase parental awareness of their child's weight status and to motivate them to help their children achieve a healthy weight.

CHAPTER 3

METHODS

The present study was conducted as a part of larger multi-component program called Smart Bodies, which is an interpersonal behavioral change intervention program based upon the Social Cognitive Theory. The purpose of the present study was to examine the impact of receiving a Body Mass Index-for-age gender specific percentile health report about their child on parent awareness of their child's weight status and on parental willingness to help their child to be at a healthy weight, eat more fruits and vegetables, and be more physically active. In addition, the limiting factors expressed by parents to serve more fruits and vegetables to their child, encourage their child to be more physically active, and limit their child sedentary lifestyle (television/videogames) were also examined. The program was approved by the Louisiana State University (LSU) and Louisiana State University Agricultural Center (LSU AgCenter) Institutional Review Board.

Design

The design for the present study was a randomized posttest-only control group design. Public elementary schools in East Baton Rouge Parish, Louisiana were invited to participate. Schools selected for the program were stratified based on Louisiana Educational Assessment Program (LEAP) scores and the percentage of children receiving free and reduced-price school lunch, and randomly assigned to the intervention (I) schools or the control (C) schools. An informed consent (Appendices A & B) and a cover letter were sent to the parents of children at the beginning of the study. The children who returned the consent forms and who gave assent to participate were included in the study. Parents who did not speak English as their primary language were excluded from the study.

Participants

A power analysis was conducted and it was estimated that to detect a difference between two populations χ^2 with a large effect size, 1 *df* and $\alpha = 0.05$ this study required $n=26$ in each group (Cohen,

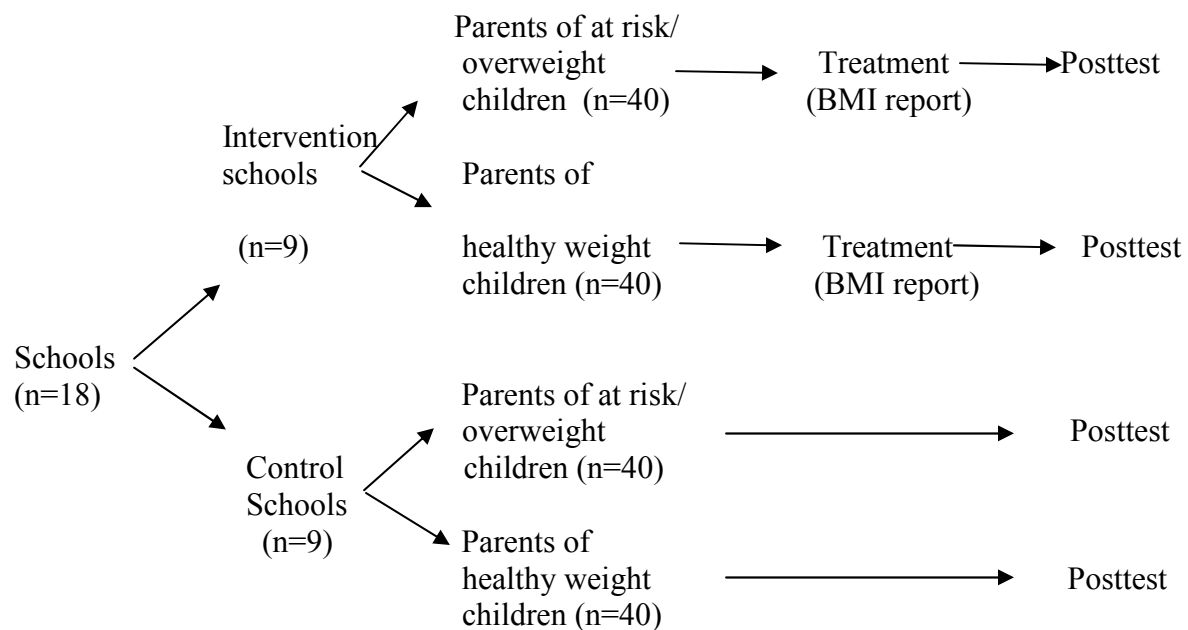


Figure 1. Study Design

1992). Participants were the parents of 4th-grade children in the 18 elementary schools participating in the Smart Bodies Research Program.

Procedure

The heights and weights of 4th grade children in both the Intervention and Control schools were measured. Standing height was measured without shoes and using a portable stadiometer (Shorr Prod. Olney, MD.) and bodyweight was obtained with a digital scale (Seca 880, Seca Co. Hanover, MD). The digital scale was calibrated prior to each measurement session using two g standard weights (5kg=11lbs). The children's heights in inches and weights in pounds were entered into a software program which calculated each child's BMI percentile and generated a BMI report (Student BMI Health Report, Louisiana State University, Baton Rouge, LA). The BMI reports were mailed by the United States mail to parents of children attending the Intervention schools, but parents of children attending Control schools did not receive these reports. The children in the Intervention and the Control schools were divided into two groups

based on their BMI percentile values, 1) Healthy Weight (HW) (BMI <85th percentile) and 2) At risk/ Overweight (AR/OW) (BMI ≥ 85th percentile). Parents of forty children from each group [Intervention Healthy Weight (I-HW), Intervention At risk/Overweight (I-AR/OW), Control Healthy Weight (CHW), and Control At risk/Overweight (C-AR/OW)] were randomly selected to participate in the parent survey.

Parents of healthy weight and at risk or overweight children in the Intervention group (40, 40) received a BMI-for-age percentile health report (Appendix C) along with a thank you note (Appendix D) and a short questionnaire (Appendix E). Parents of healthy weight and at risk or overweight children in Control schools (40, 40) received only the thank you note (Appendix D) and questionnaire (Appendix E). The questionnaire assessed parental awareness of their child's weight status, parent concern about their child's weight and their willingness to help the child eat more fruits and vegetables and to be more physically active. The child's school code, sex and the BMI percentile were written on the questionnaires for tracking purposes. The data were collected over a period of 45 days, and the parents were requested to return the questionnaire to research team within three weeks of postmark date. The return postage for questionnaires was paid by the Smart Bodies Research program. Parents who didn't return the questionnaire within three weeks were contacted by telephone and reminded to complete the questionnaire and receive the incentives by a member of the research team, a school secretary or the school nurse. The parents were provided duplicate information if requested. The parents who returned the questionnaire were given a gift pack worth \$10 including one Smart Bodies calculator, one note pad, one measuring spoon set, and two pot holders.

Statistical Analysis

The data were assessed using the Statistical Analysis Software (SAS, Version 9.1.3; Cary, NC, 2003). Weight categories "at risk of overweight and overweight" (BMI ≥ 85th %) and

“underweight and healthy weight” (BMI < 85th %) were combined for analysis. Descriptive statistics were used to describe the parents’ level of education, age, gender and ethnic background. Differences between the groups and weight categories were examined using Chi-square analysis. The Fisher’s exact test was used where the expected cell count was less than 5 in more than 20% of cells. The questions about parental perception of their child’s weight status, parent concern about their child’s weight, and parental perceptions about their child meeting the daily requirements for fruits and vegetable intake, physical activity and limiting hours of watching TV were scored as a dichotomous variable (yes or no). Binomial logistic regression was used to determine the parental perception and concern of their child’s weight status.

To avoid making an experimental wide error, the questions assessing parent willingness were divided into two categories: parent willingness to 1) Share the information with their child’s healthcare team and 2) Help the child follow healthy habits including serving more fruits and vegetables, encouraging playing outdoor games or sports, and limiting television/videogames. Responses for these questions were reported with a 5-point Likert scale and scored as follow: 1-Not at all willing, 2-Not willing, 3-No opinion, 4-Willing, and 5-Very willing. The mean scores of the responses in each category were taken for analysis. A logistic regression model was used to evaluate the parental willingness to help their child. The level of significance was set at $p < 0.05$.

In the elicitation study, parent responses to three open ended questions were organized into frequent response themes for each question. These response themes from parents in each of the four groups (I-HW, I-AR/OW, C-HW & I-AR/OW) were combined and reported as one total group of participants.

CHAPTER 4

RESULTS

Eighty-five of 149 completed surveys were returned (57%). Eleven surveys were not received and were returned due to insufficient addresses. The response rate was greater for the Control (C) schools parents (70%) as compared to the Intervention (I) school parents (44%). The lowest response rate was observed in the I-AR/OW (n= 15) as compared to the I-HW group (n=18), C-AROW (n=25) and C-HW (n=27). There was no difference in response rate between parents of at risk or overweight and healthy weight children in the I and C schools. In addition there was no difference in gender of the children between I and C schools ($p= 0.49$). Nearly 53% (n=45) of parents of male children were responded. To avoid empty cells, the level of education was divided into lower than or equal to high school and higher than high school education; age was summed into two categories lower than/equal to 30 years or higher than 30 years and ethnicity was divided into Black and Non-Black. The majority of responders were Black (n=70, 83%), followed by White (n=12, 4.1%), Hispanic (n=2, 2%), and Others (n=1, 1%). Women (n=79, 93%) completed the surveys more frequently than men, most parents were over 30 years of age (n=72, 85%), and most had completed at least a high school education (n=83, 98%). Due to the unequal representation of ethnicity between groups (Intervention group= 32 Black and 1 White; Control group= 38 Black, 11 White, 2 Hispanic and 1 Others) and the fact that the majority of participants were Black (n=70, 83%), the total group and a sub-group of only Black participants were analyzed separately.

Analysis of Total Group

Comparison of Intervention and Control Groups of the Total Group (n=85)

Between parents of children in the I and C groups, no differences were found in parent level of education ($p= 0.64$), age ($p= 0.55$) or gender ($p=0.67$), but there was a significant

difference in racial/ethnic background ($p=0.00$) (Table 1). In addition there were no differences in the children's mean BMI percentiles between the I group (BMI percentile 68.7) and C group (BMI percentile 65.9) ($p=0.69$). The control group had two underweight children with BMI percentiles 3.88 and 1.75 respectively.

Table 1 Characteristics of all parents in the Intervention ($n=33$) and Control groups ($n=52$)

Variable	Intervention group ($n=33$)	Control group ($n=52$)
Level of education	15	21
≤ High school	18	31
> High school		
Age		
≤ 30 years	6	7
> 30 years	27	45
Gender		
Male	3	3
Female	30	49
Ethnicity*		
Black	32	38
Non Black	1	14

* Ethnic representation was not equal across the groups ($p<0.01$)

For the question about parent's perception of their child's weight status, parents were asked "How would you describe your child's weight" and the following options were given: a) Underweight, b) At about the right weight (normal weight), c) A little overweight (at risk for overweight) or d) Overweight. Parent responses were graded as a correct or incorrect perception of their child's weight status based on the child's BMI percentile values. As shown in Table 2, accurate perception of their child's weight status was more than four times greater in the I group parents as compared to the C group parents. In addition, there was no difference in parent perception of accurate weight for their child in relation to child's gender ($p=0.95$). Parent responses to questions concerning their child's weight and perceptions that their child was meeting the daily recommendations for fruit and vegetable intake, participating in physical

activity and limiting time watching television or playing videogames were reported as binary responses (yes/no). There was no difference in parent concern about their child's weight status between the two groups. Parent responses of only at risk or overweight children in the I & C groups were examined. Parents of children in the I-AR/OW group reported a more accurate perception of their child's weight status [Odds Ratio (OR): 4.7; 95% Confidence Interval (CI): 1.2-18.9] and a high concern about their child's weight (OR: 8.2; 95% CI: 1.5-44.6) when compared to the C-AR/OW group parents.

No differences were observed between I & C groups in the parent's perceptions that their child was meeting the daily recommendations for fruits and vegetables and participating in at least 60 minutes of moderate physical activity. Differences between the I & C group parents in perception that their child was watching television or playing video games for less than two hours in a day approached significance. It appeared that a greater number of C group children watched television or played videogames for less than two hours in a day compared to the I group children. Parents of at risk or overweight children in the I and C groups had similar responses. There were no differences in parent perception that their child was meeting daily recommendations for fruit and vegetable intake ($p=0.39$) and participating in a minimum of 60 minutes of moderate physical activity ($p=0.57$), but it appeared that the intervention group children watched more than two hours of television or played videogames ($p=0.03$) compared to the control group children.

Parent responses to questions regarding their willingness to help their child were recorded on a 5-point Likert scale. To avoid repeated experimental-wide error, these five questions were divided into two categories; 1) Willingness to share the child's information with his/her health team [includes: a) Discuss your child's weight with his/her health care provider and b) Ask your child's school nurse, or PE teacher about ways to help him/her be at a healthy

weight] and 2) Willingness to help their child follow healthy habits [includes: a) Serve your child more fruits and vegetables, b) Encourage your child to more be physically active (playing outdoor games/ sports), c) Limit your child's time watching television or playing videogames].

The mean scores of the questions in each of these two categories were used for analysis.

For the "Willingness to share the child's information with his/her health team" category most parents indicated that they were Willing (n=36) or Very willing (n=42). Only a few parents had no opinion (n=5) or were not willing (n=1). For the "healthy habits" category, all parents reported that they were Willing (n=33) or Very willing (n=51) to help their child. To avoid quasi-complete separation of the data, the responses for both categories were coded as 1) Very willing if the mean score was 5 and 2) Willing if the score was less than 5. As shown in Table 2, there was no difference in parents' willingness to share their child's weight information with the health team or to help their child follow healthy habits between the I and C groups. Similar findings were observed in the responses of parents of at risk or overweight children.

Comparison of At Risk/Overweight and Healthy Weight Categories of the Total Group (n=85)

The total group of parents was divided into two groups based on their child's, BMI percentile values, and included an At risk/Overweight (AR/OW) group (BMI percentile \geq 85th %) and a Healthy Weight (HW) group (BMI percentile $<$ 85th %). As shown in Table 3, between children categorized into the AR/OW and the HW groups there were no differences in the parent's level of education (p=0.64), age (p=0.94), gender (p=0.31) or ethnic background (p=0.26).

When asked about their child's weight status, parents in the AR/OW group were more than five times less likely to perceive the correct weight category of their child when compared to HW group parents (Table 4). There was a slightly lower concern about the child's weight

Table 2 Odds ratios and confidence intervals for logistic regression analysis of all parents in the Intervention and Control groups (n=84)

Variable	OR	95% CI	P
Parent awareness and concern			
Parents' accurate perception of their child's weight status	4.70	0.89 – 24.86	0.00
Parents' concern about their child's weight status *	0.48	0.13 – 1.73	0.20
Parent perceptions that their child is meeting the daily recommendations for:			
Fruit and vegetable intake	2.37	0.68 – 8.20	0.78
Physical activity	1.00	0.14 – 6.67	0.72
Limited television/videogames	1.34	0.40 – 4.45	0.06
Parent Willingness			
Parental willingness to share the child's weight status information with his/her health team	1.17	0.33 – 3.48	0.88
Parental willingness to help their child to follow the healthy habits	0.91	0.23 – 5.86	0.69

The Intervention group was compared to the Control group

*Group and weight status interaction was significant ($p < 0.01$)

status among parents of AR/OW compared to parents of HW group (OR 0.98, $p=0.00$). No differences were found between AR/OW and HW group parents in their perceptions that their child was meeting the daily recommendations for fruit and vegetable intake and participating in physical activity or that their child was limited in the time he/she could spend watching television or playing videogames (Table 4). When parent willingness to help their child was examined, parents in both groups reported the same level of willingness to share their child's weight information with his/her healthcare team (Table 4). In case of parent willingness to help their child follow healthy habits, the AR/OW group parents were four times less likely to help their child when compared to the HW group parents.

Table 3 Characteristics of all parents with children in the At risk/Overweight (n=40) and Healthy weight groups (n=45)

Variable	At risk/Overweight (n=40)	Healthy weight (n=45)
Level of education		
≤ High school	18	18
> High school	22	27
Age		
≤ 30 years	6	7
> 30 years	34	38
Gender		
Male	4	2
Female	36	43
Ethnicity		
Black	31	39
Non-Black	9	6

Interaction between Group and Weight

Parents of at risk or overweight children and parents of healthy weight children responded with different concern after receiving the BMI health report. Parent concern was greater among the I-AR/OW children and was lower for parents of the I-HW children ($p= 0.00$) (see Figure 2). It appeared that after receiving the BMI health report, more AR/OW parents became concerned and fewer HW group parents were anxious about their child's weight status

Analysis of Black-only Group

Comparison of Intervention and Control Groups of the Black-only Group (n=70)

The results of analyses of the Black-only group appeared similar to that of the total group. When only the Black participants were included in a separate analysis of the Intervention Black-only (I-B) group as compared to the Control Black-only (C-B) group, there was no difference in level of education of the parents ($p= 0.96$), age of the parents ($p= 0.97$) or gender of the parents ($p=0.32$) (see Table 5). In addition there were no differences in the children's mean

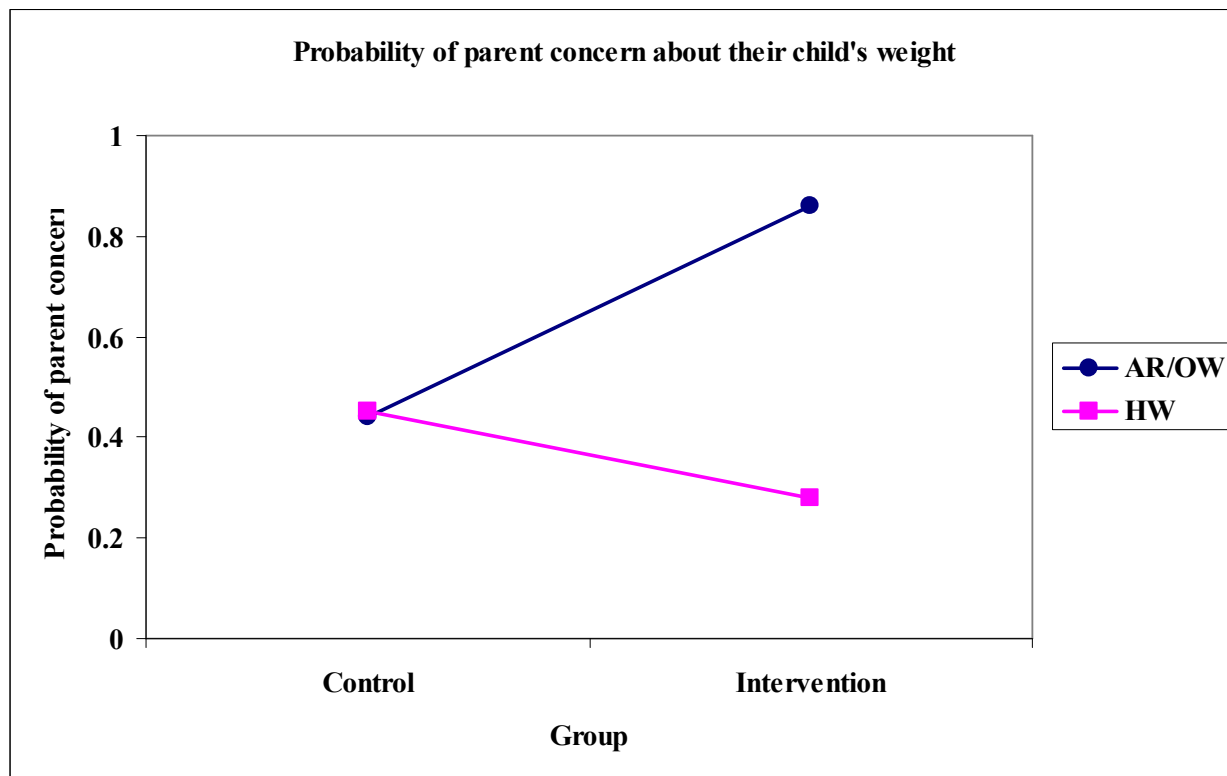
BMI percentiles between the I-B group (BMI percentile 68.7) and C-B group (BMI percentile 66.7) ($p=0.68$).

Table 4 Odds ratios and confidence intervals for binomial logistic regression analysis of all parents of children in the At risk/Overweight and Healthy Weight groups ($n=84$).

Variable	OR	95% CI	P
Parent awareness and concern			
Parents' accurate perception of their child's weight status	0.18	0.05 – 0.62	0.00
Parents' concern about their child's weight status*	0.98	0.32 – 2.93	0.00
Parent perceptions that their child is meeting the daily recommendations for:			
Fruit and vegetable intake	1.58	0.50 – 5.00	0.56
Physical activity	0.32	0.07 – 1.41	0.14
Limited television/ Videogames	0.50	0.16 – 1.56	0.82
Parent Willingness			
Parental willingness to share the child's weight status information with his/her health team	0.69	0.22 – 2.12	0.31
Parental willingness to help their child to follow the healthy habits	0.25	0.07 – 0.81	0.02

The at risk/overweight group was compared to the healthy weight group

* Group and weight status interaction was significant ($p < 0.01$)



Note. AR/OW= At risk/Overweight; HW= Healthy Weight

Figure 2. Parent concern about their child's weight in Intervention and Control groups of the total group

Table 5 Characteristics of the Black parents in the Intervention (n=32) and Control groups (n=38)

Variable	Intervention group (n= 32)	Control group (n=38)
Level of education		
≤ High school	15	18
> High school	17	20
Age		
≤ 30 years	6	7
> 30 years	27	31
Gender		
Male	3	1
Female	29	37

The results suggested that parents in the I-B and the C-B perceived their child's weight status differently. Parents in the I-B group were four times more accurate in perceiving their child's weight status compared to the C-B group parents (Table 6). There was no difference in parent perception in relation to child's gender ($p=0.72$). At the same time, parents in both groups responded similarly to the question "Are you concerned about your child's weight?" No differences were observed in the parents' perceptions about their child meeting the daily recommendations for fruits and vegetables ($p=0.80$), participating in at least 60 minutes of moderate physical activity per day ($p=0.50$) and limiting hours (<2 hours/day) of watching television or playing videogames ($p=0.37$) between I-B and C-B parents. Moreover parents in both groups expressed the same level of willingness to share their child's weight information with his/her health team or to help their child follow healthy habits.

When at risk or overweight children in the I-B and C-B groups were compared, parents of at risk or overweight children in the I-B group parents reported a more accurate perception of their child's weight status (OR: 6.2; 95% CI: 1.2-31.9) and a higher concern about their child's weight (OR 8.5; 95% CI: 1.4-50.8) than did the parents of healthy weight children in C-B group. There were no differences in parent perception of fruit and vegetable intake ($p=0.14$), time spent

Table 6 Odds ratios and confidence intervals for logistic regression analysis of Intervention Black-only and Control Black-only group parent responses about their child's weight status (n=70)

Variable	OR	95% CI	P
Parent awareness and concern			
Parents' accurate perception of their child's weight status	4.00	0.71 – 22.48	0.00
Parents' concern about their child's weight status*	0.35	0.09 – 1.33	0.33
Parent perceptions that their child is Meeting the daily recommendations for:			
Fruit and vegetable intake	2.50	0.66 – 9.38	0.80
Physical activity	1.33	0.19 – 9.01	0.50
Limited television/videogames	0.93	0.26 – 3.33	0.37
Parent Willingness			
Parental willingness to share the child's weight status information with his/her health team	1.13	0.32 – 4.02	0.79
Parental willingness to help their child to follow the healthy habits	0.81	0.19 – 3.42	0.67

The Intervention Black-only group was compared to the Control Black-only group

* Group and weight status interaction was significant ($p < 0.01$)

in physical activity ($p=0.52$), or number of hours watching television or playing videogames ($p=0.20$) between the two groups. Also there was no difference in parent willingness to share the child's weight information with the health team ($p=0.87$) or help their child follow healthy habits ($p=0.81$) between the I-B and C-B group parents.

Comparison of At Risk/Overweight and Healthy Weight Categories of the Black-only Group (n=70)

The characteristics of parent in the At risk/Overweight Black-only (AR/OW-B) and Healthy Weight Black-only (HW-B) groups are shown in Table 7. There were no differences in the level of education ($p=0.50$) or age ($p=0.88$), but there was a significant difference in gender of the parents ($p=0.02$) who completed the survey.

Table 7 Characteristics of the Black parents with children in the At risk/Overweight (31) and Healthy weight groups (n=39)

Variable	At risk/Overweight (n=31)	Healthy weight (n=39)
Level of education		
≤ High school	16	17
>High school	15	22
Age		
≤ 30 years	6	7
>30 years	25	32
Gender*		
Male	4	0
Female	27	39

* Gender of the parents was not equal across the groups ($p < 0.05$)

As shown in Table 8, Black parents with at risk or overweight children were ten times less likely to report an accurate weight status for their children compared to parents of healthy weight children. These parents of at risk or overweight children expressed almost a 30% lower concern about their child's weight status when compared to parents of healthy weight children. No differences were reported in the perceptions about their child meeting the daily recommendations for fruit and vegetable intake and physical activity or to limit hours of watching television or playing videogames between parents of at risk/ overweight and healthy weight children. In addition, there was no difference in the parents' willingness in sharing the child's weight information with his/her healthcare team. Whereas in the case of parent willingness to help their child develop healthy habits, the parents of AR/OW-B children were nearly five times less willing to help their child to follow healthy habits compared to HW-B group parents (Table 8).

Interaction between Group and Weight Status

Parents in the I-B and C-B responded differently to the question "Are you concerned about your child's weight" depending upon the weight status of their child. More parents in the Intervention AR/OW-B were concerned about their child's weight as compared to C group

Table 8 Odds ratios and confidence intervals for logistic regression analysis of parents of children in the At risk/Overweight Black-only and Healthy Weight Black-only groups (n=70)

Variable	OR	95% CI	P
Parent awareness and concern			
Parents' accurate perception of their child's weight status	0.10	0.02- 0.50	0.00
Parents' concern about their child's weight status*	0.63	0.17- 2.31	0.04
Parent perceptions that their child is meeting the daily recommendations for:			
Fruit and vegetable intake	2.22	0.58 – 8.51	0.80
Physical activity	0.54	0.10 – 2.84	0.50
Limited television/videogames	0.52	0.14 – 1.91	0.77
Parent Willingness			
Parental willingness to share the child's weight status information with his/her health team	0.80	0.22- 2.90	0.65
Parental willingness to help their child to follow the healthy habits	0.21	0.05 – 0.88	0.03

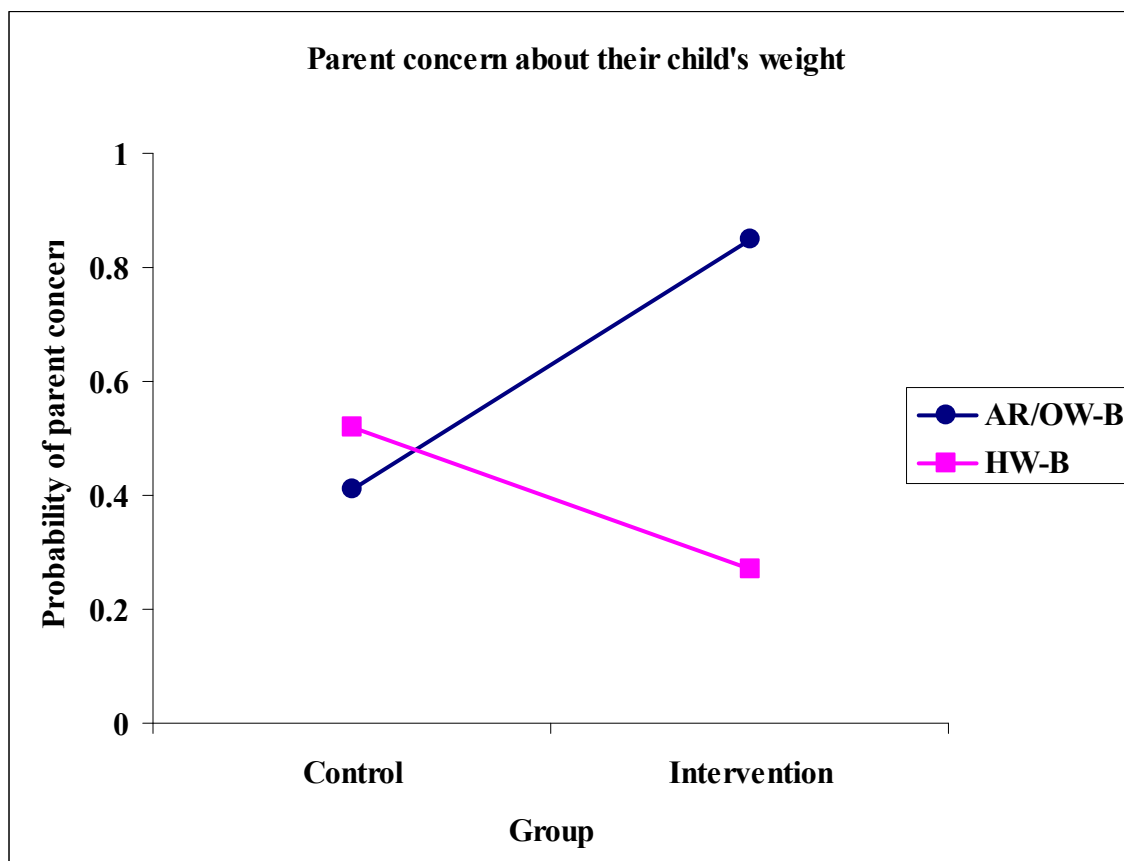
The parents of At risk/Overweight Black-only group were compared to Healthy Weight Black-only group parents

* Group and weight status interaction was significant ($p < 0.01$)

parents (Figure 3). At the same time, fewer parents of Intervention HW-B group children were concerned compared to Control AR/OW-B and Control HW-B group parents (Figure3).

Elicitation Study

The third objective of the present study was to elicit barriers expressed by parents to serving more fruits and vegetables to their child, to encouraging their child to be more physically active, and to limiting their child's sedentary lifestyle (television/videogames). Parents were asked to describe the things which limited their ability to help their child follow healthy habits. They were asked to record these barriers by responding to three open ended questions. One double-spaced line followed each statement and parents were encouraged to report multiple



Note. AR/OW-B= At risk/Overweight Black-only group; HW-B = Healthy Weight Black-only group

Figure 3. Parent concern about their child's weight in the intervention and control groups in the Black only Group

factors. The questions included: (a) Are there things that keep you from serving your child fruits and vegetables, (b) Are there things that keep you from helping your child spend time playing outdoor games/sports, (c) Are there things that keep you from helping your child watch less television and play fewer videogames. Using frequency counts, the most common barriers expressed by the parents were identified and reported. The barriers were analyzed to indicate consistency in classification by two raters and were placed from the most to the least accessible (Table 9).

For the question about barriers to serving more fruits and vegetables to their child, 82 parents responded. Nearly 80% (n=65) of the parents reported no barriers; the remaining 20%

(n=17) of parents mentioned that child food preferences, lack of time to plan/prepare meals which included fruits and vegetables, and lack of money were the limiting factors (Table 9). When asked about barriers to encouraging their child to be more physically active, 83 parents responded. Almost 73% (n=61) of parents reported no such barriers. Nearly 27% (n=22) of parents expressed that their working hours, children's school work schedule, and insecure neighborhood were the main barriers to encouraging their child to be more physically active. In addition, the majority of parents (77 out of 81) reported that they maintained strict control over the amount of time the child spent in watching television or playing videogames. The remaining parents (n=4) mentioned that a crowded home atmosphere, moving residences frequently, parent work hours, and the child's school work were the main barriers to limiting their child's time watching television or playing videogames.

Table 9 Barriers expressed by parents to help their follow healthy habits

Barriers expressed by the parents	Data themes	n	%
Serving fruits and vegetables to their children (n=17)	Kid's don't like them particularly vegetables	12	70.5
	Lack of time to plan/prepare meal	3	17.6
	Lack of money to purchase fruits and vegetables	2	11.7
Helping their children spend time playing outdoor games/sports (n=22)	Parent busy work and children school schedule	15	68.1
	Neighborhood safety	5	22.7
	Parents are not physically active	2	09.1
Limiting their child's time watching television or playing videogames (n=4)	Crowded home atmosphere	1	25
	Moving residences frequently	1	25
	Parent work hours	1	25
	Child's school work	1	25

CHAPTER 5

DISCUSSION

The project goal was to examine the impact of receiving a BMI-for-age percentile report on the parents of fourth grade children in public elementary schools in East Baton Rouge Parish, Louisiana. Parent awareness about their child's weight status was assessed as well as parent willingness to help their child maintain a healthy weight. The results of the investigation suggest that the BMI health report was an effective tool to increase parent awareness about their child's weight. Parents who received the BMI health report had greater awareness of their child's weight status. The results from the present study should be generalizable to other low socio-economic-status parents of children enrolled in public school in the southeastern United States.

The present study had a good return response rate for the survey (Instructional Assessment and Evaluation, 2006). Even though equal numbers of surveys were sent to each of the four groups, the parent response was different based on their child's weight status. The highest response rate was observed in the control healthy weight group (73%) followed by the control at risk/overweight (66%), the intervention healthy weight group (42.5%) and the intervention at risk/overweight group (40.5%). Past literature has suggested that potential problems from sending BMI report cards to parent by schools might be that parents will overreact and put their child on harmful diet programs and cause psychological harm by labeling the child based on his/her weight (Scheier, 2004a, 2004b). The fact that the lowest response was seen among parents of at risk or overweight children who received the report suggests that these parents may have received this report negatively. School nurses were provided a list all parents who received the report and did not responded for the survey. More over all parents in both Intervention and Control schools will receive the BMI health reports at the conclusion of research component of the Smart Bodies Program.

Parent Perceptions about Their Child's Weight Status

The evaluation of the BMI health report effectiveness showed that parents who received the report had greater awareness about their child weight status in both the total group (4.7 [0.89-24.86]) and in the Black-only group (4.0 [0.71-22.48]) compared to the control (C and C-B) groups. Results of the analyses of the I and C At risk/Overweight category in both total and Black-only groups also showed that parents who received the report were more likely to perceive the correct weight status for their child compared to control group parents. These results were similar to an earlier study conducted by Chomitz et al. (2003). They also reported that parents who received child weight information were more likely to correctly identify their child's weight status compared to parents who received no such information. A report published by the University of Arkansas, also supported that a BMI health report significantly improved the accuracy of parent assessment of their child's weight status (University of Arkansas, 2006).

When the analyses were stratified according to the child's weight and whether or not they received the BMI report, parents of at risk/overweight children were less likely to report their child's correct weight status compared to parents of healthy weight children. The chance of correctly perceiving their child's weight was nearly five times greater if the child was in the healthy weight category. These results were consistent in both the total group and the Black-only group. A possible explanation for these findings might be because the range of BMI percentile values for specific age and gender are wider in the healthy weight category (BMI < 85th percentile) when compared to those who are at risk for or overweight (BMI ≥ 85th percentile). Only 35% of parents of at risk or overweight children in the total group and 32% in the Black-only groups recognized that their child was at risk or overweight.

Rhee and colleagues (2005) suggested that reasons for poor awareness of their child's weight status among parents of overweight children might include denial, reluctance to accept, or

desensitization to excess weight because being overweight has become normal in the society. They also reported that sometimes parents were unwilling to label their children as overweight at a young age (Rhee et al., 2005). It has been suggested that some mothers believe that having a large child indicates that the child is healthy and that they are good parents (Baughcum et al., 2000). Moreover the majority of parents acknowledged overweight as a problem for their child only after the child's doctor made a comment about their child's weight (Baughcum et al., 2000). In addition, some parents consider their child to be overweight if he/she is inactive, lazy or being teased at school about their weight (Jain et al., 2006)

Parent Concern about Their Child's Weight Status

There was no difference in parent concern about their child's weight between I and C groups. However parent concern was influenced by the child's weight status in both the total group and the Black-only group. The data demonstrated that more parents of at risk/overweight children who received the report were concerned about their child's weight compared to parents who did not receive such a report in both the total and the Black-only groups. At the same time, fewer parents of healthy weight children who received their child's weight information were concerned when compared to the parents who did not receive such information. The report appears to catch the attention of parents of at risk or overweight children and raised their concern about their child's weight, while parents of healthy weight children were relieved to learn that their child was in the healthy weight category.

The results of the present study suggested that parents of overweight children appeared to be a little less concerned about their child's weight compared to parents of healthy weight children whether they received a report or not. These findings are in contrast to those reported by Chomitz et al. (2003), Cornell et al. (2005) and Campbell et al. (2006), Where they suggested that parents of overweight children were more concerned and that the majority of them were worried about their

child becoming overweight in the future. The difference in concern was even greater in the Black-only group parents (OR 0.63, 0.17-2.31) compared to the total group (OR 0.98, 0.32-2.93). This might be partially explained by the differences in parent's gender representation between the At risk/Overweight and the Healthy Weight groups. The At risk/Overweight group had 4 fathers and 27 mothers whereas the Healthy Weight group had 39 mothers only. Perhaps fathers of at risk or overweight children were less concerned about their child's weight compared to mothers. A previous study conducted by Adams and colleagues (2005) supported this impression and reported that fathers did not identify weight problems in their children as well and that they were less concerned about risk of overweight in their children when compared to mothers (Adams, Quinn & Prince, 2005).

Parent Perceptions That Their Child Was Meeting Recommendations for Fruit and Vegetable Intake, Physical Activity, and Limiting Sedentary Behaviors

The present study found no differences in parent perceptions that their child was eating 5-9 servings of fruits and vegetables and getting at least 60 minutes of moderate physical activity most days between the I & C and AR/OW & HW categories in both the total group and the Black-only group. A possible explanation for the similar parent responses between groups might be because many parents perceive their children as eating healthy foods and being physically active (Campbell et al., 1998).

Parents in the total group differed from the Black-only groups in their answer to the question "Do you think your child watches television or plays videogames for more than two hours most days?" More parents in the I (total) group reported that their child watched more than two hours of television or played videogames when compared to the Control (total) parents. At the same time no such difference was observed between the I-B and the C-B group parents. These differences observed in the total group but not in the Black-only might be partially explained by the unequal representation of racial/ethnic background of the participants. The Intervention (total) group had only Black

participants while the Control (total) group included 14 non-Black parents. Past literature has also suggested that Black children spend more time watching television or playing videogames when compared to White children (Dennison, Erb & Jenkins, 2002).

Parental Willingness to Help Their Child Maintain a Healthy Weight

There is extensive evidence suggesting that parent encouragement influences children to develop healthy habits (Epstein, McCurley et al., 1990; Epstein, Valoski et al., 1990b; Golan, Fainaru et al., 1998; Golan, Weizman et al., 1998; Golan & Crow, 2004). Parents in the present study (in both the total and the Black-only groups) were very willing to share their child's weight information with his/her healthcare team regardless of whether or not they received a report and whatever their child's weight status. On the other hand Chomitz et al (2003) found that parents who received a weight report were more likely to seek medical help and work on preventive measures than the parents who received no such information. A report published by the University of Arkansas noted that parents of overweight children who received their child's weight information were also willing to seek medical help. They found that 57% of surveyed physicians mentioned that they had at least one parent bring in a child's BMI letter sent by the school for discussion (University of Arkansas, 2006).

In addition, parents in both the total and the Black-only groups were very willing to help their child to follow healthy habits by serving more fruits and vegetables, encouraging their child to be more physically active and limiting time watching television or playing videogames. It was observed that receiving a BMI health report did not affect parents' willingness to help their child to be at a healthy weight. It also appeared that parents' perception and concern about their child's weight were not related to their willingness to help their child follow healthy behaviors. A previous study conducted by Chomitz et al. (2003) also found that parents' awareness of their child's weight was not related to their initiation of weight control plans. The results of the present investigation also found that parents of at risk or overweight children were nearly four times less likely to help their

child follow healthy habits compared to parents of healthy weight children in both the total group and the Black-only group.

Elicitation of Different Barriers That Limit Parents to Help Their Child

Several previous studies have suggested that parents are key players and that the home environment has a large impact on obesity prevention programs (Golan et al., 2001; 2004). The role of parents in becoming more active in adopting healthy behaviors for their children might be limited by different demographic factors (Rhee et al., 2005). The main demographic factors such as family dynamics, cultural beliefs, and situational barriers appear to be strongly associated with parental readiness to adopt healthy behaviors at home for their children (Hass et al., 2003).

While most parents in the present study reported that they were very willing to help their child follow healthy behaviors, very few of them mentioned specific barriers which kept them from helping their child. Of the 20% who listed barriers to serving their child more fruits and vegetables, the most common limitations were the child's dislike of these foods particularly vegetables, followed by lack of time to plan/prepare meals and family income. Previous studies conducted by Campbell et al. (1998) and Glanz et al. (1998) also suggested that food preferences (taste) and low family income (cost) were strongly associated with implementing healthy nutrition practices. In the present study, parents acknowledged that the local environment had an important role for encouraging children to be physically active. Parents perceived that safety concerns in the neighborhood, lack of parent/child time, and lack of parent modeling were the main barriers. These barriers were similar to those reported in a previous study conducted by Hesketh and colleagues (Hesketh, Waters, Green, Salmon & Williams, 2005). Moreover parent modeling was also an important factor in encouraging physical activity among young children. Several previous studies supported the idea that a child's physical activity is highly correlated with the parent's participation in physical activity (Moore et al., 1991; Anderssen & Wold, 1992; Goran, Reynolds & Lindquist, 1999). The majority of parents reported

that they were very willing to limit their child's time watching television or playing videogames. Most of them (95%) mentioned that they had strict control over the amount of time the child spent watching television or playing videogames. A few parents (5%) mentioned that the crowded home atmosphere, parent/children work/school schedule and using television as a comfort for a child who had to change residences frequently were the main barriers which limited restricting their child's time watching television or playing videogames.

Conclusions

The study demonstrated that a BMI health report is an effective way to increase parent awareness and concern about their child's weight status. Parents who receive the BMI health report expressed more accurate perceptions about their child's weight status compared to parents who did not receive a report. The present investigation also showed that the BMI health report raised concern among parents of at risk or overweight children, where as it appeared to be lessen anxiety in parents of healthy weight children. The results of the present study suggest that receiving a BMI health report is beneficial for all parents regardless of their child's weight status. Despite the proposed hypothesis, parents expressed a similar level of willingness to help their child to be at a healthy weight whether they received the report or not and whatever their child's weight status. Parents who are aware of and concerned about their child's weight may be more willing to overcome the barriers and help their child maintain or achieve a healthy weight. This increased knowledge and motivation among parents may encourage them to build a healthy environment around the child which is an important step for the success of an obesity preventive program. However this study did not observe if any steps were taken by the parents after receiving the BMI health report to help their children to be at a healthy weight. At the end of the study school nurses in the Intervention schools were provided with a list of parents who did not responded for the survey.

Future Directions

More research is needed to examine how parents react to these BMI health reports and to evaluate the reasons for the lower response rates among the parents of at risk or overweight children. There is always a risk that parents will put children on diet programs in order to reduce weight or prevent weight gain and these might impair their normal growth. Health care providers and nutrition educators need to be involved in providing support and guidance to parents and acknowledging the interplay of environmental and familial influences that help prevention of overweight in children. Future studies need to address parents/caregivers of different racial/ethnic backgrounds and from different socio-economic groups. In addition, further research needs to explore other effective ways to incorporate this BMI health reports into obesity-preventive programs. Additional studies are needed to develop collaborative programs which include parents, healthcare professionals, and school personnel and which address the barriers inhibiting children from achieving healthy lifestyles.

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APPENDIX A: PARENT/GUARDIAN CONSENT FORM FOR INTERVENTION SCHOOLS

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
LSU School of Human Ecology
(225) 578-1722

Melinda Solmon, PhD
LSU Department of Kinesiology
(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: PARENT/GUARDIAN CONSENT FORM FOR CONTROL SCHOOLS

Dear Parent:

Selected schools in East Baton Rouge Parish are participating in a project called “Smart Bodies.” The goal of the project is to help children learn about the human body and the importance of eating right and being physically active. Thanks to support from Blue Cross-Blue Shield and the LSU AgCenter, 250 elementary schools throughout the state will have the opportunity to participate in the Smart Bodies Program over the next five years.

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, students in fifth grade who were first 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 the project has ended. 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.

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 _____

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
School of Human Ecology, LSU
(225) 578-1722

Melinda Solmon, PhD
Department of Kinesiology, LSU
(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.

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

Description of the Study: 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. Children in fourth grade will also have their height and weight measured. After the twelve-week program, your child will fill out the same questionnaire about fruits and vegetables and physical activity.

Benefits: LSU Researchers will be provided with information necessary to evaluate the effectiveness of the Smart Bodies Program.

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 C: BODY MASS INDEX- FOR-AGE PERCENTILE REPORT

BMI Report

Monday, June 20, 2005

Student's Name : 81131

Student ID : 81131

Sex E

Birth Date 07/22/1993

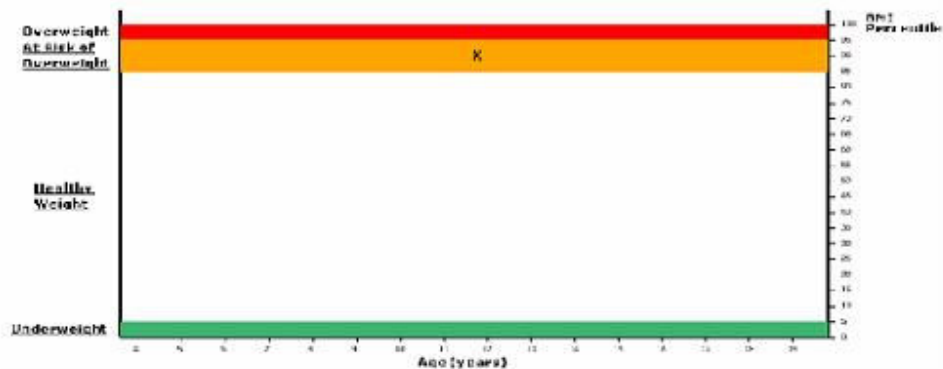
Age 11 years and 9 months

Height 5 feet 4 inches

Weight 134 lbs.

BMI-for-Age Percentile 90.81

BMI Percentile vs Age Chart



Dear Parent,

This picture shows your child's Body Mass Index (BMI)-for-age percentile and risk for being overweight or underweight. It is calculated from his/her height and weight. A bigger number means that your child weighs more than other children the same age and a smaller number means the opposite.

The American Academy of Pediatrics says that the BMI-for-age percentile is a good way to look at your child's health. A number between the 85th and 95th percentile means that your child is at risk for becoming overweight. A number above the 95th percentile means that your child is overweight. Doctors worry because overweight children are more likely to get sick from type 2 diabetes and heart disease. Overweight children often become overweight adults.

Please talk to your doctor about this report. Whatever his/her BMI-for-age number, we want you and your family to be fit and healthy. We hope you:

- Set a good example of healthy behaviors.
- Limit family TV and video game time.
- Help everyone in your family be physically active every day.
- Eat right by serving lots of fruits and vegetables, healthy snacks, low-fat dairy foods, and whole grain breads and cereals.

For more information about healthy weights for children contact the American Academy of Pediatrics at:

<http://www.aap.org> or the National Center for Chronic Disease Prevention at:

<http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age.htm>

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APPENDIX D: PARENT/GUARDIAN COVER LETTER

Dear parent,

Thank you very much for allowing your child to participate in the Smart Bodies Program at school. We hope that he/she is enjoying attending this program. As we evaluate our program we really do want to hear from you. Please take a moment now to answer the short questionnaire and return it to us in the enclosed envelop. Postage will be paid by LSU. If you return the questionnaire within one week, **you will receive four gifts worth \$10**. Once again thank you very much for helping us and for being part of the Smart Bodies Program.

Sincerely,

Georgianna Tuuri
Assistant Professor
Louisiana State University

Melinda Solmon
Associate Professor
Louisiana State University

APPENDIX E: PARENT/GUARDIAN SURVEY

Section 1

Your answers to the following questions will be kept confidential. This information is for research purposes only. Please fill in the bubble that best describes you.

1. Choose your level of completed education.

- (a) Less than High School
- (b) High school or G.E.D
- (c) Some post-High school
- (d) College graduate

2. What is your age?

- (a) 20-30
- (b) 30-40
- (c) 40-50
- (d) 50-60
- (e) >60

3. What is your gender?

- (a) Male
- (b) Female

4. What is your racial/ethnic identity?

- (a) White
- (b) Black
- (c) Hispanic
- (d) Other

Section 2

1. How would you describe your child's weight?

- (a) Underweight
- (b) At about the right weight (normal weight)
- (c) A little overweight (at risk for overweight)
- (d) Overweight

2. Are you concerned about your child's weight?

- (a) Yes
- (b) No

3. Do you think your child eats 5 to 9 servings of fruits and vegetables most days? (5 to 9 servings is about three and half cups for a 4th grade child)

- (a) Yes
- (b) No

4. Do you think your child gets at least 60 minutes of moderate physical activity (like walking) most days?
 - (a) Yes
 - (b) No

5. Do you think your child watches TV or plays videogames for more than 2 hours most days?
 - (a) Yes
 - (b) No

Section 3

Please check in box that best describes you

How willing are you to :	Not at all willing	Not willing	No Opinion	Willing	Very Willing
Discuss your child's weight with his/her health care provider					
Ask your child's school nurse, or PE teacher about ways to help him/her be at a healthy weight					
Serve your child more fruits and vegetables					
Encourage your child to more be physically active (playing outdoor games/ sports)					
Limit your child's time watching TV or playing videogames					

Section 4

Are there things that keep you from serving your child fruits and vegetables? If Yes, List some of them.

Are there things that keep you from helping your child spend time playing outdoor games/sports? If Yes, List some them.

Are there things that keep you from helping your child watch less TV and play fewer videogames? If Yes, List some of them.

VITA

Anantha Padmaja Lakkakula was born to Mr and Mrs. Lakkakula on May, 24, 1978, in Bapatla, India. She received her bachelor's degree in naturopathy and yogic sciences in 2002 from University of Health Sciences, India. She also completed a certified course in healthcare management and served as a dietician and counselor in a diabetic center in Hyderabad, India. In August 2004, Anantha Padmaja enrolled for graduate studies in the Department of Human Ecology at Louisiana State University. She intends to graduate in December 2006.