EFFECTS OF AN EDUCATION PROGRAM ON NUTRITION AND PHYSICAL ACTIVITY BEHAVIORS IN SCHOOL-AGE CHILDREN, GRADES 3-5

By

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CHAPTER I

INTRODUCTION

Due to the increasing cost of health care, finding ways to lower health care spending in the decades to come is becoming increasingly important. Some of the most expensive diet and sedentary-related diseases are among America's leading causes of death, including heart disease, cancer, obesity, diabetes, respiratory disorders and orthopedic problems (Atkinson, 1998). The economic costs of obesity were estimated to be $69 billion in 1990 (approximately 8% of total health care costs), and it is estimated that these costs will continue to increase as the population ages, especially if childhood obesity continues to increase (Hill & Trowbridge, 1998). Approximately 25-50% of overweight in adolescence tends to persist into adulthood, and the best way to optimize health and longevity is to focus on prevention of childhood and adolescent obesity (Must, 1996). Thus, it is pertinent to educate the public, and specifically children about healthy eating and physical activity. Obesity is a major contributor to all of the health conditions listed above, and obesity is now one of the most serious health problems facing America's youth (Hill & Trowbridge, 1998). In fact, obesity affects 1 in 5 children in the U.S. (Dietz, 1998). Children consume fewer fruits and vegetables, eat more fat and cholesterol, and exercise less than they did just a few decades ago (Birch & Fisher, 1998). If children become more educated about healthy behaviors as they relate to

nutrition and physical fitness, future health care spending may decrease, along with a decrease in the incidence of these diseases due to improved health in the next generation.

Many factors contribute to the unhealthy behaviors of children that ultimately affect their risk of heart disease, diabetes, cancers, obesity, respiratory disorders, and orthopedic problems. The dietary intake of children has steadily changed during the past two decades (Schwenk, 1997). The diet of U.S. children exceeds the recommendations for fat, cholesterol and added sugars, and is less than the recommendations based on the Food Guide Pyramid for fruit, vegetables, grains and dairy products (Munoz, et al., 1997). More children are consuming between meal snacks, which accounts for most of the increase in children's caloric intake (Schwenk, 1997). In addition, food availability contributes to the infiltration of low-nutrient, high-caloric foods that children eat (Schwenk, 1997). Fast food restaurant foods are available within some school cafeterias for children to choose in addition to the carry-out foods and convenience foods families consume. Among families with children, nearly half of food expenditures are spent on foods consumed outside of the home (Schwenk, 1997).

Decreased physical activity is another major factor in the development of obesity, which ultimately can increase the risk of developing diseases, such as heart disease and diabetes (Bar-Or et al., 1998). Children spend countless hours on the computer playing games, searching the internet and sending electronic mail, leaving little time for physical activity. In addition, television watching has also increased, averaging 24 hours/week, while snacking has increased as well (Bar-Or et al., 1998). Many children live in heavily populated areas. Safety is a concern for children to be outside in some of those areas, which includes traffic (Bar-Or, et al., 1998).

Further adding to the circumstances surrounding the reduction in healthy behaviors among children is the absence of one or both parents (Kennedy & Powell, 1997). Many children grow up in homes with a single parent that may be at work when the child arrives home from school, or both parents may work, leaving children to fend for themselves after school. In either situation, children are left on their own to make snacking and dinner choices and decisions on how to spend their free time.

In single-parent households, many children spend much of their day away from home (Kennedy & Powell, 1997), supporting the fact that nutrition and physical activity education interventions need to be implemented in schools, after-school programs, summer programs, day care centers and youth groups. Although it is also important to teach parents and caregivers of children the concepts of nutrition and physical activity, children will ultimately have to make the decisions to live healthy lives. Thus, an effective way to educate children is to implement nutrition and physical activity programs that will teach them healthy lifestyle behaviors that will last a lifetime.

PURPOSE

Nutrition education and physical activity programs have decreased in schools over the past few decades (Bar-Or et al., 1998). At the same time, children have become more overweight than they have ever been before (Hill & Trowbridge, 1998). Furthermore, the next generation is likely to be fatter and less fit than the current generation (Hill & Trowbridge, 1998), which may lead to increased health care spending on diseases that could be prevented by healthy lifestyle behaviors. Thus, it is imperative

to implement nutrition and physical activity programs in order to equip children with the skills to make healthier choices now and in the future.

The purpose of this study was to determine the impact of the Oklahoma Cooperative Extension Service's (OCES) "Super Nutrition Activity Program" (SNAP) on school-age children, grades 3-5. This study evaluated whether or not the program improved children's nutrition and physical activity behaviors.

OBJECTIVES

1. To determine the effect of the "Super Nutrition Activity Program" (SNAP) on a SNAP Check score in school-age children, grades 3-5.
2. To determine the effect of the SNAP program on consuming foods from the Food Guide Pyramid food groups in school-age children, grades 3-5.
3. To determine the effect of the SNAP program on nutrient dense snacks chosen from the Food Guide Pyramid food groups by school-age children, grades 3-5.
4. To determine the effect of the SNAP program on participation in physical activities in school-age children, grades 3-5.

NULL HYPOTHESES

H_o1: There will be no significant difference on a SNAP Check score in school-age children, grades 3-5, after participating in the SNAP program.

H_o2: There will be no significant difference in consuming foods from the Food Guide Pyramid food groups in school-age children, grades 3-5, after participating in the SNAP program.

H_o3: There will be no significant difference in nutrient dense snacks chosen from the Food Guide Pyramid food groups by school-age children, grades 3-5, after participating in the SNAP program.

H_o4: There will be no significant difference in the amount of participation in physical activities in school-age children, grades 3-5, after participating in the SNAP program.

ASSUMPTIONS AND LIMITATIONS

One limitation for this study was that different Oklahoma Cooperative Extension Service County Extension Educators conducted the SNAP program in different Oklahoma counties. Consequently, there may be differences between counties in teaching methods.

Another limitation of this study was that the parents or caregivers influence the food choices available to the children. Children ultimately make the decision to be healthy for themselves, but until they are capable of purchasing and preparing their own food, they are dependent upon others for making some of these decisions for them.

Another limitation of this study was that follow-up evaluation was not available to determine if the changes made were incorporated into the children's lifestyle habits.

DEFINITIONS

The Super Nutrition Activity Program (SNAP) was designed by the Oklahoma Cooperative Extension Service. Printing costs were provided by a grant from the Oklahoma Beef Industry Council. The SNAP curriculum contains 13 lessons on nutrition, food safety, and physical activity, and contains activity sheets for the children as well as take-home sheets for parents. The children completed a SNAP check questionnaire prior to starting the program and after completing the program. The SNAP curriculum was designed to be used in a variety of settings such as schools, after school programs, daycare centers, summer programs, youth groups, and camps.

The SNAP Check questionnaire was used to evaluate dietary intake, food safety, and physical activity behavior, and consisted of 11 questions. Ten questions used a Likert scale format ranging from "no"=1 to "sometimes"=2 to "yes"=3. Children were asked to mark the statement that best represented their behavior. One question asked children, "What did you have for a snack yesterday?" A registered, licensed dietitian evaluated the snacks. A point was given for each nutrient dense food from the Food Guide Pyramid food groups. The SNAP score was the total score from all the questions.

Oklahoma Cooperative Extension Services (OCES) provides research-based information about agriculture, 4-H and youth development, family and consumer sciences, and rural development to the people of Oklahoma. Workshops, television,

radio, videotapes, newsletters, fact sheets, circulars, and individual contact all serve to take scientific knowledge from the land-grant university system to the people of the state.

Body Mass Index (BMI) is equal to body weight in kilograms divided by height in meters, squared. BMI is indicative of body fat and is independent of body frame size and gender. In addition, the BMI is used to categorize risk of developing diseases associated with the amount of body fat (Mahan & Escott-Stump, 1996a). A BMI of 27 or greater is considered obese in adults and has an increased risk of developing diseases (Mahan & Escott-Stump, 1996a).

Childhood Obesity currently has no standard definition. However, most researchers are classifying children as being obese when their BMI is greater than the 95th percentile for children of the same age and gender (Dietz, 1998).

Childhood Hyperlipidemia has no standard definition. Currently, most researchers use the recommendation for adults, which defines hyperlipidemia as greater than 240 mg/dL for total cholesterol (Mahan & Escott-Stump, 1996b). According to the American Dietetic Association, children aged 2 years and older should follow the Dietary Guidelines for Americans (USDA, 2000).

LDL-cholesterol (low density lipoprotein) is a lipid/protein complex circulating in the plasma, transporting most of the blood cholesterol. This lipoprotein fraction is implicated in the risk of cardiovascular disease (Hunt & Groff, 1990). A desirable blood or serum laboratory concentration for LDL-cholesterol is 130 mg/dL or below to reduce the risk of developing cardiovascular disease (Mahan & Escott-Stump, 1996c).

HDL-cholesterol (high density lipoprotein) is a plasma lipid/protein complex rich in phospholipid and cholesterol. It is considered to be of benefit in reducing the risk of

cardiovascular disease (Hunt & Groff, 1990). A recommended HDL-cholesterol concentration of at least 60 mg/dL is considered to reduce the risk of cardiovascular disease (Mahan & Escott-Stump, 1996c). There is no current recommendation specifically for children.

Hypertension is defined as persistent high arterial blood pressure: systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHG (Mahan and Escott-Stump, 1996d). The classification for hypertension in children follows the definition for adults.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Obesity affects 1 in 5 children in the United States, and the trend for obese children is on the rise. In fact, obesity has become the most prevalent nutritional disease of children and adolescents (Dietz, 1998). Obesity is linked to many diseases and disorders, such as heart disease, diabetes, hypertension, some cancers, orthopedic problems, sleep apnea, and social inadequacies. These diseases manifest mainly in the adult population, although more children are beginning to develop some of these diseases while they are still in childhood (Dietz, 1998). Many researchers believe that the habits formed during childhood will continue into adulthood and could potentially increase the development of these diseases and disorders later in life (Dietz, 1998). Ultimately, if the number of these diseases increases, then medical expenditures could also rise as this generation of obese children grows into adulthood.

Nutrition, Physical Activity and Children

Nutritional Needs

During childhood nutrient needs are important due to the growth that occurs during this time. It is essential that children receive a wide variety of foods to ensure an adequate intake of vitamins and minerals as well as the macronutrients. Most school age children, grades 3-5, have very little difference between males and females concerning nutrient intakes (Trahms & Pipes, 1997). It is usually during the adolescent period that nutrient intakes vary between the genders.

In infancy, energy requirements are the greatest per unit of body size due to the extreme amount of growth that occurs shortly after birth (Trahms & Pipes, 1997). As infants grow into childhood the amount of energy requirement in relation to the unit of body size decreases. However, the amount of calories required increases to support spurts of growth, activity, and a larger body (Trahms & Pipes, 1997).

According to Trahms & Pipes, the dietary reference intake (DRI) for children ages 7-10 is approximately 1130 calories/day for an average child at 62 pounds and 52 inches tall. However, the energy intake needs to be adequate to account for the basal energy expenditure, specific dynamic action, level of physical activity, and the periodic growth spurts. Consequently, daily intake of calories will vary from child to child (even at the same height and weight) and from day to day.

Carbohydrates are the main source of energy intake. The recommended intake should be at least 40-50% of total caloric intake in children ages 7-10. Carbohydrates consist of both the complex and the simple sugars. The majority of the carbohydrate

intake should be in the form of the complex carbohydrates. Foods containing complex carbohydrates include cereals, grains, pastas, rice, and vegetables. Whole grains and cereals provide nutrients and fiber. Candy, cookies, colas, and foods similar to these provide energy in the form of simple carbohydrate, but they provide very little nutrient value. Fruits and milk contain a naturally occurring simple carbohydrate but they also provide vitamins and minerals. In children, high intakes of the simple carbohydrate-containing foods such as cookies, carbonated beverages, and other sweetened drinks tend to dull the flavor of foods with high nutrient values, contributes to overweight, dental caries, and general poor nourishment and should be discouraged (Trahms & Pipes, 1997).

Fiber should also be a part of children's dietary intake. Fiber is believed to help control blood glucose levels, prevent some cancers, and reduce high blood cholesterol levels. In addition, fiber assists in laxation. The recommended fiber intake for children should be approximately 170 to 300 mg/kg (Trahms & Pipes, 1997).

Protein is an essential nutrient for growth and maintenance of tissues. Protein requirements increase during growth spurts. In children ages 7-10 the protein requirements are approximately 45 grams per day, increasing during times of growth. In addition, the quality of protein can also affect the amount needed. In foods that provide protein with a high biological value, the required amount may be less, and vice-versa with foods providing protein with low biological value. Foods that contain high biological value protein include milk, eggs, yogurt, cheese and cottage cheese. Low biological value foods include desserts, sweets and bakery items (Trahms & Pipes, 1997).

Fat is the most highly concentrated source of energy of the three macronutrients. It is essential for proper development and growth of children; however, the recommended

dietary intake of fat for children has been controversial. Some researchers believe that the diet for children should be fairly high in fat in order to provide adequate calories for growth, and they believe that restricting fat intake increases the risk of stunted growth and health problems (Satter, 2000). The recommendation from the Healthy People 2000: Nutrition Objectives states that for those ages 2 years and older, fat intake should be 30% or less of the total calories. According to the Dietary Intervention Study in Children (DISC), children ages 8-10 who consumed diets with moderately lower fat intakes (at 30% total calories) were able to maintain adequate nutritional status for growth and maintenance (Obarzanek et al., 1997). Furthermore, if children were to receive calories from other food sources that provided less fat, then they will most likely be consuming foods with more nutrient value, such as fruits, vegetables and cereals.

Calcium is an important nutrient for the formation of bones, teeth, helps regulate muscle contraction, directs cell function, and nerve impulses (Trahms & Pipes, 1997). Thus, calcium plays a vital role in the growth and development in children. The DRI for calcium in children ages 4-8 is 800 mg per day, which is equivalent to approximately 3 (8oz) servings of milk per day, and in children ages 9-13 the DRI is 1300 mg per day, which is approximately the calcium in 4 (8oz) glasses of milk (Monsen, 2000). The recommendation is 2-3 servings from the milk group (Monsen, 2000).

Iron is another essential nutrient during childhood. Iron plays a role in maintaining healthy red blood cells. The requirement for iron increases with increasing blood volumes and during blood losses. Consequently, during growth spurts and during menstruation it is imperative to provide adequate iron intakes (Trahms & Pipes, 1997).

The DRI of iron for children ages 7-10 is 10 mg per day and for children 11-14 is 12 mg per day (Monsen, 2000).

Water is also important to nutritional health for children. Water functions as an essential component of body structure and as a solvent for minerals and other physiologically important compounds (Trahms & Pipes, 1997). It transports nutrients to cells as well as removing cellular wastes, and it regulates body temperature. Since water is lost by evaporation through the skin, the respiratory tract, and by elimination in feces and urine, it must be replenished every day (Trahms & Pipes, 1997). The recommended amount of water for children at age 6 is 90-100 ml/kg/day, at age 10 is 70-85 ml/kg/day and for children age 14 is 50-60 ml/kg/day (Trahms & Pipes, 1997). Fluids can be replaced through water, fruit juices and milk.

The most effective way for children to receive the amount of nutrients that they need is to follow the Food Guide Pyramid, designed by the USDA (USDA, 1992). Planning meals by the Food Guide Pyramid allows for more grain/starch foods with 6-11 servings, followed by the fruits and vegetables with 2-3 servings of fruit and 3-4 servings of vegetables. The next food groups are the milk and meat or meat alternatives, with 2-3 servings of milk and 2-3 (3oz) portions of lean meat or meat alternatives per day. The top of the pyramid includes the fats, sweets, and other foods, which are to be used sparingly.

Nutritional Status

Obesity among children is on the rise within the United States. In fact, some researchers believe that the number of obese children has increased to epidemic proportions (Hill & Trowbridge, 1998). Hill and Trowbridge estimate that between 11 to 25% of US children and adolescents are overweight, and that the current generation of children will grow into the most obese generation of adults in US history. According to the 1999 NHANES results, 13 percent of children ages 6-11 years are overweight, which is up from 11 percent from the NHANES results from 1988-1994 (CDC, 2001). With the increasing number of children becoming obese, the risk for developing diseases such as cardiovascular disease, diabetes, and other chronic diseases is also increasing. As a result, medical costs for such diseases could also rise in the future (Hill & Trowbridge, 1998).

Although not clearly defined, the definition for childhood obesity most used is body mass index (BMI) greater than the 95th percentile for children of the same age and gender (Dietz, 1998). However, values between the 85th and 95th percentile are considered an area of concern since those in that range are at a higher risk for becoming overweight, according to the National Health And Nutrition Examination Survey (NHANES) II & III (Troiano & Flegal, 1998). Even this does not take height into consideration.

Over the past few decades the number of children who are classified as overweight has steadily increased. At least 1 in 5 children are overweight, which is a 50% increase in the last two decades (Food Insight, 1997). According to Troiano &

Flegal, approximately 11% of children and adolescents were overweight in 1988-1994 and an additional 14% had a BMI between the 85th and 95th percentile, whereas only approximately 5% of children and adolescents were considered overweight during 1976-1980 (Troiano & Flegal, 1998). Genetics can play a role in the development of obesity within children, but this recent rise in obesity within children is due to increased consumption of calories and decreased expenditure of calories through physical activity (JAMA, 1997).

Children currently eat fewer foods from the "fruit", "vegetable," "grain," and "dairy" groups than recommended by the Food Guide Pyramid, and many do not meet the recommended number of servings for those food groups (Munoz et al., 1997). On the other hand, children are eating more foods from the "other" food group, and they are exceeding the recommendations for fat and added sugars (Munoz et al., 1997). In fact, an analysis of children's diets in the USA revealed that over 35.6% of the energy intake is from fat, and that saturated fat intake accounted for over 13-13.8% of the energy intake (Ricketts, 1997). Furthermore, dietary cholesterol intake is well above 300 mg/dL per day in American children as well (Ricketts, 1997). The recommendation for dietary fat, saturated fat, and cholesterol intakes for children, age 2 years and older, follows the same recommendations for adults, which states that the intake of fat should be no more than 30% of total calories consumed, with no more than 10% of that from saturated fat. Cholesterol intakes should not exceed 300 mg/dL per day (AAOP, 1998).

Children's consumption of snack foods has also increased (Schwenk, 1997). Snack foods have become more convenient, and are in some cases cheaper than healthier foods (Schwenk, 1997). School lunches have made attempts to help improve children's

intake by offering fruits and vegetables at lunch and breakfast (Baranowski et al., 1997). However, many children do not eat breakfast at school, and many bring their own lunches, which may or may not contain fruits and/or vegetables. One study showed that many children who participated in school lunch had better intakes of fruits and vegetables during the week than on the weekends due to the School Lunch program (Baranowski et al., 1997). More children reported eating high-fat foods and snack foods during the weekends, when the school lunch program is not a part of their day (Baranowski et al., 1997). In addition, for some children lack of parental oversight, due to single parents or both parents working outside of the home, may contribute to the poor food selections made for after school snacks, lunches, or possibly even dinners (Schwenk, 1997). Thus, implicating the need to educate the children on healthy eating.

Childhood Obesity

Causes

Childhood obesity, as stated before, is increasing in America's children; to the point that some researchers believe that it is quickly becoming an epidemic (Hill & Trowbridge, 1998). Obesity is now the most prevalent nutritional disease of children and adolescents in the United States (Dietz, 1998). Although there is not common agreement on the determinants of obesity (Bouchard, 1996), most researchers conclude that genetic and environmental factors likely determine the causes of childhood obesity (McGill, 1997). Many studies have been conducted to observe the genetic aspect of childhood obesity. Some obese children have normal weight parents, whereas some normal weight

children are born to overweight parents. Explaining the rationale for these occurrences scientifically cannot be done at this time (Bar-Or et al., 1998). Although researchers estimate that about 25-35% of obesity occurs in families with normal weight parents (Bar-Or et al., 1998). However, the most prevalent observation of childhood obesity occurs with both parents of obese children being overweight themselves (Bar-Or et al., 1998). In fact, approximately 30% of all cases of obese children have both parents that are overweight (Bar-Or et al., 1998). It is commonly observed that severely or morbidly obese persons are, on the average, about 10-12 BMI units heavier than their parents, brothers, or sisters (Bar-Or et al., 1998). Some researchers believe that there is a single gene that is responsible for the heredity component of childhood obesity (Bar-Or et al., 1998). However, some studies do not support this finding, and one must consider the limitation that the studies were based on the unmeasured genotype approach and the gene(s) has(have) not been identified yet (Bar-Or et al., 1998).

A child's environment can also play a role in the development of childhood obesity. Although children are ultimately responsible for their actual intake of food, they are dependent upon the type of food and many times the type of food preparation that their caregivers or family members provide. As a result, the food choices and eating behaviors of the care-givers can influence the food habits that are formed in children, and many nutritionists believe that the food habits formed in childhood will persist into adulthood (Schwenk, 1997). Children are also susceptible to marketing messages in advertisements, resulting in higher consumption of snack foods high in fat, oil, and sugar (Schwenk, 1997).

Most researchers conclude that the factors of childhood obesity are due to increased consumption of calories and decreased energy expenditure through physical activity (JAMA, 1997). When evaluating the physical causes of obesity, researchers consider energy-balance between calories consumed and calories burned in activity (Bar-Or et al., 1998). If the amount of calories consumed is equal to the calories expended in activity, then there is maintenance of weight. If the calories consumed are more than the calories utilized for activity, then there is weight gain, and if the calories consumed are less than the calories utilized for activity, then there is weight loss. However, for children, growth is a factor that must also be considered when estimating the amount of calories required (Trahms & Pipes, 1997).

Health Risks Related to Childhood Obesity

As obesity in children continues to increase, so do the risk factors for many diseases (Hill & Trowbridge, 1998). Obesity is linked to cardiovascular disease, diabetes, certain types of cancers, sleep apnea, orthopedic problems, respiratory disorders, polycystic ovary disease, pseudotumor cerebri, Blount's disease, psychosocial inadequacies, and it may even effect fertility (once a child grows into adulthood) (Dietz, 1998). Researchers believe that the children who are obese tend to grow into adulthood being overweight or obese as well, increasing the prevalence of these diseases in adulthood (Dietz, 1998).

However, an increasing number of children are already experiencing the effects of obesity before they reach adulthood (Dietz, 1998). Many children who are overweight/obese are taller for their age, have advanced bone ages, and they physically

mature before non-overweight children (Dietz, 1998). Early maturation, determined by bone age, peak height velocity, and age of menarche, is associated with increased fatness in adulthood (Dietz, 1998).

In addition to early maturation, overweight children can be faced with hyperlipidemia (Dietz, 1998). Usually the occurrence of hyperlipidemia consists of high levels of LDL-cholesterol and triglycerides, with suppressed HDL-cholesterol. This pattern of blood lipids is commonly seen in obese children, and is the most likely to lead to cardiovascular disease (Dietz, 1998). Weight reduction has the biggest impact on reducing the risk for cardiovascular disease based on blood lipid levels (Dietz, 1998).

High blood cholesterol levels promote atherosclerosis (AAOP, 1998). One of the major influences on blood cholesterol levels is the proportion of saturated fat intake from the diet, and this is seen in both adults and children alike (AAOP, 1998). Many researchers believe that the risk factors for atherosclerosis originate in childhood (AAOP, 1998). When comparing US children to their counterparts in many other countries, they have higher blood cholesterol levels and higher intakes of saturated fat and cholesterol (AAOP, 1998). Correspondingly, US adults have higher rates of coronary heart disease morbidity and mortality than other countries as well (AAOP, 1998). Furthermore, autopsy studies have shown that early coronary atherosclerosis or precursors of atherosclerosis often begin in childhood and adolescence and are related to high serum total cholesterol levels and high LDL-cholesterol levels (AAOP, 1998). Nutrition in childhood and adolescence is a major determinant of elevated LDL-cholesterol concentrations and of obesity (McGill, 1997).

Children as young as 3-4 years can have fatty streaks of intimal lipid deposits (McGill, 1997). During the second decade of life the fatty streaks increase, and at some anatomic sites, the fatty streaks are converted into fibrous plaques, which increase in number during middle age. Eventually, these fibrous plaques can rupture and lead to a myocardial infarction or stroke (McGill, 1997). McGill suggests that there is reason to suspect that plasma cholesterol concentrations in children might also be associated with the extent and severity of the early stages of atherosclerosis. Furthermore, obesity is associated with more extensive and more severe atherosclerosis in children and young adults independently of its association with hyperlipidemia, hypertension, and diabetes (McGill, 1997). Consequently, if the risk factors for atherosclerosis were reduced in children and young adults, then the progression of the disease would decrease in middle age or beyond (McGill, 1997).

In addition, obesity increases glucose intolerance and insulin resistance, and thus is a precursor to developing diabetes (Dietz, 1998). Typically, non-insulin dependent diabetes mellitus (NIDDM, 1999), currently referred to as Type 2 diabetes, is diagnosed in the overweight, adult population that is 45 years or older (Huff, 1998). One researcher found that Type 2 diabetes in children and adolescents accounted for one-third of all new cases in Cincinnati in 1994 (Dietz, 1998), and the diagnosis for new cases in children and adolescents worldwide continues to rise (Hansen et al., 2000). Before 1992, only 4 percent of the newly diagnosed Type 2 diabetes cases were children (Huff, 1998). By 1994, 16 percent of all children newly diagnosed with diabetes had Type 2 (Huff, 1998). Currently, approximately 8-45% of all children newly diagnosed with diabetes have Type 2 diabetes (Hansen et al., 2000). Type 2 complications from long term (15-20 years),

uncontrolled diabetes can lead to nephropathy, neuropathy, amputation, blindness, gastroparesis, and even cardiovascular disease (Huff, 1998). Thus, it is estimated that children who develop Type 2 diabetes and who have poor blood glucose control, will be facing the secondary complications of diabetes when they are in their thirties, which implies more medical costs as these children live out the duration of their lives with expensive treatments for diabetic complications (Huff, 1998).

According to the NIDDK, four primary risk factors exist for Type 2 diabetes in children (NIDDK, 1999). The first is ancestry. Researchers have discovered that African American, Alaskan Native, American Indian, Asian and Pacific Islander American, and Hispanic American minority groups have a higher risk of developing Type 2 diabetes in children (NIDDK, 1999). The second most important risk factor is obesity, and especially for those who carry their fat around the middle and who are "superobese." Eighty-five percent of African American children in a study group in Arkansas who developed Type 2 diabetes had a BMI of 25 or higher and 16% were in the "superobese" category (NIDDK, 1999). The third risk factor for children included having relatives that already had developed Type 2 diabetes. In fact, between 35-100% of children who developed diabetes had relatives with diabetes (NIDDK, 1999). Lastly, researchers believe that the gender of a child can increase the risk of developing Type 2 diabetes in childhood. Researchers have found that significantly more females than males have developed Type 2 diabetes in childhood (NIDDK, 1999).

In addition to cardiovascular disease and diabetes, high concentrations of liver enzymes are found in obese children and adolescents (Dietz, 1998). Increased liver enzymes were associated with fatty liver, fatty hepatitis, fatty fibrosis, or cirrhosis (Dietz,

1998). However, weight reduction results with normalization of liver enzymes (Dietz, 1998).

Other obesity related medical conditions that occur less frequently include hypertension, pseudotumor cerebri, sleep apnea, orthopedic complications, and polycystic ovary disease. Persistent hypertension has a rate of occurrence of approximately 1% of >6600 school children 5 to 18 years of age, according to one study (Dietz, 1998). However, of the children experiencing persistent hypertension, 60% had relative weights >120% of the median for their gender, height, and age (Dietz, 1998). Furthermore, childhood blood pressure and change in BMI were consistently the two most powerful predictors of adult blood pressure across all ages and both genders (Dietz, 1998).

Pseudotumor cerebri occurs in children and adolescents and is characterized by increased intracranial pressure (Dietz, 1998). It is a rare disease, but one that leads to severe visual impairment or blindness (Dietz, 1998). Most cases occur before adolescence. Approximately 50% of children who are diagnosed with pseudotumor cerebri are overweight (Dietz, 1998).

Sleep apnea is another result of childhood obesity (Dietz, 1998). According to Dietz, the only estimate of occurrence of sleep apnea in children is approximately 7%. However, one third of the children whose body weight was >150% of ideal body weight with a history of breathing difficulties during sleep were found to have apnea (Dietz, 1998). Sleep apnea appears to have a relationship with obesity hypoventilation, and obesity hypoventilation has a high mortality rate (Dietz, 1998). Aggressive therapy is suggested for obese children who may suffer from sleep apnea (Dietz, 1998).

In addition, childhood obesity tends to be accompanied by a variety of orthopedic problems (Dietz, 1998). Naturally the tensile strength of bone and cartilage was not designed to support excess quantities of weight (Dietz, 1998). As a result, excess weight among children can lead to bowing of the tibia and femurs (Dietz, 1998). The overgrowth of the medial aspect of the proximal tibial metaphysis that results from the bowing is know as Blount's disease (Dietz, 1998). The rate of occurrence of Blount's disease is low, but approximately two-thirds of the children who have Blount's disease are overweight (Dietz, 1998).

Lastly, nearly 30% of all women who have polycystic ovary disease (PCOD) may be obese, and hyperandrogenism and hyperinsulinemia frequently occur with PCOD (Dietz, 1998). Obesity is frequently associated with PCOD, but the pathophysiology is complex (Dietz, 1998). Menstrual abnormalities may begin in adolescence, and it is believed that the process of adolescent maturation and obesity may be a factor in the development of PCOD. However, the contribution of adolescent obesity to the prevalence of PCOD in adults has not been evaluated definitively (Dietz, 1998).

Physical Activity

The increasing number of children that are obese in the U.S. has risen during the past two decades to the point that researchers view it as an increasingly prevalent problem (Bar-Or, et al., 1998). Approximately 13% of children in the US are seriously overweight according to the 1999 NHANES results (CDC, 2001). Some researchers consider the prevalence of childhood obesity to be of epidemic proportions (Dietz, 1998). There are many factors that are believed to play a role in the development of childhood

obesity. The role of children's dietary intake and the changes that have occurred are only one component of this problem (Bar-Or, et al., 1998). However, the role of physical activity within children must also be addressed. Some researchers believe that the caloric intake of children hasn't changed significantly within the past few decades, and that the intake of calorically-dense foods does not account for the positive shift in the energy balance which leads to weight gain (Troiano & Flegal, 1998). Troiano & Flegal as well as Bar-Or, et al. believe that since obesity is still rising although fat consumption is decreasing then the lack of regular physical activity accounts for the positive shift in energy balance (1998).

Physical activity within children has declined over the past few decades (Troiano & Flegal, 1998). In fact, less than 50% of children engage in routine physical activity, and sedentary activity has increased (Bar-Or, et al., 1998). Less than 36% of schools offer physical education classes (Bar-Or, et al., 1998). Furthermore, the U.S. Surgeon-General states that "the prevalence of vigorous physical activity among young people falls short of the Healthy People 2000 goal by 75%," and that these goals haven't been met for light to moderate physical activity as well (Bar-Or, et al., 1998). There were seven initiatives as national objectives for health promotion set forth by the Healthy People 2000 that targeted children in improving weight management (Bar-Or, et al., 1998):

1. Reduce or maintain the prevalence of overweight in the U.S. at < 15%;
2. Increase the adoption of sound dietary practices and regular physical activity to 50% of overweight children;

3. Increase to 90% the proportion of school lunch and breakfast service and child care food services with menus that are consistent with the Dietary Guidelines for Americans;
4. Increase to 74% the proportion of schools that provide nutrition education as part of a comprehensive health education program from preschool to 12th grade;
5. Increase to 30% those who engage regularly in light to moderate physical activity for at least 30min/day;
6. Increase to 75% those children who engage in vigorous physical activity that promotes the development and maintenance of cardiorespiratory fitness three or more days per week for 20 or more minutes per occasion;
7. Reduce to 15% those who engage in no leisure-time physical activity.

Overall, the major objective of these initiatives is to "increase the span of healthy life" most effectively and efficiently (Bar-Or, et al., 1998). Based on the rate of changes only a few of these objectives would be met (Bar-or, et al., 1998).

Since nearly all children attend school, physical education within the school system is an ideal place for children to receive training and the opportunities for engaging in vigorous physical activity (Kohl & Hobbs, 1998). In addition, it is believed that if children and adolescents adopt the behaviors of routine physical activity while they are young, then they will carry the behavior into adulthood (Kohl & Hobbs, 1998). However, many schools conduct physical education classes based on the amount of time children are given for recess, suggesting that schools may be using recess as a substitute

for, rather than supplement, physical education (Kohl & Hobbs, 1998). Approximately 76% of children never see a classroom teacher for physical education (Kohl & Hobbs, 1998). Many schools do not make the investment to hire certified physical education specialists nor train teachers to be certified to teach physical education classes (Kohl & Hobbs, 1998). Consequently, many schools are eliminating physical education programs instead of developing or improving them (Kohl & Hobbs, 1998). Research from the Child and Adolescent Trial for Cardiovascular Health (CATCH) has proven that with proper training and support, modification of the school environment can affect the activity levels of children and adolescents substantially (Kohl & Hobbs, 1998).

In addition to physical education classes, schools and organized programs can provide opportunities for physical activity through programs outside school (Kohl & Hobbs, 1998). However, most children who participate in such activities are elite athletes, and programs are selective concerning children's participation (Kohl & Hobbs, 1998). Improving school programs to allow opportunities for all children to participate in sports programs will provide a means to increase physical activity levels in children (Kohl & Hobbs, 1998).

Many factors limit children's opportunities for physical activity in addition to limited resources at school. Some children have a physical handicap or physical limitation that hinders the children from participating in any or certain physical activity. Many children live in areas that are heavily populated. Safety is a concern for children to be outside in some of those areas, which includes traffic (Bar-Or, et al., 1998). Reduced family size can limit the ability for children to have interaction with other children for play (Bar-or, et al., 1998). In addition, urbanization with fenced-in back yards as well as

limited funding of community programs such as city and counties can limit children's physical activity (Bar-Or, et al., 1998). Liability and insurance issues for schools or community centers may also limit children's opportunities for physical activity (Bar-Or, et al., 1998).

Furthermore, seasonal and geographical influences can play a role with the level of children's physical activity (Kohl & Hobbs, 1998). According to data from the National Children and Youth Fitness Study (NCYFS), activity levels are the highest in the summer months, drop in the fall, and reach the lowest point in the winter, and increase in the spring again (Kohl & Hobbs, 1998). Since children are less active in winter, then children who live in areas that are warmer will be more active than children who live in colder climates (Kohl & Hobbs, 1998). In addition, children are reportedly more active on the weekends than they are during the week, and the amount of time children spend outdoors correlates with the amount of physical activity for children (Kohl & Hobbs, 1998). Thus, the climate and/or seasonal changes can play a role in hindering children's level of physical activity.

Lastly, one of the most criticized barriers to children's physical activity is television watching and playing video games (Kohl & Hobbs, 1998). Children's hours of watching television and playing video games per week have not been shown specifically to be associated with decreased levels of physical activity, but viewing and playing hours do reduce the opportunity to be active (Kohl & Hobbs, 1998). Television viewing is the most sedentary behavior among children and adolescents in the United States (Bar-Or, et al., 1998). The amount of television-watching has been shown to be a strong predictor of obesity in children, and each hourly increment of television-watching by adolescents has

been associated with a 2% increase in the prevalence of obesity (Kohl & Hobbs, 1998). Television watching averages 24 hours/week among children (Bar-Or, et al., 1998). It is reported that during hours of television viewing children's intake of high-fat, caloric-dense food intake increases, as well as children's requests for high-fat, caloric-dense foods from their parents (Kohl & Hobbs, 1998).

Children's Nutrition and Physical Activity Knowledge and Practice

Association Between Nutrition and Physical Activity Knowledge and Practice

In order to effectively communicate to children about nutrition and physical activity, it is necessary to have some insight into what they know and believe about the subjects (Food Insight, 1997). "Children today are politically correct about nutrition, but they may not have a true grasp on the subject" (Food Insight, 1997). "They know what they're supposed to say" (Food Insight, 1997). However, it would be beneficial to know what they are thinking and what their attitudes are, which influences their choices (Food Insight, 1997). In addition, Dixey found that "children appear to be well informed about healthy eating and can recite the orthodoxy concerning what they should and shouldn't eat" (Dixey, 1998). "They had a notion of healthy eating which equated with balance and with food being nutritious" (Dixey, 1998). Even studies with older children (12 to 15 year olds) found that they "were well aware that fat in the diet was unhealthy and was associated with coronary problems" (Dixey, 1998). However, "widespread confusion about the fat contents of food" (Dixey, 1998) was also found among the children, and that the children did not have sufficient knowledge or enough understanding to choose a

low-fat diet (Dixey, 1998). Furthermore, Dixey states that "research is required to show whether and how children act on this knowledge" (Dixey, 1998).

When it comes to children's knowledge and practice of physical activity, more research is needed (Kohl & Hobbs, 1997). "Attitudes and knowledge are two additional constructs that have been investigated as potential determinants of physical activity" (Kohl & Hobbs, 1997). Furthermore, "Measurement scales for children's attitudes toward physical activity have been produced" (Kohl & Hobbs, 1997). It is believed that if children have a positive attitude towards an activity, then they are more likely to participate in it (Kohl & Hobbs, 1997). Kohl and Hobbs continue by concluding that the "role of attitudes in determining physical activity behavior deserves more attention" (Kohl & Hobbs, 1997).

In addition, Goran believes that there is a strong need for the development and testing of specific questionnaires for use with children in relation to the amount of their physical activity (1998). He continues by stating that "the accuracy of any new questionnaire would always be limited by the ability of the subject to recall information accurately and without bias, and that ultimately additional improvements in questionnaire accuracy depend on greater understanding of the processing of information," leading to the understanding of children's knowledge of the subject (Goran, 1998). More research is needed in the area of understanding how physical activity patterns develop and how patterns are learned if childhood obesity is to be addressed and treated in an efficient manner (Hill & Trowbridge, 1998).

Factors That Influence Knowledge and Behavior

There are many factors that play a role in influencing children's knowledge and behavior when it comes to nutrition and physical activity. Obviously grade school children will be dependent upon a caregiver for their livelihood due to their age, maturity level, and lack of ability to care for him/herself completely (Food Insight, 1997). Caregivers provide the environment for children, and as a result also provide behavioral models for children (Birch & Fisher, 1998). As Golan, et al. states "parents and adult caregivers play an important role in the development of proper eating habits by young children. The parents' food preferences, the quantities and variety of foods in the home, the parents' eating behavior, and the parents' physical activity patterns work in concert to establish an emotional environment in which obesity may or may not be discouraged" (Golan, et al., 1998). Parents are aware of their influence on children, but they talk about their own habits differently from their children's habits, as one focus group discovered (Food Insight, 1997). However, it is the parents' habits that children are watching and imitating.

Children of obese parents are at a higher risk of developing obesity than children of thin parents (Birch & Fisher, 1998). The family environment can interact with genetic predispositions to produce patterns of food preferences, food consumption, and physical activity that can promote childhood obesity in susceptible persons (Birch & Fisher, 1998). Furthermore, familial patterns of adiposity may be partially mediated by familial similarities in diet consumption (Birch & Fisher, 1998). Children's food preferences were determinants of their consumption patterns, and these preferences and consumption

patterns were related to their parent's adiposity (Birch & Fisher, 1998). Ultimately, children come to like and eat what is familiar, and what is familiar is what is present in the environment (Birch & Fisher, 1998).

Parents also have a strong influence on children's physical activity behaviors (Kohl & Hobbs, 1998). Kohl & Hobbs believe that parents' influence on children's physical activity can be direct and indirect (1998). It's been hypothesized that there could be a significant genetic transmission of factors that predispose the child to increased levels of physical activity (Kohl & Hobbs, 1998). In addition, children whose parents are physically active have been reported to be nearly six times as likely to be active than children whose parents are both inactive (Kohl & Hobbs, 1998). Consequently, the parents/caregivers must take the lead in setting up child-friendly environments that will help children develop healthful eating and physical activity habits (Food Insight, 1997).

Although caregivers and parents have a large influence on children's nutrition and physical activity knowledge and behavior, peer influences begin to outweigh caregivers' influence as children grow older (Food Insight, 1997). Other children's school lunches may influence a child's request for certain foods. Children tend to exchange foods from school lunches packed at home. Other children's selection(s) from school cafeteria foods may also influence a child's food choice. Food choices for after-school snacks may be influenced by other children's selection. Food preferences from older or younger siblings may also influence a child's food choice.

In addition to caregivers' and peer influence, children are influenced by food advertisements found on television (Birch & Fisher, 1998). One research study observed

that 80% of advertisements during a 12-hour period showed foods with low nutritional value, including breakfast cereals high in simple sugars and snack foods high in sugar, fat, and salt (Birch & Fisher, 1998). Research results found children's food preferences and requests for foods increased in relation to the frequency with which the children saw the foods advertised on television (Birch & Fisher, 1998). Another study found that children who were exposed to advertisements selected more sugared foods than children who had not viewed any advertisements (Birch & Fisher, 1998). Since children's television viewing averages 24 hours/week (Bar-Or, et al., 1998), then it stands to reason that children are exposed to commercial influences that affect their food preferences and ultimately food consumption.

Furthermore, schools have a multi-faceted way of influencing children's knowledge and behavior as it relates to nutrition and physical activity (Bar-or, et al., 1998). Schools can provide educational classes and resources to teach children the fundamentals of nutrition and physical activity (Bar-Or, et al., 1998). School cafeterias can support teachings by providing meals that are nutritious and appealing to children (Bar-Or, et al., 1998). School sports, such as after-school programs can provide opportunities for physical activity to foster an environment of healthy behaviors (Bar-Or, et al., 1998).

In summary, "children's eating habits are mainly influenced by their family, by institutions and programs, by the media, and by their peers" (Schwenk, 1997). Schwenk also states that healthy eating among our youth may best be achieved by promoting consistent nutrition messages from all sources that affect their eating behavior (1997).

Effect of Nutrition and Physical Activity Education with Children

General Studies

There are different approaches to childhood obesity education and treatment (Drew, 1999). The most common and most established approach to prevention of childhood obesity is what some researchers call the 'control paradigm' (Drew, 1999). The control approach is considered the medical approach of trying to control external circumstances to manipulate weight loss by decreasing caloric intake and increasing physical activity (Satter, 1996). As a result, the control paradigm focuses on the external cues rather than allowing a child to learn to regulate their behavior by innate senses of hunger and fullness (Drew, 1999). The control approach follows the guidelines recently published by the Academy of Pediatrics Pediatric Nutrition Handbook, and "may misguide well-meaning practitioners to set children and families up for failure" since the handbook is a resource that is widely used (Drew, 1999).

Along with the control paradigm comes the definition of overweight (Satter, 1996). "In the current philosophical and theoretical model, prevention of obesity in childhood has taken the form of early institution of weight reduction dieting with the intent of avoiding fatness" (Satter, 1996). Satter believes that there is an "emerging view of obesity that the problem is not fatness, per se, but a level of fatness that is abnormal for the individual, and in the emerging view, fatness is a normal condition for *some* people" (1996). Satter continues by stating "studies showing stability and predictability of growth and fatness in relatively fat children have traditionally been interpreted as indicating a need for intervention" (1996). Satter believes that obesity should be

redefined according to the individual, and that children shouldn't be forced to fit into charts that are unrealistic for them (1996). The control approach may cause children to grow fatter by externally controlling food intake, which interferes with a child's sensitivity to natural signals to begin and end eating (Drew, 1999). Consequently, Satter believes that internal regulation and the evolution of normal growth is the basis for prevention of childhood obesity (1996).

Challenging the control approach is the 'trust approach' (Satter, 1996). The trust approach stresses that children should be trusted to regulate their own energy intake and weight (Satter, 1996). Satter believes that by allowing a child to self-regulate increases the child's sensitivity to start and stop eating according to internal cues of hunger and fullness, and as a result the child will follow the evolution of normal growth according to his or her genes, rather than forcing a child to fit into a standardized chart of average growth (1996). Evers concurs with Satter by stating that children should be allowed to make decisions about what and how much to eat, and that by doing so parents are empowering their children to self-regulate eating (1997).

Satter states that "for some children and adults, fatness is a normal condition maintained by inherent metabolic and behavioral processes," but self-regulation allows for individualization (1996). "A child who is controlled learns self-doubt, ambivalence, and dependency, either positive or negative" (Satter, 1996). "A child who is trusted learns self-esteem and responsibility" (Satter, 1996).

Another alternative paradigm, relating to childhood nutrition and fitness education in the 21st century is the play approach (Rickard et al., 1995). "The play approach is defined as a process for learning that is intrinsically motivated, enjoyable,

freely chosen, nonliteral, safe, and actively engaged in by young learners" (Rickard et al., 1995). The play approach allows young children to make choices and to assume responsibility for those choices (Rickard et al., 1995). Having fun is an inherent component of the play approach to learning (Rickard et al., 1995). "In this approach, internal cognitive transactions and intrinsic motivation are the primary forces that ultimately determine healthful choices and life habits" (Rickard et al., 1995).

Lastly, technology presents wider avenues in the 21st century to promote nutrition and physical activity education among children (DiSogra & Glanz, 2000). One article presents how an internet-based nutrition program, the 5 A Day Virtual Classroom, encouraged children to be advocates for policies that promote eating more fruits and vegetables (DiSogra & Glanz, 2000). The program asked the children if they were the president, how would they get kids across America to eat 5 A Day? (DiSogra & Glanz, 2000). The article further describes an innovative, internet-based nutrition program to stimulate children to suggest ways to encourage children to eat more fruits and vegetables (DiSogra & Glanz, 2000). DiSogra & Glanz believe that to be effective, nutrition promotion strategies must be creative, engaging, inexpensive, and widely disseminated (2000).

Specific Education Programs on Nutrition and Physical Activity

One research study presents information about a cholesterol screening and nutrition counseling program for children defined at risk for high cholesterol levels (Fitch et al., 1997). This study took place in a large pediatric practice in Ohio with children over the age of 2 years (Fitch et al., 1997). Children who had cholesterol values between

185 and 200 mg/dL were advised to follow the American Heart Association's Step-One diet and to have their total cholesterol concentration measured 6 months later (Fitch et al., 1997). The pediatricians and nurse practitioners provided the nutrition counseling and advice during a 15-20 minute health assessment (Fitch et al., 1997). Children who had cholesterol levels above 200 mg/dL were provided with the counseling as the first group listed, and in addition were advised to have a fasting lipoprotein profile (Fitch et al., 1997). If their LDL-cholesterol was 130 mg/dL or greater they were then referred to a nutritionist for more specific dietary information, and family members were advised to be screened for hyperlipidemia (Fitch et al., 1997). The results from the study showed that a clinically significant reduction of mean cholesterol concentration in groups of otherwise unidentified hypercholesterolemic children can be expected as a result of cholesterol screening and appropriate nutritional counseling in a pediatric setting (Fitch et al., 1997).

A second study involved a 2-year partnership between schools and the community and was designed to promote healthy behaviors in food choices and physical activity (Harris et al., 1997). The partnerships were alliances that all shared the responsibilities, resources, and rewards for the common effort (Harris et al., 1997). The study was the Kansas LEAN School Intervention Project (Harris et al., 1997). The Kansas LEAN model consisted of forming partnerships to make changes in schools and the broader community, and there were three school-based components: modifying school lunches, enhancing nutrition education, and increasing opportunities for physical activity (Harris et al., 1997). On-site coordinators (registered dietitians) were hired to facilitate intervention activities (Harris et al., 1997). The coordinators initiated the community

partnerships by recruiting parents, teachers, business leaders, and other community members (Harris et al., 1997). The results suggest that both the school and community partnerships contributed to improve diet and physical activity among children and adults (Harris et al., 1997).

Another study involved a school based community intervention program on nutrition knowledge and food choices in elementary school children in the rural Arkansas Delta (Dollahite et al., 1998). The purpose of this study was to provide nutrition education to school children, grades K-5 and their parents in a low-income rural community via the school, the Supplemental Nutrition Program for Women, Infants, and Children, the Food Stamp program, and the Expanded Food and Nutrition Education Program (Dollahite et al., 1998). A community consortium was developed to guide project interventions, which included a school-based nutrition curriculum, revised lunch menus with nutrition messages in the cafeteria, parent attendance at lunch, as well as development and dissemination of nutrition messages to parents, and community activities (Dollahite et al., 1998).

The outcome results were compared in a pre-/post intervention design with results from students and parents in a neighboring community (Dollahite et al., 1998). One outcome of the intervention included behavioral intention to be positively related with improved food choices and is thought to be predicative of behavioral change, although it may or may not translate into actual change in children (Dollahite et al., 1998). Increased knowledge is often considered to be the first step in impacting health behavior (Dollahite et al., 1998). The result of the study is that "classroom-based nutrition education for elementary school children, supported by other changes in the school

environment, can result in knowledge gain and in improvements in reported behavioral intentions and behavior" (Dollahite et al., 1998).

A fourth study is called the Cookshop Program, and it evaluated the link between nutrition education with lunchroom food experiences with classroom cooking experiences (Liquori et al., 1998). This study was designed to increase preferences for and consumption of minimally processed whole grains and vegetables through cooking these foods in the classroom along with multiple exposures to the same foods in the cafeteria and parent involvement (Liquori et al., 1998). It emphasized how eating a plant-based diet was not only important for personal health but was also resource conserving or more ecologically sustainable (Liquori et al., 1998). The study used a quasi-experimental, pre/post intervention-comparison group design (Liquori et al., 1998). The results of the study suggested that actual cooking experiences and eating food with peers, accompanied by cognitive learning, may provide a promising approach to nutrition education, especially for younger children (Liquori et al., 1998).

Lastly, a study was conducted to evaluate the short and long term benefits of a school and home based physical activity "enrichment" program for children at higher risk of cardiovascular disease (Burke et al., 1998). The study took place during two 10-week school terms with 800 11 year-olds (Burke et al., 1998). The study included standard physical activity and a nutrition program in six schools (Burke et al., 1998). The results showed that fitness improved significantly in program schools, particularly with enrichment in higher risk boys, and that substantial improvements persisted 6 months later in girls (Burke et al., 1998). The conclusion is that two-semester health programs with physical activity enrichment for higher risk children can produce benefits sustained

for at least 6 months, and that improvements extend to lower risk children exposed indirectly to the enrichment (Burke et al., 1998).

Education Specific to Childhood Obesity

Only one research article was found concerning education for children with obesity. The research was a pathways program, which was a school-based program for a primary prevention of obesity in American Indian children (Caballero et al., 1998). It included 40 schools in seven different American Indian communities (Caballero et al., 1998). The program consisted of a 3-year feasibility phase, and this article included the first phase that was completed (Caballero et al., 1998). The major components of the intervention included school food service, classroom curriculum, physical education program, and family involvement (Caballero et al., 1998). The aim of the Pathways intervention was to reduce average percent of body fat in intervention-school children by at least 3% compared with control-school children by the end of the 3-year intervention (Cabarello et al., 1998). The goals were to be achieved by increase in physical activity and a reduction in dietary fat intake, not in dietary energy intake (Cabarello et al., 1998).

Summary

In summary, childhood obesity is becoming more prevalent. Children are eating more foods high in fat and sugar, and they are eating fewer servings of fruits and vegetables. Children are participating less in physical activities and in exchange are increasing their involvement in sedentary activities. Childhood obesity may be the cause of many health-related diseases later in adulthood, such as cardiovascular diseases,

diabetes, hypertension, cancers, respiratory disorders, and orthopedic problems. As a result, researchers are trying to find the most efficient ways to decrease obesity in children, and help prevent other children from developing obesity. By finding more efficient solutions to the childhood obesity problem, many of the adulthood health problems may be decreased, which will also reduce medical expenditures. A few studies have been conducted to evaluate different nutrition and/or physical activity education programs, and only one study was found on nutrition and physical activity education for obese children. More research is needed to determine the best approach to increase children's knowledge of nutrition and physical activity, and to increase healthy behaviors.

CHAPTER III

RESEARCH PROCEDURE

Introduction

This chapter describes the development of the Super Nutrition Activity Program (SNAP), SNAP Check questionnaire, subject recruitment, experimental study, and statistical analysis.

Obesity is on the rise among children in the United States. In fact the percentage of US children that are overweight has risen to 13% among children ages 6-11 years according to the 1999 NHANES results, which is up from 11% from 1988-1994 NHANES results (CDC, 2001). Obesity is now one of the most serious health problems facing America's youth (Hill & Trowbridge, 1998). Obesity is a major component in the development of other diseases and health problems, such as heart disease, diabetes, cancers, respiratory disorders, and orthopedic problems (Schwenk, 1997). The economic costs of obesity were estimated to be $69 billion in 1990 (approximately 8% of total health care costs), and it is estimated that these costs will increase as children grow into adulthood (Hill & Trowbridge, 1998). Nutrition and physical activity play an important role in the prevention of obesity. Educating children on proper nutrition and physical activity may help decrease the incidence of diseases secondary to obesity, and in turn reduce health care spending. Consequently, the Super Nutrition Activity Program was

designed to increase children's knowledge and application of proper nutrition and physical activity.

The purpose of this study was to determine the impact of the Oklahoma Cooperative Extension Services' (OCES) "Super Nutrition Activity Program" (SNAP) on school-age children, grades 3-5. This study evaluated the impact of the SNAP program on children's nutrition and physical activity behaviors. The objectives of the study included:

1. To determine the effect of the "Super Nutrition Activity Program" (SNAP) on a SNAP Check score in school-age children, grades 3-5.
2. To determine the effect of the SNAP program on consuming foods from the Food Guide Pyramid food groups in school-age children, grades 3-5.
3. To determine the effect of the SNAP program on nutrient dense snacks chosen from the Food Guide Pyramid food groups by school-age children, grades 3-5.
4. To determine the effect of the SNAP program on participation in physical activities in school-age children, grades 3-5.

This study was approved by the Institutional Review Board (IRB) for human subjects research at Oklahoma State University (Appendix A).

Development of the Super Nutrition Activity Program

The Super Nutrition Activity Program (SNAP) was developed by the Oklahoma Cooperative Extension Service (OCES) to increase knowledge and application of proper nutrition, food safety, and physical activity behaviors among school-age children.

Printing costs were provided by a grant from the Oklahoma Beef Industry Council. Metropolitan Life Foundation also provided a brochure for each participant, entitled, "Healthful Eating: A Family Affair." The SNAP curriculum was designed to be a flexible program that could be used in a variety of settings, such as schools, after school programs, daycare settings, church groups, 4-H clubs, Girl/Boy Scouts of America, summer programs and camps. The SNAP curriculum contained 13 sessions on nutrition, food safety, and physical activity. The 13 sessions included:

1. The Grain Game: This session focused on grain foods from the Food Guide Pyramid bread, cereal, rice and pasta food group. This session discussed the importance of grain foods in the diet; nutrients provided by grain foods; recommended number of servings from this food group; and what constitutes a serving. This session also discussed dietary fiber; why dietary fiber is important; and how to increase the fiber content of foods from the bread, cereal, rice and pasta food group.

2. Fruit & Veggie Sense-ations: This session focused on the Food Guide Pyramid fruit and vegetable food groups. This session discussed the importance of fruits and vegetables in the diet; nutrients provided by fruits and vegetables; recommended number of servings from these food groups; and what constitutes a serving. This session also discussed the importance of consuming a variety of fruits and vegetables; and the different forms that fruits and vegetables can be found, such as fresh, frozen, and canned.

3. Meat What You Eat: This session focused on the Food Guide Pyramid meat, poultry, fish, dry beans, eggs, and nuts food group. This session discussed the importance of protein foods in the diet; nutrients provided by foods in this food group; recommended number of servings from this food group; and what constitutes a serving.

This session also discussed how to make healthy choices by making lower fat choices from this food group and using lower fat preparation methods.

4. Moo-ve to Dairy Foods: This session focused on the Food Guide Pyramid milk, yogurt and cheese food group. This session discussed the importance of dairy foods in the diet; nutrients provided by foods in this food group; recommended number of servings from this food group; and what constitutes a serving. This session also discussed how to make healthy choices by making lower fat choices from this food group.

5. Sugar, Fat and All That: This session focused on fats, oils, and sweets found in the tip of the Food Guide Pyramid. This session discussed that foods in the tip of the Food Guide Pyramid provide little nutrition for the calories that they provide, and that they should be used sparingly. This session also discussed that some foods in the Food Guide Pyramid food groups also contain fat and sugar, but these foods also provide nutrients, and to make healthy choices by choosing foods in the Food Guide Pyramid food groups that are lower in added fat and sugar.

6. Super Good For You Snacks: This session focused on making healthy snack selections from the Food Guide Pyramid food groups. This session discussed that healthy snacks can be a part of a balanced diet; that snacks can be a "pick-me-up" during the day by providing energy and needed nutrients, which is especially important for children.

7. Super Start: Breakfast: This session focused on the importance of breakfast and making healthy breakfast choices from the Food Guide Pyramid food groups. This session discussed that breakfast means to "break the fast" and provides nutrients to start

the day; that having breakfast can help children have more energy and to do better in school; and that breakfast can be made of many different foods and ideas.

8. Is the Ground Brown? This session focused on ground beef food safety. This session discussed food borne illnesses common to ground beef; basic food safety guidelines; the proper way to defrost ground beef; and cooking ground beef to an internal temperature of 160° F.

9. Supermarket Sleuth: This session focused on learning how to read and use the Nutrition Facts panel on foods. This session discussed what the Nutrient Facts panel is; what information is on the Nutrition Facts panel; and how to compare foods using the Nutrition Facts panel to make healthy food choices.

10. Pyramid Place Restaurant: This session focused on eating healthy when eating out. This session discussed that foods eaten out at restaurants can be a part of a healthy diet. This session also discussed the importance of including foods from a variety of Food Guide Pyramid food groups when eating out; and making selections that are lower fat and sodium, and higher in fiber when eating out.

11. Manners Make You Super: This session focused on the importance of table manners. This session discussed why table manners are important, and some examples of good table manners.

12. Super Fit Me: This session focused on the importance of physical activity. This session discussed how physical activity affects health; the importance of being physically active daily; and having a positive attitude towards physical activity. This session also discussed that physical activities need to be fun, and encouraged participation in lifelong physical activities.

13. Water for Life: This session focused on the importance of water. This session discussed that water is essential to life; why the body needs water; how water is lost throughout the day; how temperature affects water loss; that thirst is not a good indicator of water need; and how much water is needed every day. This session also discussed how physical activities can increase water loss and how to replace water lost through physical activities.

Each session contained a "super message," background information, "SNAPpy Points" or key points, opening the session, discussion points, activities appropriate for both younger and older children, and a parents/caregiver take home page to help reinforce the session. In addition, each child received a SNAP sticker for each session they completed, which they could put on a "SNAP To Good Health" passport card.

Development of the Super Nutrition Activity Program Evaluation

The impact of the SNAP program on children's nutrition, food safety, and physical activity behaviors was evaluated using a SNAP Check questionnaire. The SNAP Check questionnaire consisted of 11 questions. Ten questions used a Likert scale format ranging from "no"=1 to "sometimes"=2 to "yes"=3. Children were asked to mark the statement that best represented their behavior. One question asked children "what did you have for a snack yesterday?" A registered, licensed dietitian evaluated the snacks. A point was given for each nutrient dense food from the Food Guide Pyramid food groups. The SNAP score was the total score from all the questions. Validity of the SNAP Check questionnaire was evaluated by 12 Oklahoma County Extension Educators. Reliability of the SNAP Check questionnaire was evaluated by 32 school-age children,

grades 3-5. Internal reliability of the SNAP Check questionnaire was Cronbach's alpha = 0.74, the reliability coefficient for the test-retest reliability was r = 0.94.

Program Implementation and Evaluation

The SNAP program was implemented with children, grades 3-5, in nine Oklahoma counties. Oklahoma County Extension Educators who implemented the program attended an in-service training on conducting and evaluating the SNAP program. Oklahoma County Extension Educators were also provided with brochures and flyers to market the SNAP program within their respective county. One hundred and seventy-six children, grades 3-5, completed the SNAP program; 75 were boys and 101 were girls.

A pre-test, post-test design was used to evaluate the SNAP program. Children, grades 3-5, completed the SNAP Check questionnaire prior to receiving any education using the SNAP curriculum. After completing the SNAP program the children retook the same SNAP Check questionnaire.

Statistical Analysis

Data were analyzed using the Statistical Analysis System (SAS) for windows (SAS Inst. Inc., Cary NC, 1999) version 8.0. Mean pre and post values for the total SNAP Check score and for each question on the SNAP Check questionnaire were compared for the total sample and by gender, using the SAS General Linear Modules and least squared means procedures. Significance level was set at $p \leq 0.05$.

CHAPTER IV

RESULTS AND DISCUSSION

Introduction

The purpose of this study was to evaluate the effects of an Oklahoma Cooperative Extension Service nutrition education program, Super Nutrition Activity Program (SNAP), on school-age children, grades 3-5. This study evaluated whether or not the program improved children's nutrition and physical activity behaviors. The objectives of the study were:

1. To determine the effect of the "Super Nutrition Activity Program" (SNAP) on a SNAP Check score in school-age children, grades 3-5.
2. To determine the effect of the SNAP program on consuming foods from the Food Guide Pyramid food groups in school-age children, grades 3-5.
3. To determine the effect of the SNAP program on nutrient dense snacks chosen from the Food Guide Pyramid food groups by school-age children, grades 3-5.
4. To determine the effect of the SNAP program on participation in physical activities in school-age children, grades 3-5.

Description of Subjects

The subjects in this study were school-age children, grades 3-5. A total of 176 children from 9 Oklahoma counties completed the SNAP program and SNAP Check pre and post questionnaire. Of the 176 children who participated in the SNAP program, 75 were boys and 101 were girls.

Effects of the SNAP Program on the Total Sample

The effects of the SNAP program on nutrition, food safety and physical activity behaviors in children grades 3-5, are presented in Table 1.

TABLE 1. Effect of the Super Nutrition Activity Program On Nutrition, Food Safety, and Physical Activity Behaviors in Children, grades 3-5.*

	Beginning n =176	Ending n = 176
1. I eat something before school starts.	2.51±0.05	2.60±0.05
2. I wash my hands before I eat.	2.52±0.05	2.63±0.04
3. I eat bread or grain foods every day.	2.40±0.05	2.60±0.04#
4. I drink milk every day.	2.42±0.05	2.58±0.05#
5. I eat fruits every day.	2.19±0.05	2.42±0.04#
6. I eat vegetables every day.	2.28±0.05	2.37±0.05
7. When I am thirsty, I drink water.	2.33±0.05	2.47±0.04#
8. Nutrition food labels help me pick foods to eat.	1.94±0.06	2.17±0.06#
9. I check to see my hamburger is brown all the way through before I eat it.	2.06±0.07	2.41±0.06#
10. Every day I do some exercise like running, biking, swimming, playing a sport or other physical activity.	2.78±0.04	2.81±0.03
11. Write the foods you ate for a snack yesterday.	0.87±0.07	1.07±0.06#
Total SNAP Score	24.30±0.31	26.30±0.30#

*Mean ± SE. #Beginning and ending scores significantly different, $p \leq 0.05$.

After completing the SNAP program, the total SNAP Check questionnaire score significantly increased for the total sample. The total SNAP score for the total sample improved by 66%. Several individual questions on the SNAP Check questionnaire also significantly increased for the total sample. Question 3, "I eat bread or grain foods every day" increased significantly, and improved by 23%. Question 4, "I drink milk every day" significantly increased, and improved by 26%. Question 5 "I eat fruits every day" significantly increased, and improved by 31%. Question 7, "When I am thirsty, I drink water" significantly increased, and improved by 20%. Question 8, "Nutrition food labels help me to pick foods to eat" significantly increased, and improved by 30%. Question 9, "I check to see my hamburger is brown all the way through before I eat it" significantly increased, and improved by 34%. Question 11, "Write the foods you ate for a snack yesterday" significantly increased, and improved by 32%.

No significant change was observed in Question 10 following the SNAP program. This led the researcher to believe that the children perceive they were already doing some form of physical activity every day. This leads to further questions concerning what specific types of physical activity are they doing; how long are they performing these activities; to what intensity are they conducting these activities; etc. The results of Question 10 contradict current research, which concludes that US children are not doing enough activity (and in some cases no activity) to be healthy (Hill & Trowbridge, 1998). In fact, Hill & Trowbridge state that the current generation of U.S. children are the most sedentary in our nation's history (1998). Hill & Trowbridge also conclude that children are spending increasing amounts of time in sedentary activities such as television watching, video games, and computer games (1998). Bar-Or, et. al. continues by stating

that less than 50% of children engage in routine physical activity (1998). Bar-Or, et. al. further proclaims that the U.S. Surgeon General states "the prevalence of vigorous physical activity among young people falls short of the Healthy People 2000 goal of 75%." The results from Question 10 strongly confirm that more research is needed to determine what children perceive to be physical activity, and how to improve children's level of physical activity.

Effects of the SNAP Program by Gender

The effects of the SNAP program on nutrition, food safety, and physical activity behaviors in children, grades 3-5, by gender are presented in Table 2. After completing the SNAP program, the total SNAP Check questionnaire score significantly increased for both males and females. The males' total SNAP Check score improved by 62%. Whereas the females' total SNAP Check score improved by 68%. Initially, the females' mean total SNAP Check score was higher than the males'. As with the total sample, neither the males, nor the females had a significant increase in Question 10, concerning physical activity.

Males' only had one question that significantly increased, which was Question 9 "I check to see my hamburger is brown all the way through before I eat it," which improved 34%. On the other hand, females' had several questions that significantly increased. Question 1, "I eat something before school starts" significantly increased, and improved 24%. Question 3, "I eat bread or grain foods every day," significantly increased, and improved 32%. Question 5, "I eat fruits every day," significantly increased, and improved 33%. Question 7, "When I am thirsty, I drink water,"

significantly increased, and improved by 23%. Question 8, "Nutrition food labels help me pick foods to eat," significantly increased, and improved by 27%. Question 9, "I check to see my hamburger is brown all the way through before I eat it," significantly increased, and improved by 35%.

TABLE 2. Effect of the Super Nutrition Activity Program On Nutrition, Food Safety, and Physical Activity Behaviors in Children, grades 3-5, by Gender.*

	Males n = 75		Females n = 101	
	Beginning	Ending	Beginning	Ending
1. I eat something before school starts.	2.44±0.08	2.44±0.08	2.55±0.07	2.72±0.05#
2. I wash my hands before I eat.	2.47±0.08	2.57±0.06	2.55±0.06	2.67±0.05
3. I eat bread or grain foods every day.	2.36±0.08	2.49±0.07	2.43±0.06	2.68±0.05#
4. I drink milk every day.	2.36±0.08	2.53±0.08	2.47±0.07	2.62±0.06
5. I eat fruits every day.	2.19±0.08	2.30±0.07	2.20±0.06	2.50±0.05#
6. I eat vegetables every day.	2.16±0.08	2.16±0.07	2.37±0.07	2.52±0.06
7. When I am thirsty, I drink water.	2.27±0.08	2.36±0.07	2.37±0.06	2.55±0.05#
8. Nutrition food labels help me pick foods to eat.	1.81±0.09	1.96±0.10	2.03±0.09	2.33±0.08#
9. I check to see my hamburger is brown all the way through before I eat it.	1.85±0.10	2.27±0.09#	2.22±0.08	2.51±0.07#
10. Every day I do some exercise like running, biking, swimming, playing a sport or other physical activity.	2.81±0.05	2.79±0.05	2.75±0.05	2.82±0.04
11. Write the foods you ate for a snack yesterday.	0.80±0.10	0.99±0.10	0.92±0.09	1.14±0.09
Total SNAP Score	23.44±0.46	24.98±0.48#	24.92±0.42	27.17±0.36#

*Mean ± SE. #Beginning and ending scores significantly different, $p \leq 0.05$.

One explanation for why the females' total SNAP score and individual question scores improved more than the males' scores could be that females are already aware of food and weight issues, even within grade-school ages 3-5. According to Birch & Fisher, "by middle childhood, even before the fat deposition that occurs in girls at puberty, gender differences in weight concerns and dieting prevalence apparent in adulthood already are emerging" (1998). Birch & Fisher continue by stating that "by the age 7, children identify overweight silhouette drawings as being less attractive, having fewer friends, and being less smart than counterparts" (1998). "Even before puberty, girls report a heightened sense of body dissatisfaction and a desire to be thinner, with dieting behaviors reported among children as young as 9 years of age" (Birch & Fisher, 1998).

Another possible explanation for why the females' total SNAP score and individual question scores increased more than the males' scores could be that children often will imitate behaviors that they have observed. This is called "modeling" according to Birch & Fisher (1998). Modeling plays an important role in establishing preferences within children (Birch & Fisher, 1998). Hypothetically, a female child may have observed a dieting behavior in a female "model," such as a mother, sister, neighbor, television actress, etc. The female child may have adopted the dieting pattern after that model. According to Birch & Fisher, "models can have powerful effects on food selection, especially when the model is similar to the observer or is seen as particularly powerful, as in the case of older peers" (1998).

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Findings

The purpose of this study was to determine the impact of the Oklahoma Cooperative Extension Service's (OCES) "Super Nutrition Activity Program" (SNAP) on school-age children, grades 3-5. This study evaluated whether or not the program improved children's nutrition and physical activity behaviors.

The objectives of this study included:

1. To determine the effect of the "Super Nutrition Activity Program" (SNAP) on a SNAP Check score in school-age children, grades 3-5.
2. To determine the effect of the SNAP program on consuming foods from the Food Guide Pyramid food groups in school-age children, grades 3-5.
3. To determine the effect of the SNAP program on nutrient dense snacks chosen from the Food Guide Pyramid food groups by school-age children, grades 3-5.
4. To determine the effect of the SNAP program on participation in physical activities in school-age children, grades 3-5.

Null Hypothesis One stated: There will be no significant difference on a SNAP Check score in school-age children, grades 3-5, after participating in the SNAP Program. After completing the SNAP program, children's SNAP Check score significantly increased for both the total sample and for both genders as reported in Table 1 and Table 2. Therefore, the researcher rejected Null Hypothesis One.

Null Hypothesis Two stated: There will be no significant difference in consuming foods from the Food Guide Pyramid food groups in school-age children, grades 3-5, after participating in the SNAP program. After completing the SNAP program a significant difference in foods consumed from the Food Guide Pyramid food groups was observed for the total sample and for females as reported in Table 1 and Table 2. Therefore, the researcher rejected Null Hypothesis Two.

Null Hypothesis Three stated: There will be no significant difference in nutrient dense snacks chosen from the Food Guide Pyramid food groups by school-age children, grades 3-5, after participating in the SNAP program. After completing the SNAP program there was a significant difference in snacks chosen from the Food Guide Pyramid food groups rather than from sweets and other non-nutrient dense foods for the total group as reported in Table 1. Consequently, the researcher rejected Null Hypothesis Three.

Null Hypothesis Four stated: There will be no significant difference in the amount of participation in physical activities in school-age children, grades 3-5, after participating in the SNAP program. After completing the SNAP program there was no significant difference in reported participation in physical activities for the total sample

and for each gender as reported in Table 1 and Table 2. Thus, the researcher failed to reject Null Hypothesis Four.

The results observed in this study show that the SNAP program was effective in improving school-age children, grades 3-5, total SNAP scores, foods consumed from the Food Guide Pyramid food groups, food safety behaviors, and snacks chosen from the Food Guide Pyramid food groups.

Conclusions

In conclusion, obesity in U.S. children is on the rise. Some researchers believe that it is at epidemic proportions. Health care spending is also on the rise, and will continue to rise as the secondary disease states of obesity increase. It is imperative to improve children's nutrition and physical activity behaviors in an effort to slow the rate of childhood obesity. Hopefully, slowing the rate of childhood obesity will also decrease obesity induced complications, which in turn will reduce health care spending and improve the state of well-being of U.S. children.

With the increasing number of U.S. children that are obese, this study suggests that it is possible to impact some health behaviors in school-age children, grades 3-5. However, not all of the health behaviors highlighted in this study were improved, mainly physical activity. From the results of this study, it appears that the children perceive that they are already participating in physical activity. These results directly contradict research on childhood physical activity. As Hill & Trowbridge state this is the most sedentary generation of children in U.S. history (1998). The Surgeon General also

proclaims that this generation of children did not meet the Healthy People 2000 goals for physical activity (Bar-Or et al., 1998).

Furthermore, when the results are analyzed by gender, females had higher initial SNAP Check scores than the males, and they had more significant increases in individual SNAP Check questions than the males. From the results and from other research, it is apparent that females already have a heightened awareness about nutrition topics as they relate to weight and physical appearance, even at early ages (Birch & Fisher, 1998). This may be an area of concern when trying to convey health messages to help avoid the obesity epidemic. Special precautions may need to be outlined to help prevent the development of eating disorders in the attempt to improve children's health behaviors.

Recommendations

Since this study only analyzed data gathered from pre and post-test scores, it is difficult to determine if the changes that occurred will continue into adulthood as daily habits. Long-term studies are needed to determine if nutrition, food safety, and physical activity programs impact children on a long-term basis in addition to impacting children's behaviors during a short-term program.

Additional research is also needed on evaluating what children perceive as physical activity, at what intensity level children are participating in physical activity, and how long children are engaging in physical activity.

Evaluation on food safety behaviors among children needs further research. Although evaluating food safety behaviors was not an objective of this study, there was a significant increase in the children's SNAP scores for questions concerning food safety behaviors. Possibly children are not being taught about food safety behaviors, and that may have lead to the improvement seen in the SNAP scores. Food safety behaviors should be researched further to identify children's knowledge level and application of food safety.

Lastly, the difference in the results between the genders should also be considered for future research. It is possible that the females may be more "politically correct" in answering the questions about nutrition and physical activity than the males. The females may be more concerned with "pleasing the teacher" by marking the answer that they think the teacher wants to see rather than which answer best describes their actual behavior.

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APPENDIXES

APPENDIX A

THE OKLAHOMA STATE UNIVERSITY'S INSTITUTIONAL REVIEW BOARD APPROVAL FORM FOR HUMAN SUBJECTS

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 10-01-98 **IRB #: HE-99-023**

Proposal Title: EVALUATION OF AN OKLAHOMA COOPERATIVE EXTENSION YOUTH NUTRITION AND ACTIVITY EDUCATION PROGRAM ENTITLED "SUPER NUTRITION ACTIVITY PROGRAM" (SNAP)

Principal Investigator(s): Janice R. Herman

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Signature: Carol A. Olson Date: October 2, 1998

Director of University Research Compliance

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modification to the research project approved by the IRB must be submitted for approval. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

APPENDIX B

SUPER NUTRITION ACTIVITY PROGRM

QUESTIONNAIRE

SNAP Check

Super **N**utrition **A**ctivity **P**rogram

Name:_____

cut here

Check One: _____ Beginning Program _____Ending Program

Write the grade you are in:_____ Check if you are a : _____Boy _____Girl

Fill in circle with your answer.

1.	I eat something before school starts.	Yes	Sometimes	No
2.	I wash my hands before I eat.	Yes	Sometimes	No
3.	I eat bread or grain foods every day.	Yes	Sometimes	No
4.	I drink milk every day.	Yes	Sometimes	No
5.	I eat fruits every day.	Yes	Sometimes	No
6.	I eat vegetables every day.	Yes	Sometimes	No
7.	When I am thirsty, I drink water.	Yes	Sometimes	No
8.	Nutrition food labels help me pick foods to eat.	Yes	Sometimes	No
9.	I check to see my hamburger is brown all the way through before I eat it.	Yes	Sometimes	No
10.	Every day I do some exercise like running, biking, swimming, playing a sport or other physical activity.	Yes	Sometimes	No

11. Write the foods you ate for a snack yesterday. _____

_____

VITA

Melissa Marie Hooper

Candidate for the Degree of

Master of Science

Thesis: EFFECTS OF AN EDUCATION PROGRAM ON NUTRITION AND PHYSICAL ACTIVITY BEHAVIORS IN SCHOOL-AGE CHILDREN, GRADES 3-5

Major Field: Nutritional Sciences

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Professional Experience: Clinical Dietitian (December 2000-present) & Outpatient/Wellness Dietitian (February 1998-December 2000) for St. John Medical Center, Tulsa, Oklahoma; Consultant Dietitian for Keith and Associates (October 1997 to February 1998); completed Dietetic Internship at Integris-Baptist Medical Center, Oklahoma City, Oklahoma in May 1997; obtained R.D. status in November 1997.

Professional Organizations: American Dietetic Association; Oklahoma Dietetic Association; Tulsa District Dietetic Association; Sports, Cardiovascular, and Wellness Nutritionists; Nutrition Education for the Public.